Seagreen Offshore Wind Farm

Client Representative Report

Post-construction Over Trawl Survey - Inter Array Cable Protection

Brown & May Marine Ltd.

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Post-construction Over Trawl Survey - Inter Array Cable Protection

Undertaken by

Brown & May Marine Limited

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Abbreviations

Abbreviation	Description
AIS	Automatic Identification System
BMM	Brown & May Marine
GPS	Global Positioning System
m	Metre
SFF	Scottish Fishermen's Federation

1.0 Introduction

This document presents the findings of the Post-construction Over Trawl Survey undertaken by Seagreen Wind Energy within the Seagreen Offshore Wind Farm array site between 7th May – 13th May 2024 following the installation of rock protection on the inter array cables. Brown & May Marine (BMM) personnel were on board as the client representative for the works.

1.1 Background

Following extensive consultation with the Scottish Fishermen's Federation (SFF), the over trawl survey aimed to replicate typical fishing operation practices using a local fishing vessel with crew experienced in squid trawling. Areas considered to be important to local fishers where rock protection had been used were targeted by the survey following feedback from SFF and SFF Services.

2.0 Methodology

2.1 Survey Vessel and Gear

The vessel "Westro PD20", a 21.5 metre (m) local fishing vessel based at Peterhead was used for the survey (Figure 2-1). The specifications of the survey vessel are provided in Table 2-1.

Figure 2-1 Survey vessel 'Westro PD20'

Table 2-1: Survey vessel specifications

Westro PD20 Specifications	
Type of vessel	Squid trawler
Overall length	21.5 m
Draft	4.40 m
Engine	Caterpillar 3412 540kw
Speed	Steaming 8-9 knots

The survey was conducted using a standard squid trawl with 14" rockhoppers on the ground line to assist the net in passing over boulders or areas of uneven seabed (Figure 2-2). Also fitted to the trawl was a standard "flip up rope" positioned at the front (mouth) of the net to prevent any boulders from entering the net and damaging the trawl bag.

Figure 2-2: Trawl net

2.2 Survey Area

The proposed over trawl locations where rock protection was required for inter array cables within the Seagreen Offshore Wind Farm array site are shown in Figure 2-3.

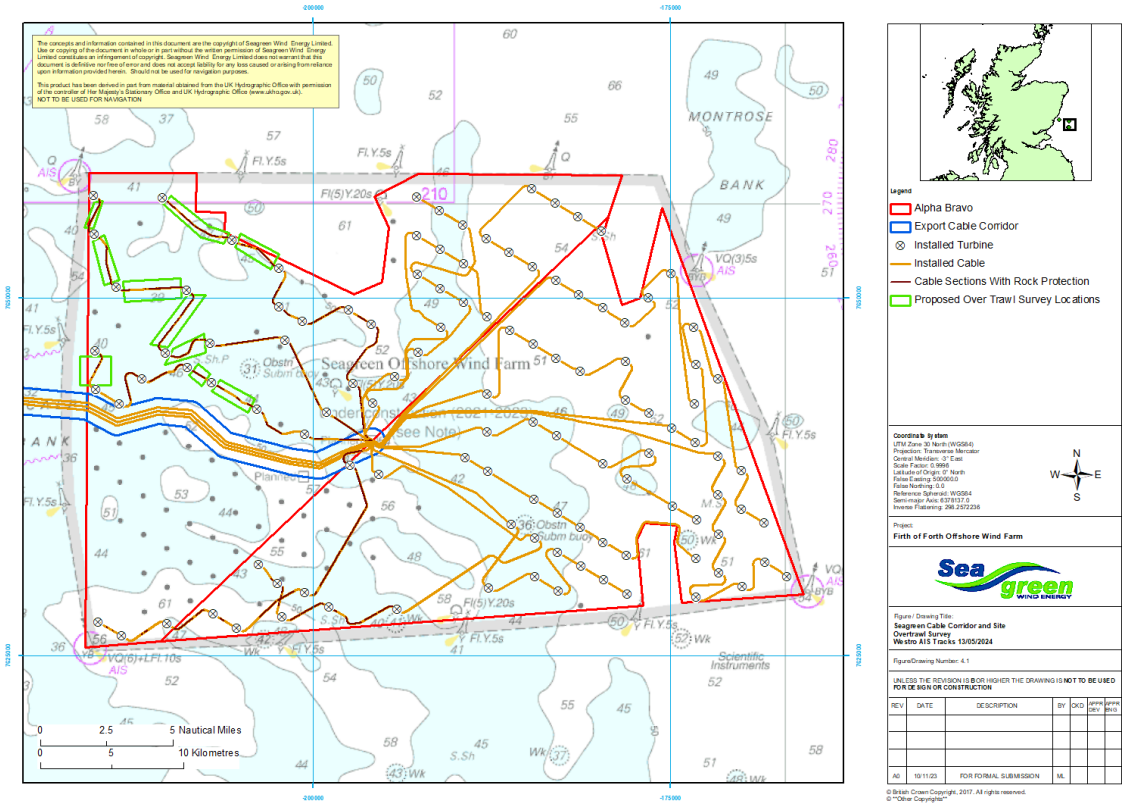

Figure 2-3: Over trawl survey locations within Seagreen Offshore Wind Farm

2.3 Positioning and Navigation

Over trawl operations were only conducted during daylight hours. The position of the survey vessel was tracked at all times on board using the vessel's two KODEN Differential Global Positioning System (GPS), inputting into the vessel's electronic plotting systems. The vessel also transmitted Automatic Identification System (AIS) at all times. Vessel tracks were downloaded daily and charted.

2.4 Data Recording Procedures

The following data recording procedures were adhered to throughout the over trawl survey:

1. All data (including as laid cable route and survey area) was uploaded onto the vessel's plotters
2. The vessel had AIS operational to allow for the recording of the vessel's tracks.
3. Vessel tracks were also recorded on the vessel's plotter system and independent GPS. These tracks were downloaded onto a USB by BMM upon completion of the survey.
4. Survey progress was recorded via detailed commentary/event log including:
    a. Coordinates of where the vessel and fishing gear crossed the cable or rock protection locations
    b. Direction of tow
    c. Direction and strength of tide
    d. Time and duration of fishing gear contact with seabed
    e. Photos of any gear damage
5. Any positions where a snag occurred was marked and recorded. The three indicators of a possible snagging of the trawl gear are:
    a. An increase in towing tension
    b. A reduction in the vessel speed
    c. Damage to trawl gear

3.0 Over Trawl Operations

The over trawl survey was carried out between 7th May – 13th May 2024 and 139 crossings of the inter-array cables with rock protection were undertaken (Figure 3-1). Photographs of the net being hauled aboard and the catches are shown in Appendix A. An overview of the daily trawling operations is provided below in section 3.1. For a more detailed account of daily operations, please refer to Appendix B.

The following transects were not completed as another additional day would have been required; K04-L06 (one crossing), K04-L02 (three crossings), L02-M01 (12 crossings), N06-N08 (11 crossings). It was agreed by all parties that these were not required given there had been minimal speed reductions recorded during the previous 139 crossings.

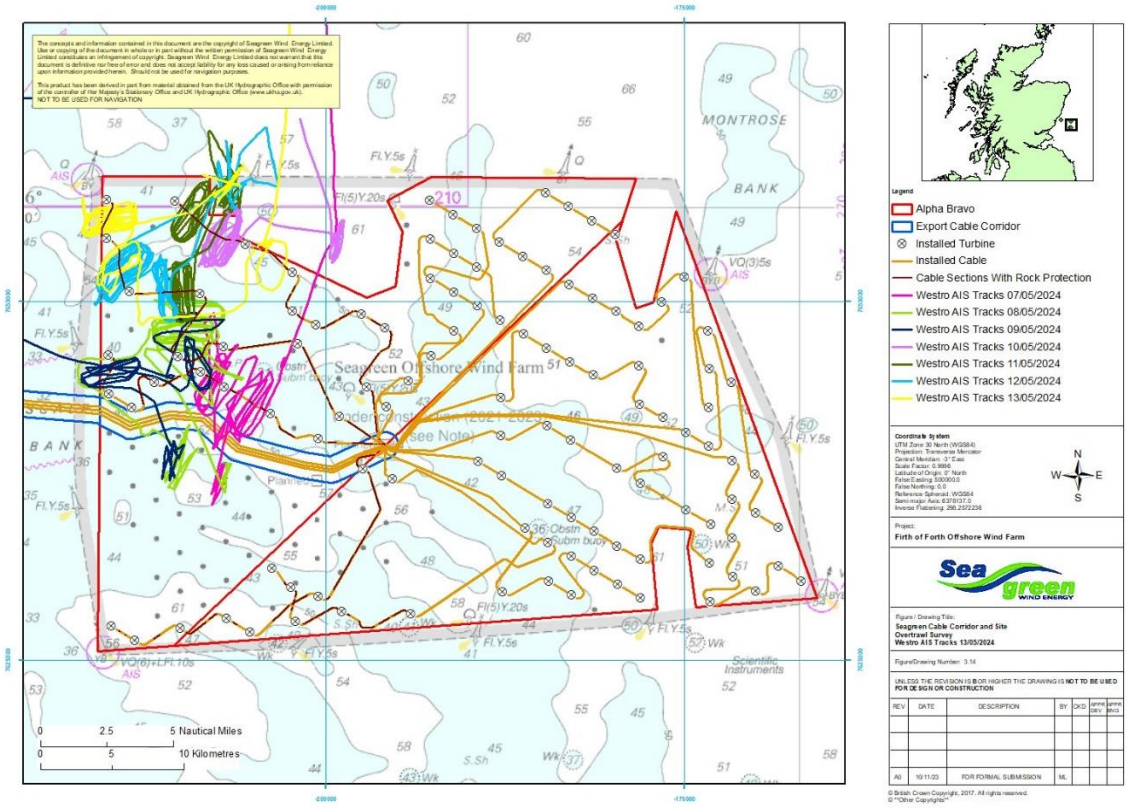

Figure 3-1: Westro tracks 7th May – 13th May 2024

3.1 Daily Summaries

3.1.1 Tuesday 7th May 2024

The following work was completed (Figure 3-2):

- Area J09-J11 - 10 successful crossings
- Area J08-J09 - seven successful crossings
- Area J07-K08 - two successful completed crossings

No snagging events or gear damage observed.

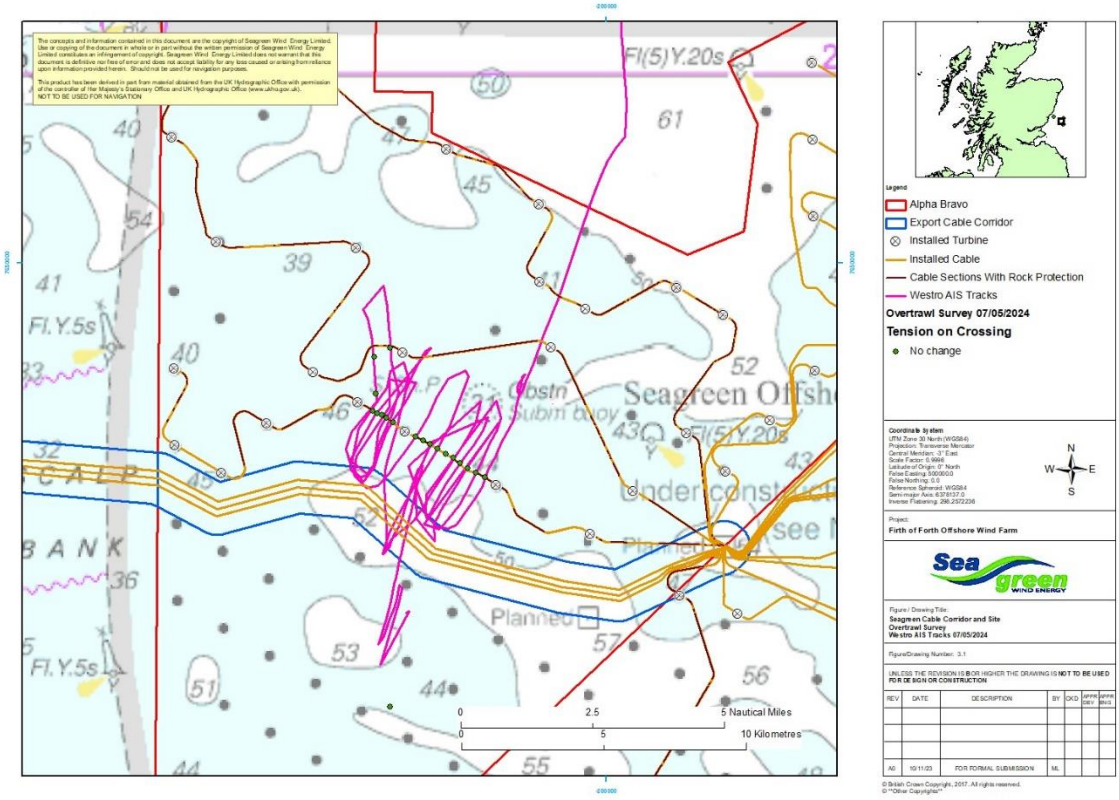

Figure 3-2: Westro over trawl tracks 7th May 2024

3.1.2 Wednesday 8th May 2024

The following work was completed (Figure 3-3):

- Area L06-J07 - 17 successful crossings
- Area J07-K08 - five successful crossings

At 10:00, the over trawl gear was recovered, and two damaged floats were reported on the headline of the net. Following discussion with the skipper, damage was thought to have occurred during gear recovery and not during the over trawl works. Floats were replaced and gear was redeployed at 10:10 in area J07-K08. No further snagging events or gear damage were recorded.

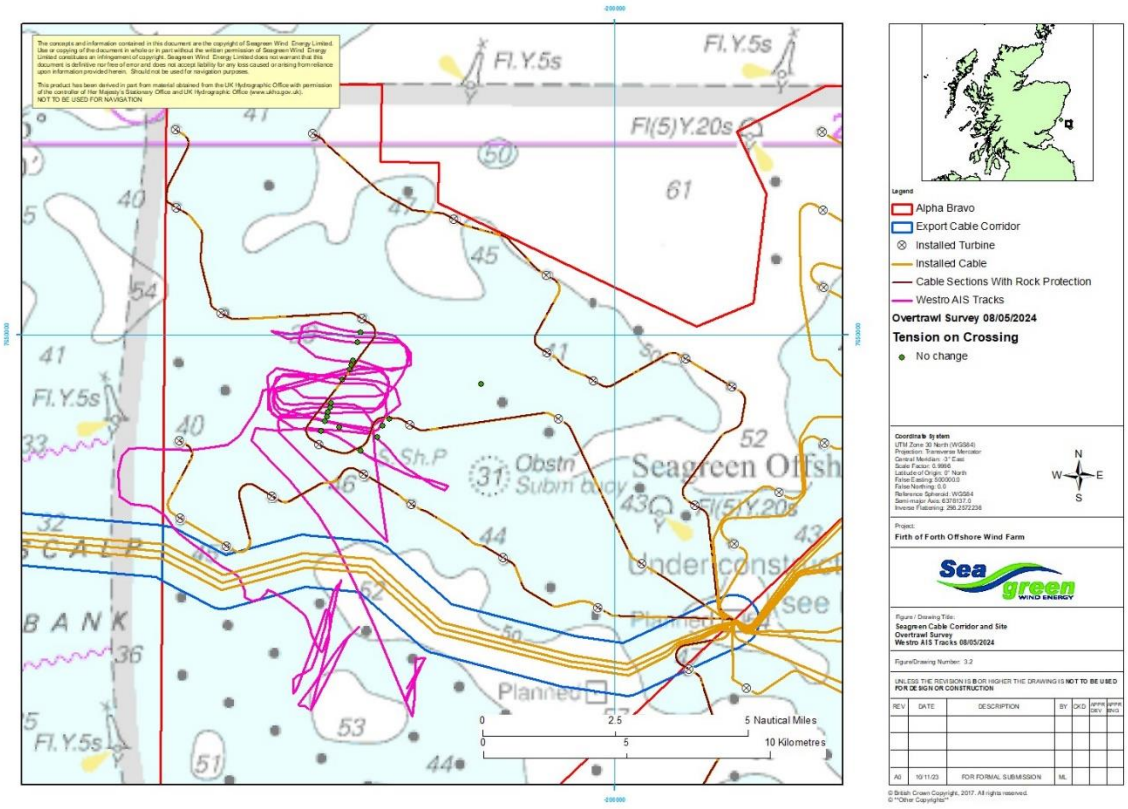

Figure 3-3: Westro over trawl tracks 8th May 2024

3.1.3 Thursday 9th May 2024

The following work was completed (Figure 3-4):

- Area G06-H05 - seven successful crossings
- Area J07-L06 - six successful crossings
- Area J07-K08 - seven successful crossings

No snagging events or gear damage observed.

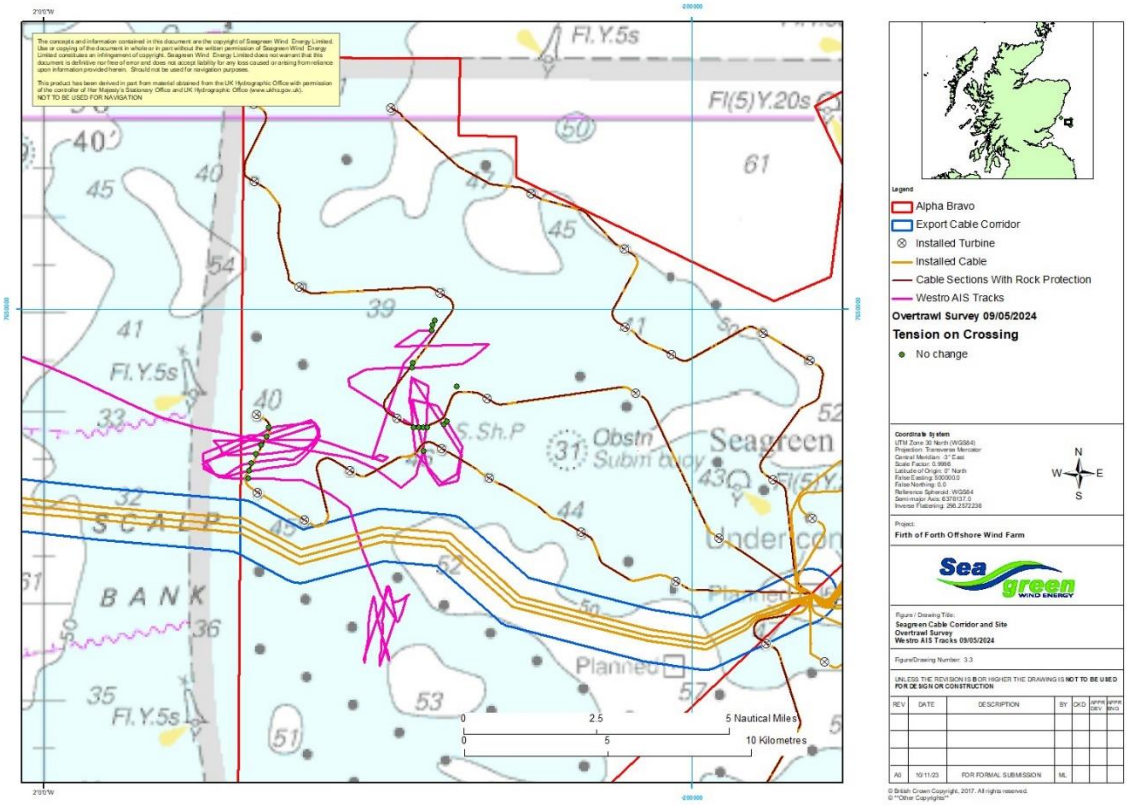

Figure 3-4: Westro over trawl tracks 9th May 2024

3.1.4 Friday 10th May 2024

The following work was completed (Figure 3-5):

- Area N06-N03 - 20 successful crossings

At 11:10, a slight reduction in speed was reported along with a slight increase in tension on the trawl gear. The gear was recovered for an inspection at 11:35, but no damage was observed. No further snagging events or gear damage was observed.

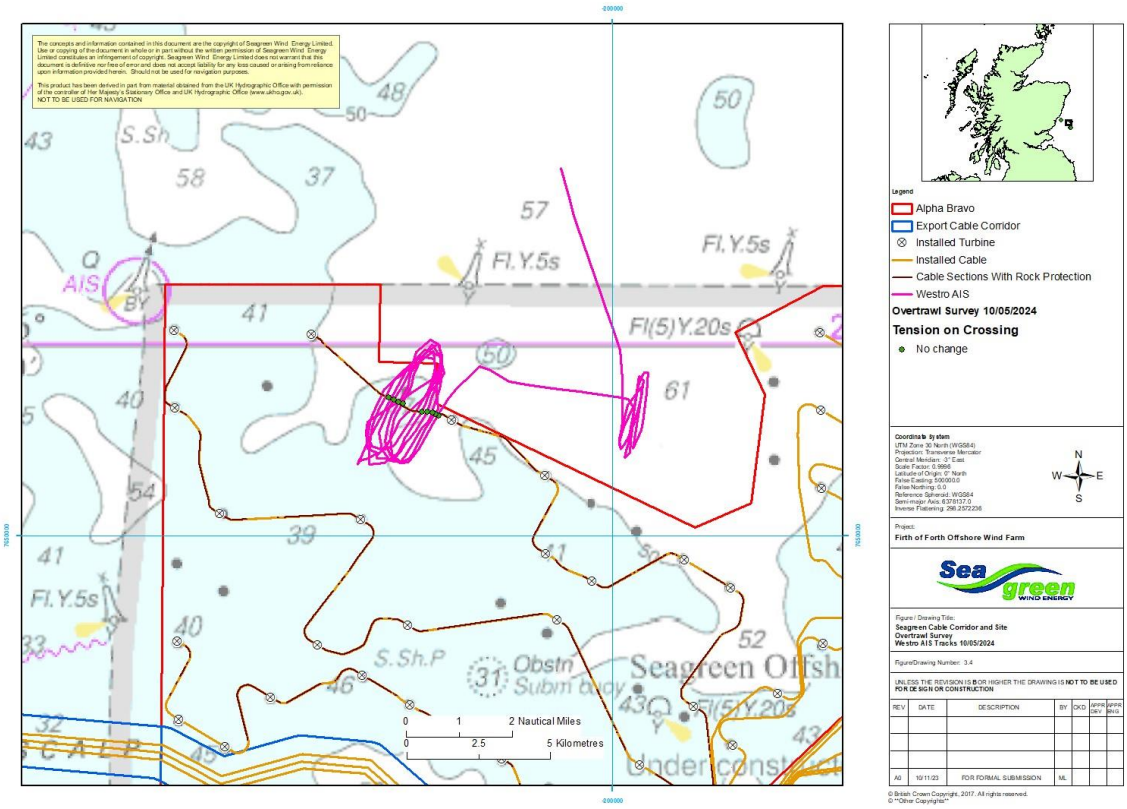

Figure 3-5:Westro over trawl tracks 10th May 2024

3.1.5 Saturday 11th May 2024

The following work was completed (Figure 3-6):

- Area N06-N03 - 10 successful crossings
- Area L06-K04 - 10 successful crossings
- Area N06-N03 -10 successful crossings
- Area L06-K04 - 10 successful crossings

At 07:40, 200m beyond the second crossing of area N06-N03, a significant reduction in speed occurred. Speed reduced down from 2.5 kts to 0.1 kts along with a significant increase in tension and reduced trawl door spread. Gear was recovered for damage inspection, but no damage was observed. No further snagging events or gear damage observed.

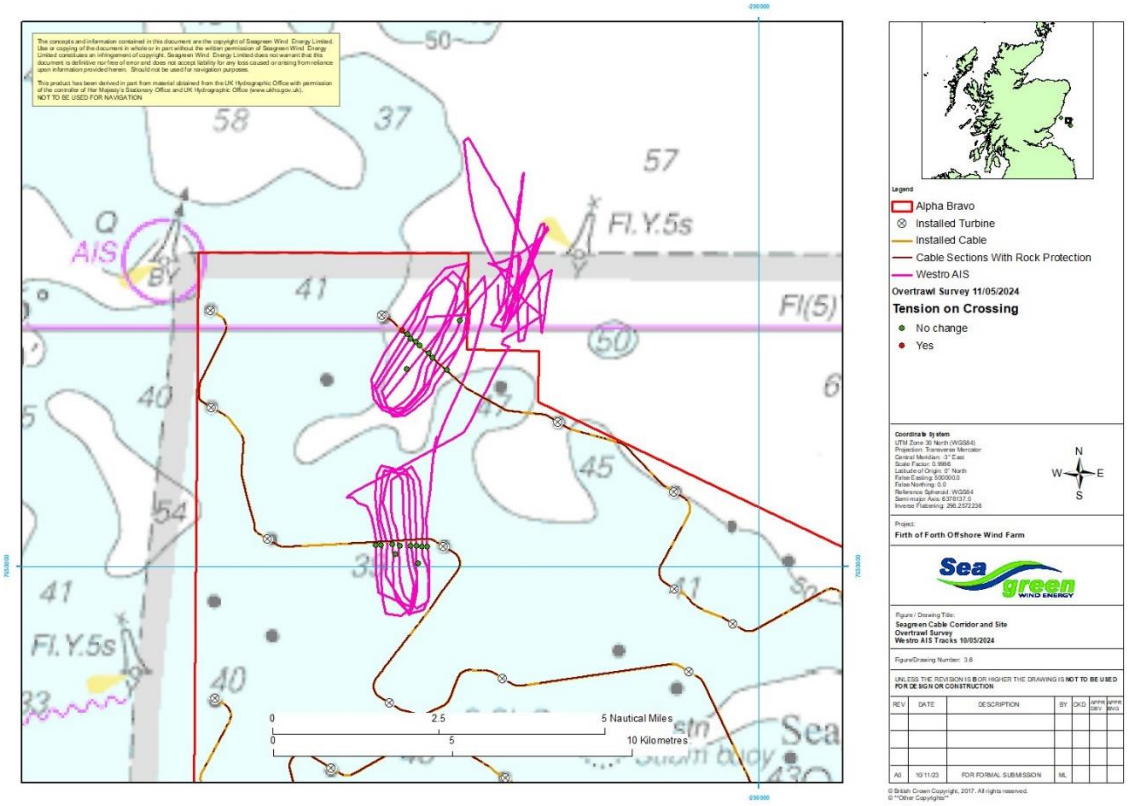

Figure 3-6: Westro over trawl tracks 11th May 2024

3.1.6 Sunday 12th May 2024

The following work was completed (Figure 3-7):

- Area L06-K04 - six successful crossings
- Area K04-L02 - 12 successful crossings

No snagging events or gear damage observed.

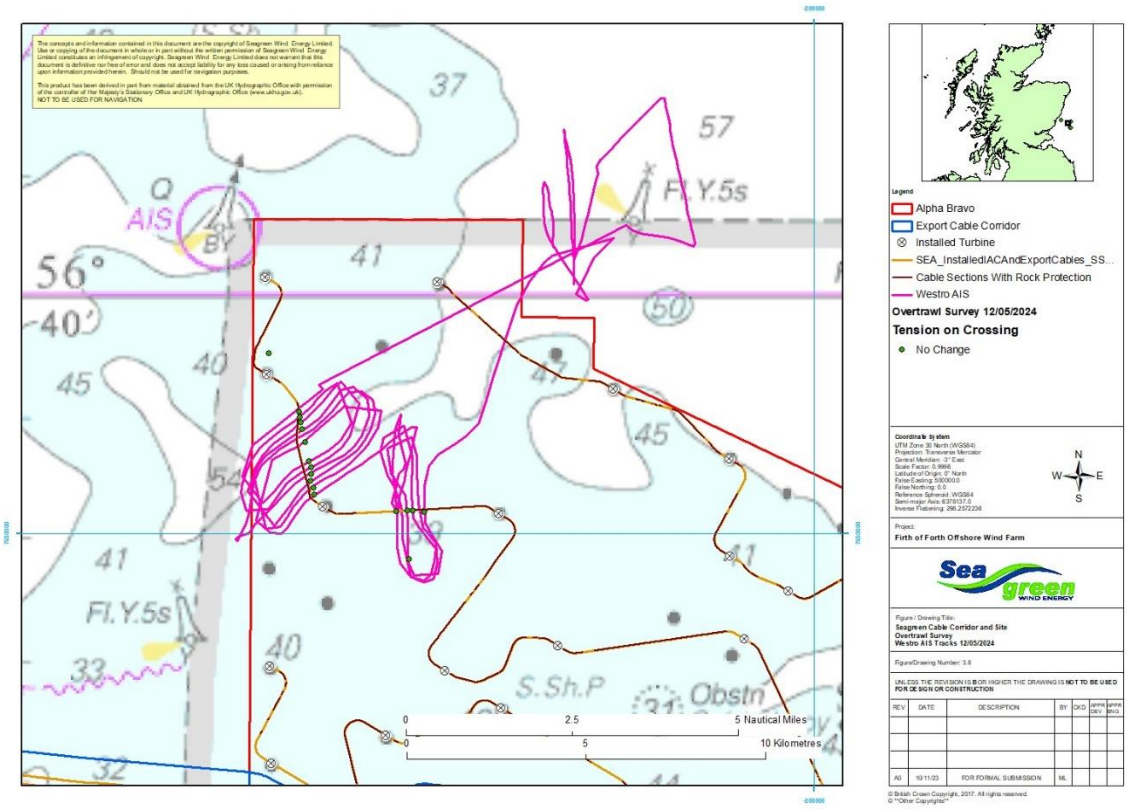

Figure 3-7: Westro over trawl tracks 12th May 2024

3.1.7 Monday 13th May 2024

The following work was completed (Figure 3-8):

- Area K04-L06 - one successful crossing
- Area N06-N08 – three successful crossings

At 08:15, 900m beyond the third crossing point, the trawl gear snagged on the seabed. The over trawl gear was recovered, and it was found that a towing extension section and a towing shackle was broken (Figure 3-9 and Figure 3-10). The fishing gear was able to be repaired and was redeployed at 09:00.

At 09:06, after crossing the cable, there was a brief change in engine noise due to increased load on the trawl gear. This additional load caused the towing bridle (dyneema rope) to part (Figure 3-11). A brief reduction in speed was observed and recorded, however, the skipper of the vessel deemed it acceptable given the seabed conditions in the area and decided not to recover the gear for inspection as it was most likely the trawl door as opposed to the trawl net that caused the reduction in speed.

After area L02-M01, the skipper continued to trawl 800m away from the cable crossing, however, it was noted that the trawl door spread had not recovered to the pre-crossing distance. The trawl gear was recovered for inspection, however, no damage was observed, and the trawl gear was redeployed at 09:55.

Following redeployment of gear after an inspection at 16:24, the over trawl gear came fast on the seabed 270m north of the fourth cable crossing at N06-N08 when turning to undertake the next transect. The trawl gear was recovered for inspection at 18:15, however, no damage was observed, and the trawl gear was stowed for transit back to port.

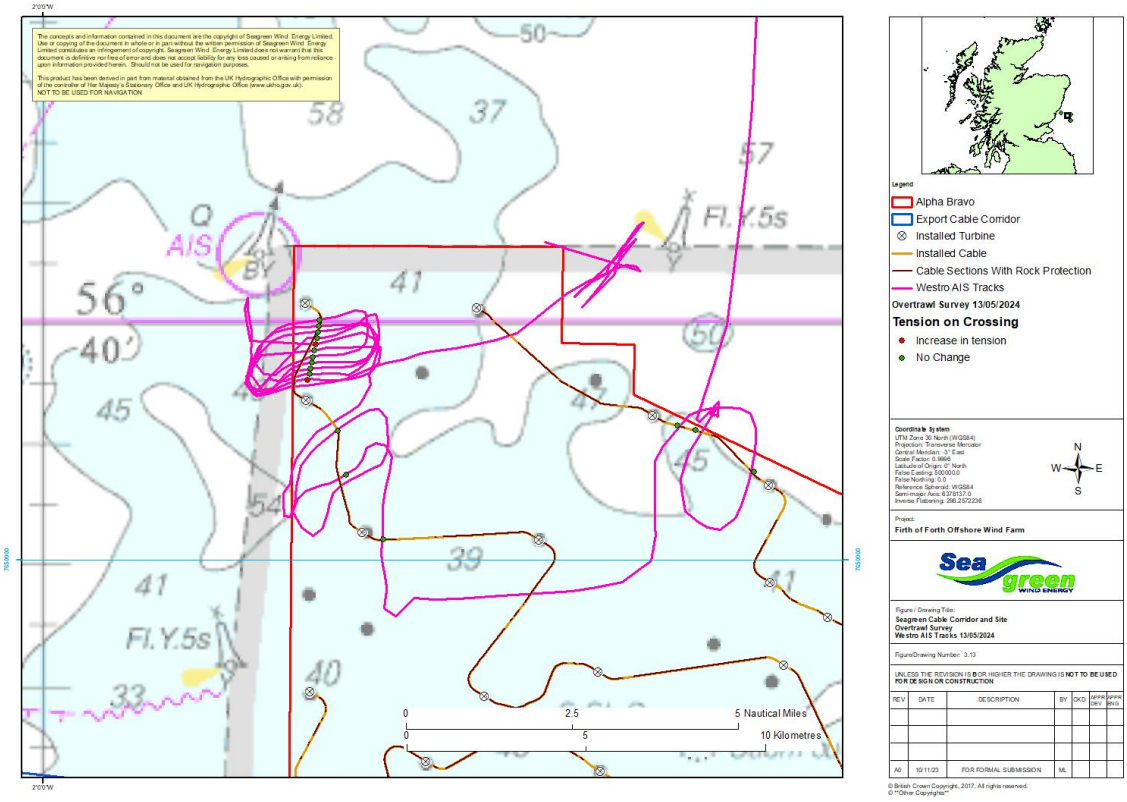

Figure 3-8: Westro over trawl tracks 13th May 2024

Figure 3-9: Broken towing extension piece

Figure 3-10: Broken towing shackle

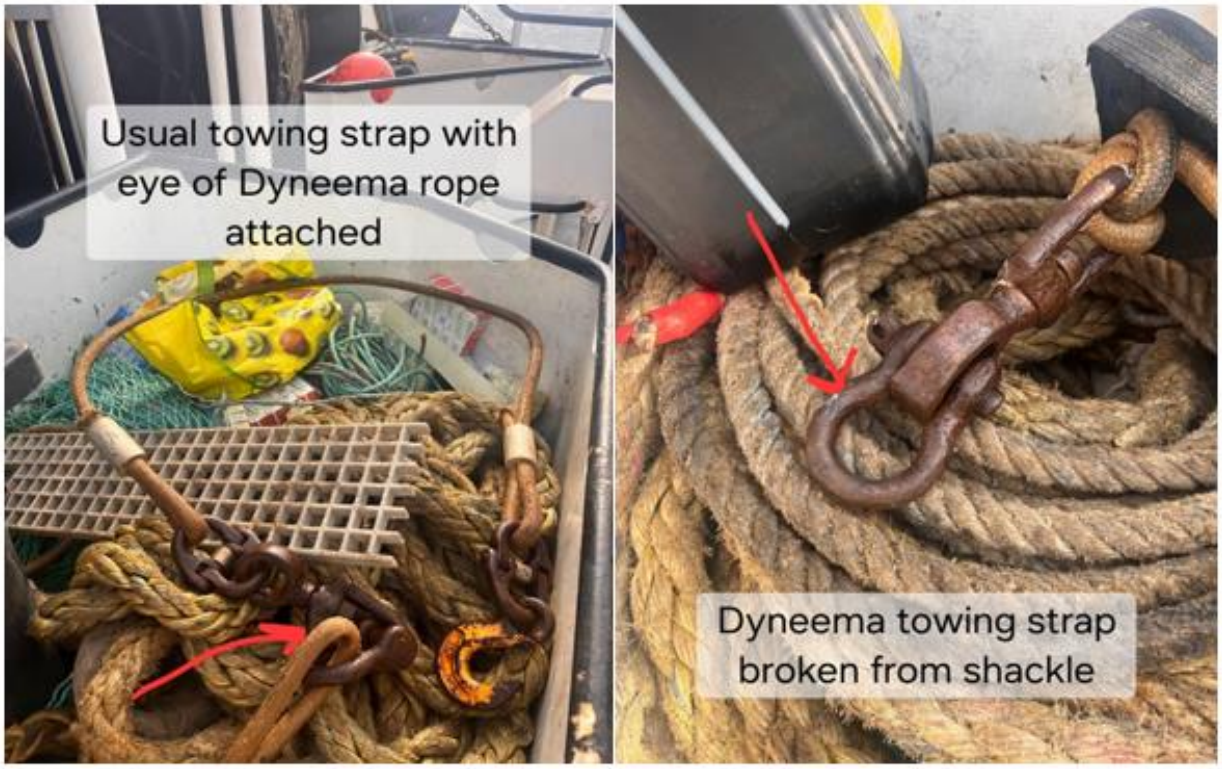

Figure 3-11: Dyneema rope

3.2 Snag Events

Further information on the snag events that occurred during the over trawl survey are detailed below. Based on the shared fishing experience of the BMM team and the skipper of FV Westro, however, it was agreed that during the over trawl survey no snagging instances occurred directly over the Seagreen Offshore Wind Farm inter-array cables.

3.2.1 Snag 1

During trawl operations on 13th May 2024 at 08:15, during the third cable crossing of the day, the fishing gear snagged on seabed at a position 900m beyond the crossing point at area L02-M01 (56° 39'.709N, 001° 56'.860W). The fishing gear was recovered to find a broken towing extension piece along with a broken towing shackle (Figure 3-9 and Figure 3-10 respectively). The fishing gear was able to be quickly repaired by the crew, and the vessel continued with the remaining crossings in the area.

3.2.2 Snag 2

During trawl operations on 13th May 2024, following the first snag, the fishing gear was then re-deployed at 09:00. At 09:06 when making the fourth cable crossing of the day, the fishing gear caught briefly on the seabed when crossing over the berm (56° 39.836 N, 001° 55.897W) resulting in a broken dyneema rope towing bridle (Figure 3-11). The snag was only momentary, and the gear came free from the seabed without any intervention and the vessel continued towing. The incident was deemed as acceptable by the vessel skipper given the seabed conditions in and around the crossing location.

4.0 Summary

Over the course of the over trawl survey, a total of 139 crossings of rock protected cables were surveyed. Two snagging occurrences were observed resulting in minor damage to the trawl gear, however, these snags occurred when the fishing gear was not in the proximity of the rock protection. The over trawl survey results therefore indicate that the rock protection over the inter array cables is within specification and that during this survey, mobile fishing gear has been able to successfully pass over the rock protection without an interaction.

It is, however, recommended that the relevant fishing channels, such as fishing industry representatives (FIR's) and the SFF, are provided with the coordinates of the unrelated snagging incidents which occurred during the survey so they can be avoided by other fishers in the area.

Appendix A

Photographs of the trawl net being hauled and an example catch are given below.

A 1: Cod-end being hoisted aboard vessel to empty catch

A 2: Catch emptied inside vessel hopper

Appendix B

A summary of daily events is provided below.

Monday 6th May 2024
Vessel mobilsation; vessel induction, HSE briefing.
21:30 Vessel departed Peterhead port and transited to Seagreen array.
Tuesday 7th May 2024
06:30 TBT on bridge with skipper, BMM surveyors and mate.
07:00 Fishing gear deployed and commenced running lines .
09:30 Over trawl gear recovered for inspection, No damage observed.
09:45 Over trawl gear re-deployed and continued running lines.
12:45 Over trawl gear recovered for inspection. No damage observed.
14:00 Over trawl gear re-deployed and continued running lines.
15:55 Over trawl gear recovered for inspection. No damage observed.
16:11 Over trawl gear re-deployed and continued running lines.
18:15 Over trawl gear recovered for inspection. No damage observed. Gear stowed.
18:30 Survey finished for the day.
Wednesday 8th May 2024
06:30 TBT on bridge with skipper, BMM surveyors and mate.
07:00 Over trawl gear deployed and commenced running lines.
10:00 Over trawl gear recovered for inspection. 2 damaged floats were reported on the headline of the net.
10:10 Floats replaced. Fishing gear re-deployed and continued running lines .
12:50 Over trawl gear recovered for inspection. No damage observed.
14:00 Over trawl gear re-deployed and continued running lines.
16:30 Over trawl gear recovered for inspection. No damage observed.
16:44 Over trawl gear re-deployed and continued running lines.
17:44 Over trawl gear recovered for inspection. No damage observed.
18:00 Gear stowed.
18:15 Scouting of turning areas for static gear for survey scope for following day.
19:00 Survey finished for the day.
Thursday 9th May 2024
05:30 TBT on bridge with skipper, BMM surveyors and mate.
06:00 Over trawl gear deployed and commenced running lines.
09:30 Over trawl gear recovered for inspection. No damage observed.
10:15 Over trawl gear re-deployed and continued running lines.
12:45 Over trawl gear recovered for inspection. No damage observed.
13:10 Over trawl gear re-deployed and continued running lines.
16:00 Over trawl gear recovered for inspection. No damage observed.
16:15 Scouting of turning areas for static gear for survey scope for following day. Survey finished for the day. Transit to Montrose
18:45 Moored at Montrose Harbour.
20:45 Departed Montrose Harbour to head to site and lie until first light.
Friday 10th May 2024
06:35 TBT on bridge with skipper, BMM surveyors and mate.
06:45 Over trawl gear deployed and commenced running lines.
10:10 Over trawl gear recovered for inspection. No damage observed.
10:45 Over trawl gear re-deployed and continued running lines.
11:10 Slight reduction in speed and slight increase in tension on over trawl gear.
11:35 Over trawl gear recovered for inspection. No damage observed.

12:00 Over trawl gear re-deployed and continued running lines.
14:45 Over trawl gear recovered for inspection. No damage observed.
15:15 Over trawl gear re-deployed and continued running lines.
17:48 Over trawl gear recovered for inspection. No damage observed. Gear stowed. Survey finished for the day.
Saturday 11th May 2024
06:00 TBT on bridge with skipper, BMM surveyors and mate.
06:45 Fishing gear deployed and commenced running lines.
07:40 Reduction in speed observed along with increase in tension and reduced trawl door spread, 200 m beyond 2nd cable crossing. Over trawl gear recovered for inspection with no damage.
08:00 Over trawl gear re-deployed and continued running lines.
12:15 Over trawl gear recovered for inspection. No damage observed.
13:00 Over trawl gear re-deployed and continued running lines.
15:10 Over trawl gear recovered for inspection. No damage observed.
15:20 Over trawl gear re-deployed and continued running lines.
18:00 Over trawl gear recovered for inspection. No damage observed. Gear stowed. Survey finished for the day.
Sunday 12th May 2024
06:35 TBT on bridge with skipper, BMM surveyors and mate.
06:45 Fishing gear deployed and commenced running lines.
07:43 Thick fog rolling in. Visibility less than 100 m.
09:55 Fishing gear recovered for inspection. No damage observed. Survey halted due to thick fog and reduced visibility.
11:15 Fishing gear re-deployed and continued running lines.
15:10 Fishing gear recovered for inspection. No damage observed.
15:30 Fishing gear re-deployed and continued running lines.
18:15 Fishing gear recovered for inspection. No damage observed. Gear stowed. Survey finished for the day.
Monday 13th May 2024
06:35 TBT on bridge with skipper, BMM surveyors and mate.
06:40 Over trawl gear deployed and commenced running lines.
08:15 Over trawl gear snagged on seabed 900 m beyond cable crossing. Gear recovered for inspection. Broken towing extension piece and broken shackle on back-strop observed. Gear repaired.
09:00 Over trawl gear re-deployed and continued running lines.
09:06 Over trawl gear stuck briefly on seabed when crossing over berm, resulting in broken towing bridle. Snag came free from seabed and vessel continued towing.
09:40 After cable crossing skipper decided to recover gear for inspection due to trawl-door spread reduction. No damage observed.
09:55 Over trawl gear re-deployed and continued running lines.
12:55 Over trawl gear recovered for inspection. No damage observed.
13:50 Over trawl gear re-deployed and continued running lines.
15:40 Over trawl gear recovered for inspection. No damage observed.
16:24 Over trawl gear re-deployed and continued running lines.
17:57 Over trawl gear came fast on seabed 270 m north of cable crossing, when turning to make
18:15 Over trawl gear recovered for inspection. No damage observed. Gear stowed. Survey complete. Vessel transit back to port. Vessel demobilised.