GWYNT Y MÔR
OFTO

Gwynt y Môr OFTO plc

Income Adjusting Event Claim for the [REDACTED] Repair associated with repairing cable failure to SSEC3 that occurred on 15 October 2020

Executive Summary

This document sets out the basis for an IAE claim by the Licensee for the repair costs associated with a power core failure in one of the Licensee's offshore cables that occurred on 15 October 2020. The Licensee has established that the cable failure was caused by a fault originating in one of the fibre optic cables (there are two) contained within the offshore power cable and, although this may be a latent defect, the IAE claim should nevertheless be approved on the grounds of uninsurability.

Faults developed in the fibre optic cables some months before the power core failure, albeit the power core failure was in a different place to any of the earlier fibre optic faults. The power core failure occurred despite the Licensee taking a wide range of precautionary measures before and after the fibre optic cable failures started.

It is now clear that any of the fibre optic faults could cause power core faults and the offshore cable containing them should be removed. However, they are spread over a significant cable length that is more than the Licensee could reasonably be expected to hold in its strategic spares or procure with a short delivery time. [REDACTED] this IAE claim reflects the costs associated with the [REDACTED] repair to remove the cable containing the power core fault. [REDACTED].

This document provides evidence to explain:

- Why the event was beyond the Licensee's control.
- Why the Licensee's claim for uninsurability is legitimate.
- How the [REDACTED] Repair activity was procured and delivered as efficiently as possible.

[REDACTED] the Licensee has taken the precautionary step of limiting the export capacity of the cable in liaison with the wind farm operator. This action was recommended to mitigate the risk of one of the remaining fibre optic cable faults progressing to another power core fault before sufficient new cable can be delivered. The Licensee has ordered new cable and it is due to arrive in the UK in November 2021. [REDACTED]. The Licensee would be happy to meet with Peter Bingham and the Authority's technical team to present the technical evidence in more detail.

[REDACTED] the Licensee has provided a detailed claim document to help the Authority to agree this event qualifies as an IAE claim and confirms that it will continue to examine this incident and seek to mitigate potential impacts on future windfarm operation and cost exposure to consumers.

[REDACTED]

A1. Summary

A1.1 Under Amended Standard Condition E12-J3 of the Gwynt y Môr OFTO plc (the "Licensee") offshore transmission licence, the Licensee is requesting the Authority to determine an Income Adjusting Event pursuant to a major fault on the subsea cable of Export Circuit 3 ("SSEC3") on 15 October 2020 (the "Cable Failure") and notified to the Authority on the same day.

A1.2 The Licensee has repaired the power core fault and returned SSEC3 to service on 7 March 2021 [REDACTED], this claim relates to the repair costs associated with this repair.

A1.3 This claim is to notify the Authority that the Licensee has now established that, in respect of relevant year 7 ending on 31 March 2021, it has incurred costs above the STC threshold amount of £1,000,000 due to this [REDACTED] Repair.

A1.4 The Licensee holds an offshore electricity transmission licence, granted on 11-Feb-15 under section 6(1)(b) of the Electricity Act 1989 (the "Licence"). The Licensee hereby gives Notice to the Authority, pursuant to paragraph 14 of the Condition, that it has incurred an increase in costs and/ or expenses that it considers is an Income Adjusting Event ("IAE") on the grounds of uninsurability.

A1.5 Pursuant to paragraph 16 of the Condition, this Notice gives particulars of:

(a) the event to which the Notice relates and why the event constitutes an IAE;

(b) the amount of any change in costs and/or expenses that have been caused by each event and how the amount of these costs and/or expenses has been calculated;

(c) the amount of any allowed revenue adjustment proposed as a consequence of each event and how this allowed revenue adjustment has been calculated; and

(d) any other analysis or information that the Licensee considers sufficient to enable the Authority and the relevant parties to assess fully each event to which the Notice relates.

A2. The Event that occurred and why it is an IAE

A2.1 The Licensee believes this event is an IAE under sub-paragraph 15(c) of the IAE Condition on the grounds of uninsurability after considering:

(a) the four factors that the Authority would consider when exercising its discretion under this limb as set out at paragraph 66 of the Authority's final determination of the IAE claim associated with SSEC2, published on 5 June 2020 (the "SSEC2 Determination")[1];

(i) whether the Licensee knew of the event or circumstance before it arose or ought to have known of it;

(ii) whether the risk of damage of that type was reasonably foreseeable (even if the particular way in which the damage has occurred may not have been);

(iii) whether there are nevertheless exceptional factors in the relevant case that mean that the event or circumstance, or its consequences, should not be treated as being reasonably foreseeable, whether in whole or part; and

(iv) the ability of the Licensee to manage the risk or impact by putting in place and pursuing risk management arrangements such as insurance, commercial recourse against third parties and/or operating practices.

[1] https://www.ofgem.gov.uk/publications-and-updates/determination-relation-notice-second-income-adjusting-event-gwynt-y-m-r-ofto-plc

(b) further detail on the extent of the requirements to satisfy the fourth factor (in paragraph 66 of the SSEC2 Determination) set out in the Licence modifications for all OFTO licences to Amended Standard Condition E12-J3 ('Restriction of Transmission Revenue: Allowed Pass-through Items') (the IAE Condition) as set out in the 28-Nov-18 Decision (the "IAE Decision Document")[2].

A2.2 Based on the four factors of the SSEC2 Determination (and referring to paragraphs in that document where appropriate), the Licensee considers that this event is an IAE because:

(a) At paragraph 69 and 70 of the SSEC2 Determination the Authority accepted that the Licensee could not reasonably have known about the specific fault that arose in relation to the SSEC2 cable failure; the Authority is able to draw the same conclusion for this IAE (first factor) since the cable failures on SSEC2 and SSEC3 have similar causes. The Licensee has set out the various reports commissioned to investigate the causes of the issues with SSEC3 in Section B. The independent technical report into the causes of the Cable Failure (the "RCA Technical Report" provided at Appendix B2), includes the following conclusions:

(i) The results of materials tests did not suggest that there were any inherent deficiencies with the power core insulation material.

(ii) Electrical activity between metallic elements within the spare fibre optic cable (FOC) and the power cores damaged the B and Y power cores and led to insulation breakdown in the B core.

(iii) This electrical activity was initiated by a loss of continuity of the metallic elements within the spare FOC. This loss of continuity was caused by corrosion, which in turn was caused by water ingress though breaches in the waterproof polyethylene sheath of the spare FOC.

(b) At paragraph 71 to 73 of the SSEC2 Determination, the Authority reconfirmed its view that latent defects should be anticipated by the Licensee and are therefore reasonably foreseeable (second factor) and the Licensee anticipates that the Authority will draw the same conclusion in determining this IAE claim. However, where an IAE occurs in the context of asset failures caused by latent defects, in particular in circumstances of 'uninsurability', ASC E12-J3 will provide protection where the relevant IAE definition has been met, including that the OFTO is unable effectively to mitigate the effects of latent defect risk including, through no fault of its own, that risk becoming uninsurable. The Licensee provides information to support this position at Section C;

(c) The Licensee does not consider the third factor has a material bearing on whether this event is an IAE but for completeness, the Licensee does consider there are exceptional factors in this event (third factor) that prevent it from being reasonably foreseeable. In particular, the fact that multiple fibre optic cable (FOC) breaks have occurred over a five km length of SSEC3 over a period of at least 10 months prior to the Cable Failure, which meant that the Licensee was not able to remove all the FOC faults in one repair campaign. The Licensee explains why this has occurred in Section B. [REDACTED]

(d) the Licensee has limited recourse to any risk management arrangements, such as insurance and construction warranties, (fourth factor) because:

(i) All the construction warranties that are relevant to this Cable Failure have expired and the Licensee has no recourse available towards the Developer under the terms of the Sale and Purchase Agreement signed in February 2015.

[2] https://www.ofgem.gov.uk/publications-and-updates/income-adjusting-events-policy-offshore-transmission-owner-licences

(ii) Although the Licensee did manage to secure insurance with a LEG 3 exclusion after the 2015 cable failures, insurers have always insisted on maintaining an exclusion for the 2015 Root Cause Failures. The Licensee provides evidence of the effort it has applied to secure insurance since the 2015 cable failures at Section C and further details at paragraph A4;

(iii) Suffice to say, the Licensee does not have recourse to insurance cover [REDACTED] and therefore there is sufficient information contained in this claim to determine it is an IAE on the grounds of uninsurability under limb (c) of the IAE Condition.

(iv) To satisfy the Licence condition on uninsurability (as per the IAE Decision Document), the Licensee must evidence (amongst other things) that it has conducted an exhaustive search of the Worldwide Offshore Transmission Asset Insurance Market (see Section C) and demonstrate that the Latent Defect existed but was not apparent to an efficient licensee at the time the Offshore Transmission Assets were transferred to it. We consider that the Authority has already determined that the Licensee could not reasonably have known about the specific fault (paragraph 69 and 70 of the SSEC2 Determination).

A2.3 Although the Licensee believes this event is an IAE under sub-paragraph 15(c) of the IAE Condition, it reserves the right to amend this claim to consider an IAE under sub-paragraph 15(a) of the IAE Condition if necessary.

A3. The costs incurred, how they have been calculated and the resulting revenue adjustment

A3.1 The Cable Failure has resulted in extensive repair work to the transmission assets in the financial year 1-Apr-20 to 31-Mar-21 (the "Relevant Financial Year"). [REDACTED]

A3.2 There has been an overall change to the costs and expenses of the Licensee of [REDACTED] as a result of the [REDACTED] Repair. A full breakdown of these costs is evidenced in Section D.

A3.3 Under the terms of IAE Decision Document, the Licensee understands that the Authority can apply a deductible set at the level adopted by the Licensee at tender stage. In this case, the applicable deductible is £3,000,000.00 (the "Deductible").

[REDACTED]

A4. Other commercial recourses available to the OFTO

A4.1 As set out in Section C, the Licensee had:

(a) Insurance cover with a LEG 3 exclusion (except for events with a similar root cause to the 2015 cable failures) up to the day before the Cable Failure occurred;

[REDACTED]

A4.2 The RCA Technical Report included the following conclusions that suggest the cause of the Cable Fault is a new root cause.

(a) The extent of the degradation of the spare FOC sheath, and the extent of corrosion of the aluminium wire armour, suggests that the degradation had occurred over a prolonged period of months (rather than days or weeks), but less than multiple years. During much of this time the fibres would remain intact. It is considered highly unlikely that any path breaching the sheath was present from the time of manufacture.

(b) A large number of localised features were observed on the polyethylene sheath of the spare FOC. Some of these features had breached the thickness of the sheath. The exact mechanism by which these features occurred is the subject of further investigation[3].

[REDACTED]

A5. Any other analysis or information to enable the Authority to assess the IAE

A5.1 The Licensee has prepared a detailed report at Section D setting out the steps that it has taken to ensure that the costs incurred in completing the cable repair are reasonable and have been efficiently incurred. This includes details of the following:

(a) Engagement with key stakeholders;

(b) Activities undertaken prior to the Cable Fault occurring;

(c) Procuring a repair contractor;

(d) Delivering the repair activities; and

(e) Explanation of other material costs included in the out-turn cost of the repair.

A5.2 The Licensee has included the RCA Technical Report for the Cable Failure at Appendix B2.

A5.3 The Licensee has included evidence, at Section D, setting out:

(a) the extent of insurance cover available to the Licensee;

(b) the attempts to improve the insurance cover since 2015;

(c) the current view of the insurance market towards the OFTO sector; and

(d) indicate the extent to which the Licensee's insurance policy will respond to the Cable Failure.

A5.4 The Authority published a report by DNV dated 3 June 2020 (the "DNV Report") that implies the 2015 Root Cause Failure could have been prevented if the windfarm developer had followed Good Industry Practice. The Licensee has procured an independent review to consider if the conclusions made in the DNV Report are reasonable given the Good Industry Practice that was available at the time the cables were being manufactured and installed. This report is provided at Appendix A1.

A5.5 The Licensee has reviewed the requests for additional information issued by Ofgem in connection to the IAE claims for the SSEC1 and SSEC2 cable repairs submitted by the Licensee. These requests and the Licensee's assessment of their relevance to this IAE claim is provided at Appendix A2.

A5.6 [REDACTED] the Licensee is progressing several actions to protect the circuit, maintain availability, further understand the process that caused the faults to occur [REDACTED].

Action	Description
	[REDACTED]
2	Impose an export cap of 52.8% on SSEC3 to reduce the potential induced voltage in the FOC cable in SSEC3 and thereby reduce the rate of corrosion in the location of the remaining FOC faults (and any undetected FOC faults). This approach is in line with an assessment contained in a report prepared by Southampton Dielectric Consultants and a further technical note included at Appendix D1 and D3. Ofgem is considering a separate EE claim in connection with the application of this export cap.

[3] the additional investigations have been commissioned as per action 4 in paragraph A5.6 below

Action	Description
3	Procure the extra cable needed to remove all the known FOC faults in SSEC3. The Licensee ran a tender exercise and placed an order for 8.5km of cable with SEI. 7.5km will be available for removing the known FOC faults and 1km will be used to replenish the Licensee's strategic spares. The 7.5km length of cable will be available ex-factory (Japan) by 30 September 2021.
4	Continue to monitor SSEC3 by conducting regular OTDR tests each way through the FOCs in SSEC3 (targeting a 4- 6 week interval, subject to operational constraints) to determine if the FOC fault positions are changing. The OTDR tests carried out since the [REDACTED] Repair (up to 31 May 2021) indicate there is no material change to the number and location of the FOC Faults.
5	Following the RCA investigation (particularly that to Cable 13), the Licensee has commissioned further investigations (that RINA will carry out and SDC will comment on) to try and determine the full extent of the potentially damaged sections of SSEC3 as this may extend further than the known FOC faults: • Test FOC samples (from SSEC3, SSEC2 and SSEC1) to (i) re-create the process, that has caused the Cable Failure to occur, in laboratory conditions using varying levels of induced voltage while the FOC samples are immersed in seawater, and (ii) analyse the blisters (or abnormalities) that develop as a result of this process • Determine the tensile strength of the FOC cables that have been on the seabed for several years to determine if any special protection is required when lifting the cables to the surface to carry out repairs – findings show no adverse impact. [REDACTED]
	[REDACTED]
7	Negotiate with BMCL and the CAR insurers to determine an appropriate remedy for the uncontrolled lowering incident with joint 2. This is ongoing.
8	Although an Export Cap has been applied to SSEC3, there is a risk that another unplanned power core failure will occur before the new cable arrives. In this scenario, SDC has advised that a reactive repair should be delayed until the new cable arrives. It is therefore appropriate for the Licensee to prepare for a reactive repair timed for the arrival of the new cable in November 2021. So an ITT has been prepared for issue to repair contractors to conduct a reactive repair (if it is required) when the new cable is available [REDACTED]

Appendix A1 – RINA Report 2021-0049 – Review of DNV Report No. 20-2326 r2

The Licensee commissioned RINA Tech to conduct an independent review of the conclusions drawn by DNV-GL in its report to Ofgem dated 3 June 2020 and used in Ofgem's final determination of the Licensee's IAE claim for SSEC2.

Appendix A2 – Review of previous IAE questions

Review of questions raised by Ofgem during its determination of the Licensee's IAE claims for SSEC1 and SSEC2 to check that, where appropriate, relevant information is provided to support this IAE claim for SSEC3.

B1. Summary

B1.1 This Section B provides information on the:

(a) Background to the incident

(b) Sequence of events from the fibre optic cable faults in early 2020 through to the current situation presented in a storyboard style

(c) Details of the testing carried out leading up to the Cable Failure

(d) Explanation of preparation work by the Licensee during this time

(e) Details of the reports commissioned by the Licensee to determine the root cause of the power core fault on SSEC3.

B1.2 This information is provided to explain the exceptional nature of the event and to demonstrate that the Licensee has been an efficient and diligent operator at all times and has applied appropriate consideration for the windfarm owner, consumers and other stakeholders.

B2. Background

B2.1 The Licensee has four 132 kV subsea export circuits (SSEC1, SSEC2, SSEC3 and SSEC4). SSEC1 and SSEC3 run from the shore to offshore substation east (OSP E); SSEC2 and SSEC4 run from the shore to offshore substation west (OSP W). Each subsea cable contains two fibre optic cables (FOCs);

(a) the 'Main FOC' provides communications between the onshore substation and the OSP (although not all the fibres are actually used);

(b) the 'Spare FOC' is terminated at the transition joint bay (TJB) onshore and kept as a spare should the Main FOC fail.

B2.2 In January and February 2020, the Licensee discovered that the fibres in the FOCs within SSCE3 had broken (the "Early FOC Breaks") as set out below:

(a) During a routine test of the fibres in the Spare FOC on 23 January 2020, the Licensee's O&M contractor identified that all fibres within the Spare FOC within SSEC3 had failed in the vicinity of a subsea joint that was installed by the developer in 2015[1].

(b) On 8 February the Licensee received notification that all fibres within the Main FOC in SSEC3 had failed. Further investigations confirmed that all fibres are broken at a location circa 2.4km inshore of the break in the Spare FOC identified in January.

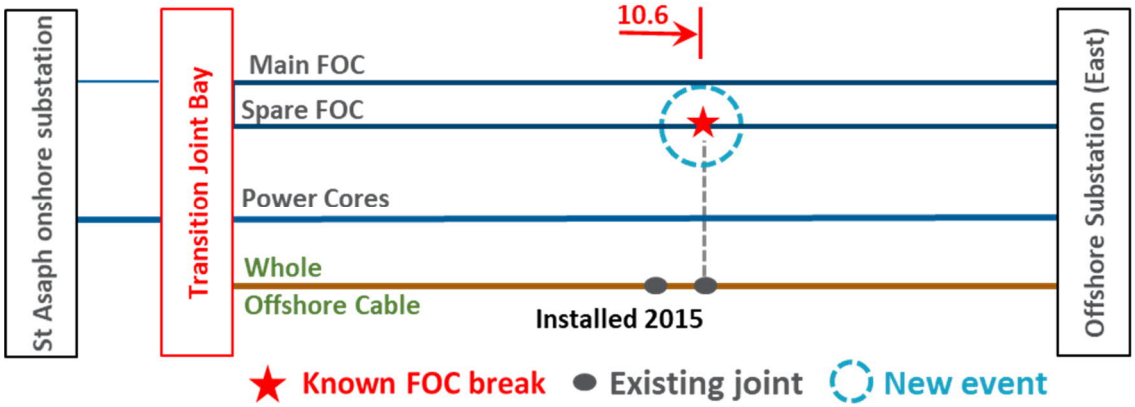
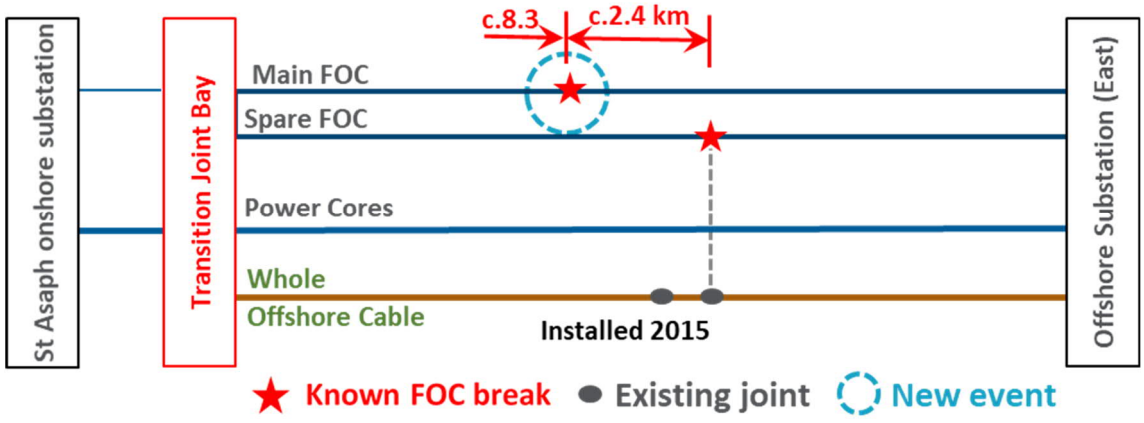
Since the Main and Spare FOC operate independently of each other, with independent earthing arrangements, there is no obvious connection between the two failures.

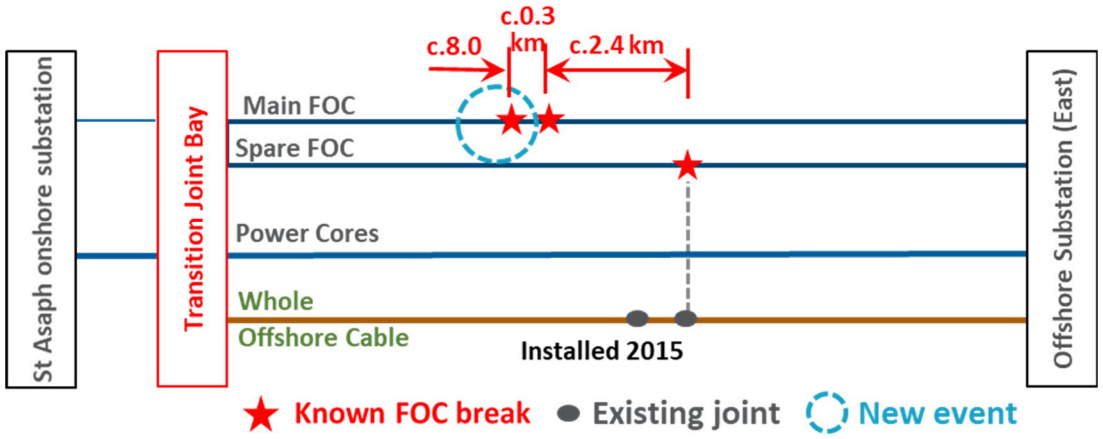
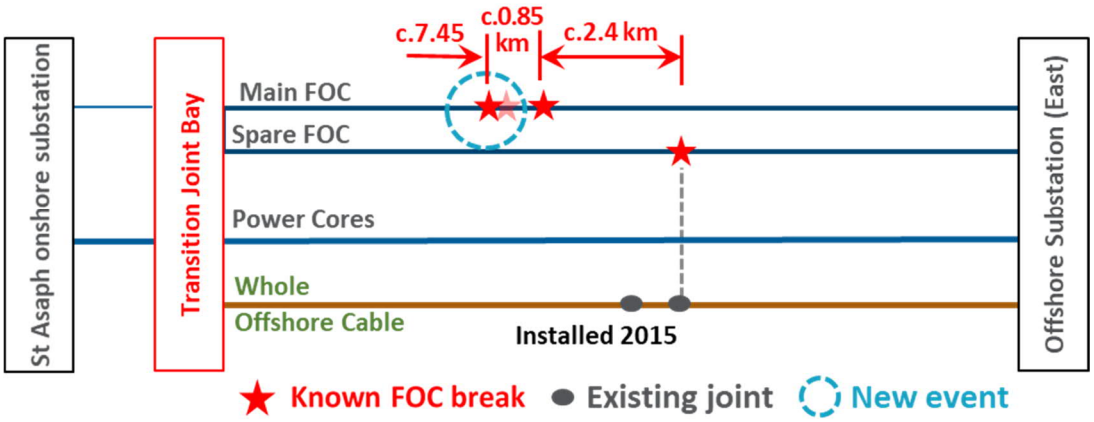
B2.3 Since no communications were now possible through SSEC3, the SSEC3 communications flows were re-routed via spare fibres within the Main FOC in SSEC1 with no reduction in service.

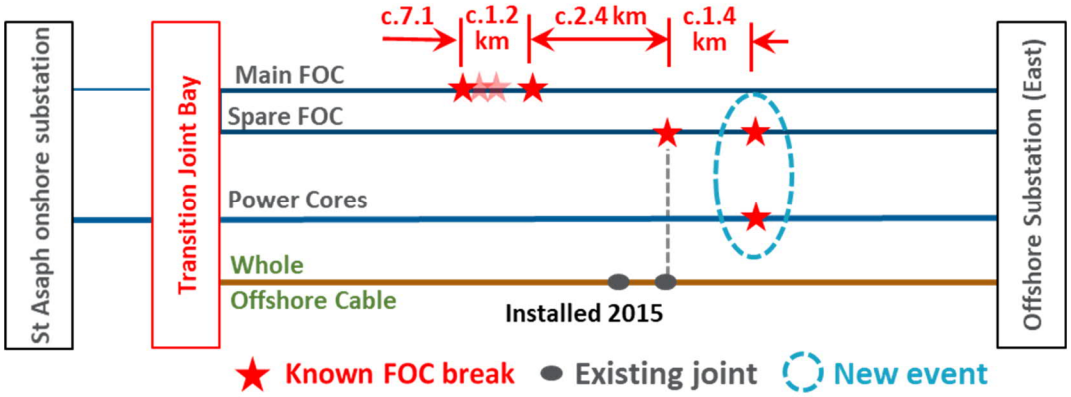
B2.4 Given the complexity of the issues associated with SSEC3, the Licensee has set out the sequence of activities in a short form presentational style in Section B3, with further background in section B4.

[1] This repair removed the so called 'hotspot joint' installed during construction that was identified as possibly defective.

B3. Storyboard of activities from January 2020 to June 2021

1	January 2020 - All fibres broken in Spare FOC • FOC Fault has developed between May 2019 (last time the Spare FOC was tested) and January 2020. • Exact location is not known but in the vicinity (or even within) one of the joints installed in 2015. • No impact on operational capability, all communications in Main FOC continue to operate. • No evidence that this FOC fault would cause a power fault, so the appropriate approach is to maintain availability of the asset for the windfarm operator and the consumers. • If there was compelling evidence a power fault would result and this was the only FOC Fault then Licensee could remove it with cable and joints from its spares (1000m and 463m of cable plus three cable joints as per good industry practice). 
2	February 2020 - All fibres broken in Main FOC • Fault time known as the Main FOC as communications to the OSP failed triggering alarms. • Exact location is not known but c. 2.4km onshore from the FOC Fault in the Spare FOC. • The Licensee does not have enough cable in its spares to remove both FOC faults • Requires c.3.0km of cable to remove these faults in one repair (delivery c.8 months from order). • No loss of functionality, communications diverted down spare fibres within SSEC1 cable. • No compelling evidence that these FOC faults would cause a power fault, so the appropriate approach is to maintain availability of the asset for the windfarm operator and the consumers. • The Licensee increased frequency of OTDR testing to check developing status of the FOCs 

3	May 2020 - New information for Main FOC • New OTDR tests indicate a new FOC fault in the Main FOC (or the previous fault had extended). Exact location is not known but c. 0.3km inshore from the Feb-20 FOC Fault in the Main FOC. • Impossible to determine extent of any damage between the two faults in the Main FOC. • The Licensee does not have enough cable in its spares to remove all these faults. Requires c.3.5km of cable to remove these faults in one repair (delivery c.8 months from order). • Still no compelling evidence that these FOC faults would cause a power core fault. • The Licensee approached cable suppliers for new cable and issued an ITT to its Framework Repair contractors to conduct a potential repair. 
4	June – August 2020 - Further testing • New OTDR tests and Distributed Acoustic Sensing (DAS) improved the fault location accuracy. The Main FOC is now broken c. 0.85km inshore from the Feb-20 FOC Fault location. • A Line Resonance Analysis (LIRA) test in June showed no degradation in the power core insulation compared to a similar test in November 2018; A Partial Discharge (PD) test in August was inconclusive; too much background noise - common when testing long cables. • The Licensee does not have enough cable in its spares to remove all these faults. Require c.4.0km of cable to remove these faults in one repair (delivery c.8 months from order). • Still no compelling evidence that these FOC faults would cause a power core fault; the appropriate approach remains to maintain availability of the asset for the windfarm operator and the consumers. • In Aug-20, the Licensee approached Southampton Dielectric Consultants (SDC) to help explain why the FOC faults were occurring and what the implications might be (report issued Nov-21). 

5	15 October 2020 - SSEC3 Power Core Fault • Power core faulted on 15 October. OTDR tests show the Spare FOC is also broken in same place. • Exact location is not known but c.1.4km offshore from the previous FOC Fault in the Spare FOC. • Also Main FOC fault had moved c.1.2km inshore from the Feb-20 FOC Fault in the Main FOC. • The Licensee can repair the power fault but does not have enough cable to remove the FOC faults. • c.5.5km of cable is needed to remove all the faults in one repair (delivery c.8 months from order). • The Licensee made plans to repair the power core fault and return SSEC3 to service [REDACTED]. 
	[REDACTED]

B4. Actions taken by the Licensee between Jan-20 and Oct-20

B4.1 Further testing

B4.1.1 The Licensee remained concerned about balancing the need to maintain asset availability (for the windfarm owner and the consumers) and determining whether the FOC Faults presented a clear threat to maintaining availability that should be addressed as soon as practicable. The Licensee was aware of experience from Greater Gabbard OFTO where fibres had broken in one of its offshore cables and the assets have continued to perform normally for three years.

B4.1.2 Therefore, between February and October 2020, the Licensee conducted further tests to monitor any further developments in the health of the FOCs, check for any degradation of the power cores and to improve the accuracy of the location of the fibre breaks:

17 February, 12 May and 15 May	Additional OTDR tests were conducted from onshore: • By May, the Main FOC break had moved c.300m towards the shore. • The Spare FOC break remained static near the subsea joint.
14 May, 10 September (Spare FOC only) and 15 October	Additional OTDR tests were conducted from offshore. • Between May and October, the Main FOC break moved c.200m offshore. • In September, the Spare FOC break remained static near the subsea joint; • In October, the Spare FOC break had moved c.1.39km offshore, the same location where the cable fault occurred later the same day 15-October.
12 June:	LIRA test of the power cores. Showed no degradation in the power core insulation compared to a similar test conducted in November 2018.

01 July:	OTDR and DAS testing from the onshore substation. This testing improved the accuracy of the location of the broken fibres: • the Spare FOC was confirmed to be broken at or very close to a subsea joint installed by Innogy as part of the 'hot-spot' repair carried out in 2015; • the Main FOC was confirmed broken circa 3.1km in-shore of this joint.
30 July:	Partial discharge (PD) test showed no evidence of PD activity. Note that a PD test is not particularly suited to long lengths (above 5km) of subsea cable.

B4.2 Consideration for undertaking a pre-emptive repair

B4.2.1 Although there was no compelling evidence to suggest that the Licensee should proceed to remove the FOC Faults, as an experienced operator, it was sensible to take action to discuss the matter with its stakeholders and prepare for interventions if they were required.

B4.2.2 Between February and October 2020, the Licensee met with the relevant stakeholders to discuss the situation with the fibre breaks and the Licensee's contingency plans should one the fibre breaks develop into a power core fault.

B4.2.3 The Licensee has a suite of Contingency Plans for dealing with all credible asset failures, including one for managing a subsea cable fault repair. The Licensee has Framework Agreements with two repair contractors (Global Marine and Boskalis) to support this contingency plan.

B4.2.4 On 15-May the Licensee issued a 'Call-off notice' to both Framework Agreement contractors to provide a quotation to remove the FOC faults from SSEC3. The Licensee considered three options for a repair, two pre-emptive and one reactive, viz:

(a) Option 1: single pre-emptive repair, two joints and circa 3.5km of cable; or

(b) Option 2: double pre-emptive repair, 2 x two joints and 2 x circa 500m of cable.

(c) Option 3: reactive repair, two joints and circa 500m cable to repair only one FOC failure. With a decision taken at the time on whether to conduct a pre-emptive repair of the second FOC failure, this will be dependent upon weather conditions at the time.

B4.2.5 The programmes from both framework contractors suggested that a repair will take circa 78 days from appointing the contractor to remove the FOC faults from SSEC3 and re-energise the circuit.

(a) If such a repair used cable from the Licensee's strategic spares then it would not be possible to remove all the FOC faults.

(b) If enough new cable to remove all the FOC faults was ordered, then the repair would be delayed until new cable could be delivered (about 8 months from placing the cable order).

B4.2.6 Without more information on the probability of a cable failure occurring it was not possible to determine which Option represented the best course of action. This prompted the Licensee (in August 2020) to ask Southampton Dielectric Consultants (SDC) for advice on:

(a) Whether the SSEC3 cable was likely to fail, considering the data from the various tests commissioned by the Licensee, the cable history, and failure of the FOCs?

(b) If so, whether it is possible to estimate the time scale on which such a failure is likely to occur?

B4.2.7 SDC's report was not completed before the power core failure occurred on 15 October 2020.

B4.3 Strategic spares constraints and steps taken to remove these constraints

B4.3.1 Spare cable:

(a) The Licensee's holding of spare subsea cable in 2020 was: 463m of ABB cable (left over from the 2015 repairs) and 1000m of SEI cable, both lots stored in Sunderland. This level of spare accords with good industry practice i.e. sufficient for at least one subsea cable fault repair.

(b) To facilitate an Option 1 repair, the Licensee approached two cable suppliers (NKT and SEI) for budget prices and delivery times for 3.5km of cable; this was later increased to 4.0km following the results of OTDR testing in July. Both suppliers offered similar prices asked for a purchase order before the end of 2020 to ensure delivery in the second half of 2021.

(c) The Licensee approached other OFTOs. One OFTO was prepared to sell the Licensee 1.3km of suitable cable, but would offer no guarantee as to the integrity of the cable.

(d) The Licensee could not remove all the FOC faults with any of the individual lengths it had (or could buy from other OFTOs) nor could it do so by combining all these cable lengths. Note that combining multiple cable lengths together in a single repair involves multiple joints on the seabed which is not considered good practice.

B4.3.2 Spare joints:

(a) The Licensee's holding of spare subsea cable joints in 2020 was three SEI joints suitable to join the in-situ 500mm NKT cable to the spare 630mm SEI cable. This level of spares accords with good industry practice in that it is sufficient for at least one subsea cable fault repair with one joint for contingency.

(b) Global Marine indicated that, if they were appointed as repair contractor, they could provide two universal subsea joints that would also be suitable.

B4.4 Should the Licensee have conducted a pre-emptive repair or ordered new cable in 2020?

B4.4.1 The Licensee did approach cable suppliers and repair contractors during 2020 as a matter of good practice because a reactive repair may have been required. However:

(a) A pre-emptive repair would disrupt availability for the windfarm owner and reduce power supplies for consumers, so the Licensee would have to have good reasons to take such a step;

(b) there was no evidence to suggest that the FOC faults were likely to cause a power core fault. The SDC Report did make this link but it arrived after the Cable Fault occurred.

B4.4.2 In any event, the Licensee could not conduct a pre-emptive repair that removed all of the FOC breaks before the power core fault occurred because:

(a) In accordance with good industry practice, the Licensee only held sufficient cable and joints for one repair.

(b) To have used all of the Licensee's strategic spares on a single intervention would have meant the Licensee taking a gamble on which of FOC faults was most likely to develop into a power core fault and then not have any cable available to conduct a repair if a power core fault occurred elsewhere on SSEC3 or any of the other three export circuits.

(c) Note: if the Licensee had elected to conduct a single repair it is likely that the focus would have been on the Main FOC fault, in which case the Licensee would have expended all of its strategic

spares and been unable to respond to the power core fault that occurred on 15-October, which was outside of the range of the known FOC faults.

(d) The option of conducting two repairs to address the two known FOC faults (one on the Main FOC and one on the Spare FOC) was not appealing as:

(i) it would leave SSEC3 with five subsea joints;

(ii) there would be no spare cable or joints available if another FOC fault developed that caused a power core fault, and;

(iii) there was no guarantee that such an intervention would resolve the issues that might remain within SSEC3.

B4.4.3 The Licensee did not order additional cable before the power core fault occurred because:

(a) The location of the Main FOC fault was continuing to move towards the shore meaning that the Licensee was not certain what length of cable would be required.

(b) The two cable manufacturers contacted were both suggesting delivery times in the second half of 2021 for an order placed in 2020 for 4.0km of cable. So it would not be available for any pre-emptive repair in 2020.

(c) Even if the Licensee had ordered 4.0km of cable in mid-2020 it would have been insufficient for the Licensee's current need which is for at least 5.5km of cable and it is not possible to increase the length of cable once the order has been placed.

B5. Root cause of the faults

B5.1 The causes of the FOC faults and the power core fault is contained in the following reports commissioned by the Licensee:

(a) Report ENG 56 / 2020 by Southampton Dielectric Consultants (SDC) on the likely condition of SSEC3 following the formation of breaks in the fibre optic cables and subsequent power core failure (provided at Appendix B1), the "SDC Report";

(b) Root Cause Failure Investigation Report 2021-0360 rev 1 by RINA Tech on the likely causes of the SSEC3 power core fault (provided at Appendix B2), the "RCA Technical Report";

(c) Technical Note TN 31 / 2021 by SDC (provided at Appendix B3), the "SDC Technical Note".

B5.2 The relevance and connection between these three reports are explained below.

B5.3 The SDC Report

B5.4 SDC are recognised experts in issues with fibre optic cables (FOC) in subsea power cables. The Licensee approached SDC in August 2020 to provide an opinion on the following:

(a) Whether the SSEC3 cable was likely to fail, considering the data from the various tests commissioned by the Licensee, the cable history, and failure of the FOCs?

(b) If so, whether it is possible to estimate the time scale on which such a failure is likely to occur?

(c) Whether there are further tests that could usefully be considered by the Licensee (offline and online) to gain a better understanding of what is happening?

(d) Whether the FOC failures in the Main FOC and Spare FOC are related given they have failed at different times and places?

B5.5 During the preparation of the SDC Report, the power failure on SSEC3 occurred so the first two of these questions became moot. The occurrence of the power core fault raised the following additional questions:

(a) What was the cause of the power cable failure?

(b) If only the section of cable that contains the failed power core is repaired, is it likely that the remaining breaks in the FOCs will lead to further failures? If so, in what timescale?

(c) If further repairs are made, is it possible to estimate the reliability of the cable?

(d) Can the risk of failure be mitigated by reducing the maximum load current through the cable?

(e) How should the health of the cable be monitored?

B5.6 The SDC Report was issued in November 2020 (and shared with Ofgem shortly thereafter).

B5.7 The SDC Report made the following conclusions:

(a) It is very unlikely that the spare FOC break triggered events that led to the main FOC breaks.

(b) It is likely that both FOCs have similar weaknesses including sheath conductivities that are too low. These are likely to have led to breaks in approximately the same time scales for both FOCs.

(c) The fault could have developed in the subsea joint, SJ1. If this is the case it may have led to:

(i) corrosion of the aluminium armouring wires on one / both FOCs;

(ii) a break in the spare FOC inside the joint; or/and

(iii) corrosion and disruption to the earthing bonds connecting the FOCs within the joint. The corrosion of earthing bonds may be able to lead to a situation in which the induced voltages on some sections of one or both FOCs is increased.

(d) The failure of the power core L1 (red) is extremely likely to be associated with the breakage of the spare FOC located approximately 1.4 km offshore from subsea joint SJ1.

(e) There are likely to be two breaks in the spare FOC (one of which led to failure) and at least four breaks in the main FOC. These breaks, perhaps with the exception of the one near SJ1, have occurred because of material problems and possible surface defects in the semiconducting sheath that surrounds the FOCs. This has allowed holes to form in the sheath, and the FOC armouring wire to corrode and break. This has led to severe damage to the cable in the region of the breakage and electrical failure.

(f) If the cable is put back on full load without removing all the defective FOC sections, it is at least probable and possibly very likely that a power core failure will occur within a year. If the permitted load current is capped, then there is a smaller but still significant risk of failure.

B5.8 The SDC Report also made three recommendations, which the Licensee has (or will) carry out:

(a) that OTDR measurements on both FOCs are made from both ends of the cable to assess the full length of the cable that contains FOC breaks.

(b) that the cable is monitored when back on load using temperature distributed sensing, especially when it is experiencing high loads.

(c) that a post-mortem analysis of the cable and subsea joint SJ1 is used to check the underlying causes proposed in this report and to provide a better assessment of the state of the cable. [REDACTED]

B5.9 There are clear similarities between the conclusions drawn by SDC and the findings contained in the RCA Technical Report, which are drawn out in the SDC Technical Note.

B5.10 RCA Technical Report - Conclusions

B5.11 The RCA Technical Report (provided at Appendix B2), prepared by Rina Tech, draws the following conclusions concerning the failure:

(a) The results of materials tests did not suggest that there were any inherent deficiencies with the power core insulation material.

(b) Electrical activity between metallic elements within the spare fibre optic cable (FOC) and the power cores damaged the B and Y power cores and led to insulation breakdown in the B core. [Note the core designation used by RINA aligns with the cable colours which does not align with the designation used on site; the fault occurred on Red phase, L1.]

(c) This electrical activity was initiated by a loss of continuity of the metallic elements within the spare FOC. This loss of continuity was caused by corrosion, which in turn was caused by water ingress though breaches in the waterproof polyethylene sheath of the spare FOC.

(d) The extent of the degradation of the spare FOC sheath, and the extent of corrosion of the aluminium wire armour, suggests that the degradation had occurred over a prolonged period of months (rather than days or weeks), but less than multiple years. During much of this time the fibres would remain intact. It is considered highly unlikely that any path breaching the sheath was present from the time of manufacture.

(e) A large number of localised features were observed on the polyethylene sheath of the spare FOC. Some of these features had breached the thickness of the sheath. The exact mechanism by which these features occurred is the subject of further investigation.

B5.12 [REDACTED]

B5.13 The final conclusion is subject to further investigation by way of tests, commissioned by the Licensee, to try and recreate the failure path that has occurred in laboratory conditions. Essentially, the tests will apply varying levels of voltage for a period of time to lengths of FOC immersed in seawater to see how the breaches in the polyethylene sheath occur. In doing so, the importance of the localised features that have been observed (final conclusion) may become clear.

B5.14 RCA Technical Report - Discussion

B5.15 The RCA Technical Report also includes a useful discussion of the investigation (Section 7 from Appendix B2), the salient points are repeated below.

B5.16 RINA has previously examined failed sections of export cables SSEC1 and SSEC2. The examination of the SSEC3 cable detailed above presented many similarities to the previous investigations but indicated that it was unlikely to be caused by damage during the manufacturing process.

B5.17 During the examination of the SSEC3 cable no evidence of mechanical damage was found on the outer serving and armour wires of either of the cable samples which were stripped down.

B5.18 At the power core fault location there was:

(a) evidence of degradation of the Y core lead sheath, insulation screen and insulation.

(b) a localised fault hole was evident in the B core, along with wider surrounding electrical degradation of the lead sheath, insulation screen and insulation. Examination of the B core fault location found that the insulation had discoloured in the region containing the fault hole, with the discolouration being most significant towards the outer surface of the core.

B5.19 Three lengths of main FOC were examined. No damage, degradation or defects were observed on the sheath of the main FOC. Examination of the main FOC's armour wires in one location found them to be in good condition with no evidence of mechanical damage or corrosion.

B5.20 The spare FOC was found to have

(a) degraded and lost continuity in the vicinity of the power core fault location. The distance between the two intact ends of the FOC sheath across this gap was approximately 520 mm.

(b) In addition to the gap, five features were found on the sheath of the spare FOC in the section of cable containing the power core fault location.

(i) Three of the features consisted of spots on the sheath which resembled 'craters' up to 10mm in diameter. In two of these three cases, lumps of hard material, each about 5 to 10 mm in diameter, aligned with the position of the spots. These three spots were visually distinct from the blister-like features observed elsewhere. From the appearance of the spots they may have formed through a combination of pressure applied by the lumps of material, and heat. None of the three had breached the thickness of the sheath (the deepest extended through more than 50% of the thickness). Given the relatively close proximity of these three features to the main failure site they may be an effect of the degradation of the surrounding cable components, and most likely formed as a result of the wider degradation.

(ii) One of the five FOC sheath features consisted of a lump in the sheath, approximately 5 mm in diameter. It was found to contain a bubble which vented to the inner surface. The bubble did not vent to the outer surface but did occupy more than 50% of the sheath thickness.

(iii) The final FOC sheath feature observed in the section of cable containing the power core fault consisted of a raised 'crease' in the sheath approximately 3 mm in diameter, with a hole underneath which breached the full thickness of the sheath.

B5.21 Further sheath features which were broadly similar to the lump and crease discussed above were found in the other two lengths of spare FOC which were examined.

(a) Two features were found in the 'Cable 13' sample, which was taken from immediately adjacent to the section of cable containing the power core fault in the offshore direction.

(b) Eighteen features were found in the 'Fibre Fault' sample (c.30 m inshore of the power core fault location) and two significant areas of degradation were found in this section of FOC.

(i) One consisted of a 200 mm length with numerous sheath features and underlying swelling, which was indicative of armour wire corrosion.

(ii) The other area consisted of degradation and corrosion which had led to an almost complete separation of the FOC. Onset of degradation was found on the PE sheath of the B power core in this location. This did not extend through the thickness of the PE to the lead sheath, however it is considered that this degradation would have developed further given time.

B5.22 The location of the FOCs, in the interstices between two power cores, will result in an induced voltage on the FOC armour and stainless-steel tube.

(a) If the FOC is reliably earthed at both ends there will be a circulating current flowing in the armour and stainless-steel tube of the FOC.

(b) Previous work has shown that this will be of the order of 40 A at a load of 140 MW. The aluminium armour of the FOC can readily carry this current without damage but the stainless-steel tube is not capable of carrying this current on its own.

(c) Once corrosion has led to a loss of continuity of the FOC armour wires, the stainless-steel tube will not be able to carry the circulating currents and will melt.

B5.23 Following corrosion of the FOC armour wires and loss of electrical continuity:

(a) the voltage difference across the discontinuity would result in arcing across the discontinuity. Further erosion would result in current flowing from the ends of the armour wires/steel tube to the semi-conducting sheath over the power cores.

(b) the fault in the power cores is considered to have been caused by this current degrading the semi-conducting sheath such that the current flowed to the lead sheath in a small area.

(c) if this area was sufficiently small, it could lead to a high enough current density to melt the lead sheath, which would have degraded the underlying XLPE insulation.

(d) this would have occurred in several areas close to the break in the fibre optic armour resulting in multiple areas of damage to the lead.

This mechanism is also consistent with the finding that the insulation degradation was most severe at the outer surface.

B5.24 Overall, it was found that (i) the B power core had failed, with electrical breakdown having occurred between the conductor and the lead sheath, and (ii) there were several other locations where the lead sheaths of both the B and Y cores were eroded due to electrical activity. These locations were eroding at the same time with one location eventually initiating the power core failure.

B5.25 The most likely sequence of events which led to the fault can be summarised as follows:

(a) Breach of the waterproof sheath of the spare FOC,

(b) Ingress of seawater under sheath,

(c) Loss of continuity of the aluminium armour wires due to corrosion, and subsequent melting of the stainless-steel tube,

(d) Current flow occurs from the ends of the armour wires/steel tube to the semi-conducting sheath over the power cores,

(e) High localised current density erodes the lead sheath of the B and Y power cores and degrades the XLPE insulation,

(f) The degradation of the B core XLPE reaches a stage where it cannot withstand the operating voltage and the insulation fails.

B5.26 The extent of the degradation of the spare FOC sheath, and the extent of corrosion of the aluminium wire armour, suggests that the degradation had occurred over a prolonged period of months, rather than days or weeks. During much of this time the fibres would remain intact.

(a) The rate of corrosion would have been affected by temperature, the amount and concentration of electrolyte, the grade of aluminium used and the standing voltage on the armour.

(b) Both the temperature and the standing voltage are a function of the load current, both being at a minimum during periods of low export current.

These variables prevent an accurate assessment of the time taken for the corrosion to occur. Corrosion of the wire armour would continue until the point where a discontinuity occurs. Arcing across this discontinuity would have further degraded the armour and stainless-steel tube leading to fibre breaks. This is likely to have occurred very shortly after discontinuity of the wire armour.

B5.27 It is considered that for the corrosion to initiate, a breach in the waterproof PE sheath of the FOC and subsequent water ingress must have occurred. Several features which breached the thickness of the sheath were found on the spare FOC. It was found that corrosion had led to the loss of continuity of the metallic elements within the FOC at two locations in the examined cable lengths.

B5.28 The exact mechanism by which the localised features on the sheath of the FOC formed and/or developed is not currently known.

(a) One possible explanation is that they are manufacturing defects which led to bubbles in the extruded PE, with corresponding lumps on the surface.

In extreme cases the bubbles may have breached, or very nearly breached, the thickness of the sheath. Owing to the timescales involved, it is considered highly unlikely that any path breaching the sheath was present from the time of manufacture (because the water ingress and corrosion would have already developed and caused failure much earlier).

(i) It is therefore more likely that the breach of the sheath has been caused by a mechanism which has developed more recently.

(b) A second possible explanation for the formation of the sheath features is a localised inconsistency in the conductivity of the PE.

(i) According to the cable's cross-sectional drawing, the PE is semi-conductive.

(ii) Measurements of relative resistance have found some variation in conductivity along the length of the FOCs. However, it should be noted that this measurement technique would not be expected to detect very localised variations.

(iii) In the event that a very localised region of sheath was to have a relatively high conductivity it could be expected that the resulting high leakage current through the region would lead to localised heating. This could, in turn, degrade and breach the PE sheath.

B5.29 SDC Technical Note

B5.30 This technical note was commissioned after SSEC3 was returned to service in March 2021 to provide an opinion on the following:

(a) Would the Licensee be wise to conduct a reactive repair should a cable fault occur before the new cable (that has been ordered) arrives in the UK?

(b) Have the findings of the RCA Technical Report reinforced SDC's view that the cable is at a higher risk of failure than if it had been returned to service with no cap applied?

B5.31 SDC considered the additional information provided and used a statistical approach in considering the first question above. SDC made the following conclusions:

(a) The OFTO would not be wise to conduct a reactive repair should a cable fault occur before [the date when the new cable arrives]. The exception to this may be if the fault is clearly associated with the over-boarding incident, in which case a reactive repair could be considered.

(b) The findings of the RINA RCA have reinforced SDC's view that the cable is at a higher risk of failure than if it had been returned to service with no cap applied.

B5.32 In addition, SDC observed that:

(a) The RCA Technical Report generally confirms the deductions made in the SDC Report concerning the causes of failure (paragraph 8, SDC Technical Note).

(b) Resistance measurements on the two semiconducting polyethylene (PE) FOC sheaths were presented in the RCA Technical Report and concluded that the "sheath is conductive" (page 29). Whilst it is correct that the sheath is much more conductive that pure PE, SDC believe it is unlikely to be sufficiently conductive to prevent a voltage from being induced on the FOC (paragraph 9 and 10, SDC Technical Note).

(c) The RCA Technical Report shows that the failure of the FOC leading to the failure of the power core, was very much in line with the proposed sequence of events in the SDC Report; see Figure below.

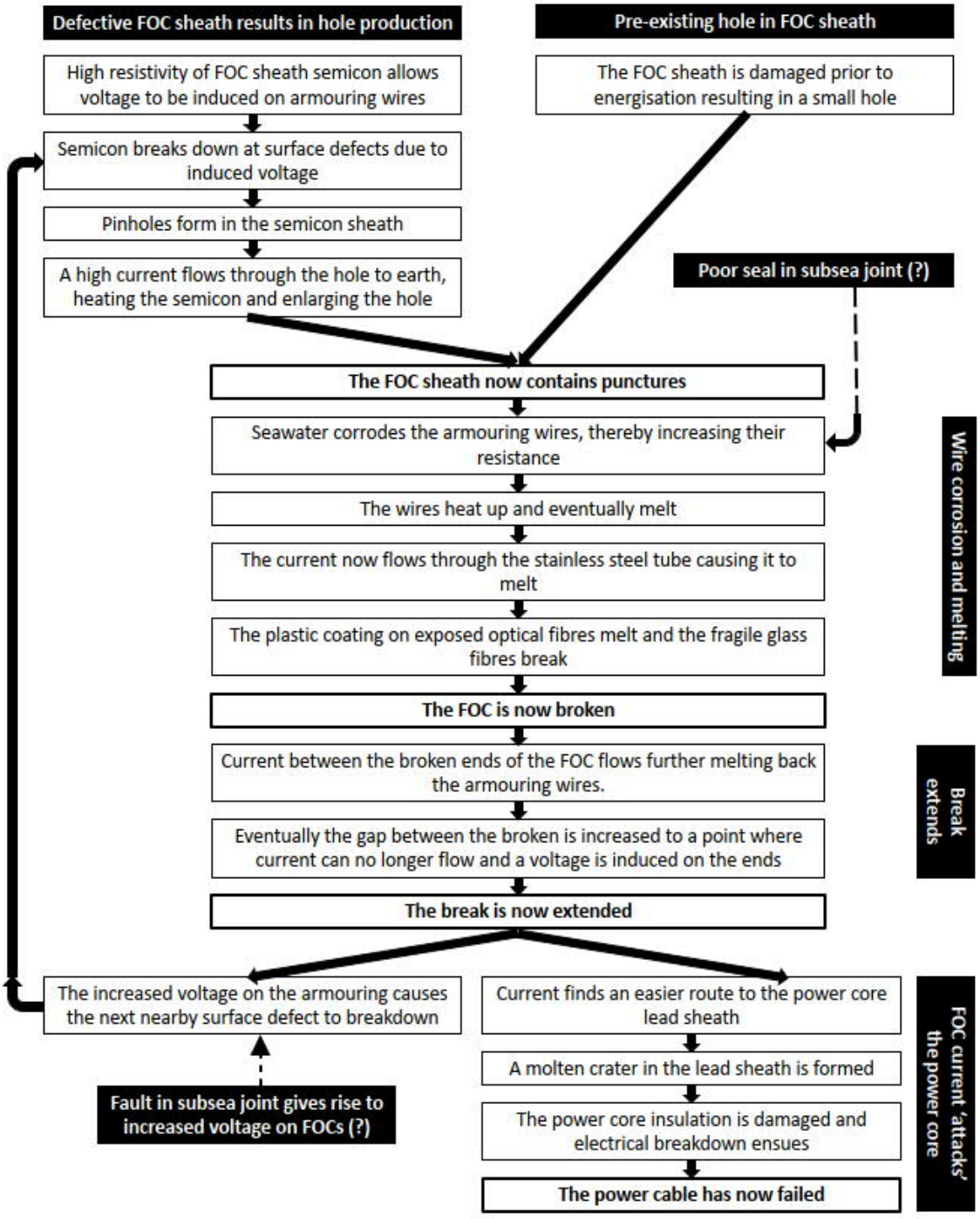


Figure 2: Sequence of events leading to failure of the power cable proposed in the SDC Report (Figure 12, page 33)

(d) The RCA Technical Report (page 21) states that in some cases there were "lumps of material" associated with defects (or "features") on the FOC. From the photograph (Figure 3.21 of the RCA Technical Report), these appear to be clinker-like deposits. SDC considers that It is possible that these are pieces of charred "semicon" (the carbon-filled material from which the FOC sheath is made). If the semicon heats up excessively then it can evolve into gaseous products and carbonaceous solid material, which appear charcoal or clinker like (paragraph 17, SDC

Technical Note). Such flaws may cause local weaknesses that could lead to FOC failure (and hence power core failure).

(e) The most likely FOC defects to cause power core failure are those that have already caused breakages of the FOC nearest the middle of the cable length (where the induced FOC voltage is highest). If these FOC defects cause corrosion that causes a breach in the power core lead sheath then a power core failure will occur. SDC would expect this process to be slowed down if an power export cap was applied because the rate of degradation is roughly proportional to the square of the current. Whilst the cable does not normally operate at its full load current, it is noticeable that the failure of SSEC3 on the 15 October 2020, happened about 2 days after the cable was under full load for several hours (paragraph 24, SDC Technical Note).

Appendix B1 - Report ENG 56 / 2020 by Southampton Dielectric Consultants

Appendix B2 - Root Cause Failure Investigation Report 2021-0360 rev 1

Appendix B3 - Technical Note TN 31 / 2021 by SDC

C1. Summary

C1.1 In this Section C, Gwynt-y-Môr OFTO (the "Licensee") seeks to set out its position and conclusions in respect of its insurance and how it may respond to the matters in issue.

C1.2 The Licensee has utilised its insurance broker, Willis Towers Watson (WTW) to source insurance quotes since 2015. The Licensee thereafter agrees to bind to the terms which it deems most favourable. The information in this Section C has been compiled with input from WTW[1].

C1.3 It is apparent that the insurance market in the OFTO sector has hardened in the past two years and a number of insurers have exited the sector.

C1.4 The Cable Failure[2] occurred on the first day of what would have been the insurance renewal date in 2020. Due to the difficulties in securing insurance cover last year, the Licensee had a hybrid cover on the day the fault occurred with 55% of the policy covered by an extension to the existing policy (some more restrictive policy terms) and 45% of the policy covered by new, more restrictive policy terms.

C1.5 [REDACTED]

C1.6 [REDACTED]

C1.7 This Section C provides information in the following sections to support this position:

(a) background of insurance position since the 2015 export cable failures;

(b) the extent of insurance cover available to the Licensee;

(c) the current view of the insurance market towards the OFTO sector; and an

(d) indication of whether the Licensee's insurance policy will respond to the Cable Failure.

[1] References to WTW's views and understanding contained in this Section C relate to WTW's reasonable opinion as an insurance broker.

[2] Defined in the main body of the IAE notification as 'a cable failure on the subsea cable of Export Circuit 3 ("SSEC3") on 15-Oct-20 (the "Cable Failure")'.

C2. Background since the 2015 export cable failures

C2.1 Circuit 1 (SSEC1) failed on 2 March 2015 at a time when, in WTW's view, the insurance market had started to become wary of insuring subsea cables for OFTOs. This was due to various losses having occurred on subsea cables, several of which related to the failure of fibre optic cables.

C2.2 Root cause analysis determined that the 2 March 2015 loss - as well as a subsequent failure of export cable circuit 2 (SSEC2) on 25 September 2015 - was caused due to failure of fibre optic cables (FOC)[3].

C2.3 A failure of the intertidal joint of South Export cable C1 at Thanet OFTO had also occurred on 23 February 2015, a few days prior to the 2 March 2015 loss at Gwynt-y-Môr, which in WTW's view added to insurers' disquiet in continuing to provide insurance for this sector.

C2.4 The Licensee's 2015/16 Property insurance policy period, which ran for 12 months from 17 February 2015 to 16 February 2016, was placed subject to LEG 2 exclusion. The policy also excluded loss or damage arising from the "hot spot" in SSEC3.

2016 Insurance Renewal

C2.5 At the 2016 policy renewal date (17 February), the lead insurer on the policy, AXA, who had a 35% share, declined to renew the policy due to the Licensee's loss record and because of the generally prohibitive loss experience suffered by OFTOs generally at the time. However, AXA agreed to allow a short extension of the 2015/16 policy period from 17 February 2016 to 29 February 2016.

C2.6 Consequently, the insurance placement had to be restructured effective from 1 March 2016, with a series of further extensions covering the period up to 30 June 2016. During the extension periods, coverage continued on the basis of LEG 2 exclusion.

C2.7 The following root cause exclusion came into effect from 1 March 2016 (this version and subsequent iterations are referred to in this Section C as the 2015 Root Cause Exclusion):

"LEG 2 coverage hereon excludes loss or damage to the export cables resulting from the same root causes which gave rise to the following cable failures:

(i) SSEC 1 (Date of loss 02.03.2015) - Root cause as confirmed by Edif ERA report dated October 2015. Damage to the lead sheath sustained during the manufacture/laying up process, prior to cable armouring.

(ii) *SSEC 2 (Date of loss 25.09.2015) - Root cause to be confirmed by Edif ERA report to be issued following the investigation currently in progress.*"

C2.8 In addition, one of the insurers on the panel (Canopius) with a share of approx. 10% also imposed a LEG 1 exclusion in respect of the cables which applied to their participation.

C2.9 WTW's understanding was that the OFTO insurance market became tighter during 2016.

(a) AXA UK withdrew from underwriting OFTOs and subsea cables risks altogether.

(b) When the policy was eventually renewed (1 July 2016), insurers insisted on retaining the 2015 Root Cause Exclusion and 42.5% of the placement was subject to LEG 1 exclusion for offshore cable losses.

(c) The coverage for other assets on the policy continuing to be covered on the basis of LEG 2 cover. The 2015 Root Cause Exclusion was slightly modified as follows:

[3] See Edif ERA Final report for SSEC1 (October 2015) and Edif ERA Final report for SSEC2 (September 2016).

"*LEG 2 coverage hereon excludes loss or damage to the export cables resulting from the same root causes which gave rise to the following cable failures:*

(i) SSEC 1 (Date of loss 02.03.2015) - Root cause as confirmed by Edif ERA report dated October 2015.

(ii) *SSEC 2 (Date of loss 25.09.2015) - Root cause as confirmed by Edif ERA report dated May 2016.*"

C2.10 The root exclusion clause was further modified as follows in respect of the GCube and HDI participations, which were subject to LEG 1/96 exclusion:

"*LEG 1 "Outright" Defects Exclusion to apply to any loss or damage to export cables resulting from the same root causes which gave rise to the following failures:*

(i) SSEC 1 (Date of loss 02.03.2015) - Root cause as confirmed by Edif ERA report dated October 2015.

(ii) SSEC 2 (Date of loss 25.09.2015) - Root cause as confirmed by Edif ERA report dated May 2016.

However, LEG 2/96 Model "Consequence" Defects wording to apply to all other losses."

2017 Insurance Renewal

C2.11 At the 2017 renewal (1 July), after almost two years with no losses, just over 50% of the new panel of insurers agreed to provide cover on the basis of LEG 3, with 30% remaining subject to LEG 2 and approx. 18% being subject to LEG 1 exclusion.

C2.12 The 2015 Root Cause Exclusion continued to apply to all insurers, this being a pre-condition for insurers' continued participation on the programme, in the following further modified form:

"*LEG 3 coverage hereon excludes all loss or damage to the export cables arising directly or indirectly from the same root causes which gave rise to the following cable failures:*

(i) SSEC 1 (Date of loss 02.03.2015) - Root cause as confirmed by Edif ERA report dated October 2015.

(ii) *SSEC 2 (Date of loss 25.09.2015) - Root cause as confirmed by Edif ERA report dated May 2016.*"

2018 Insurance Renewal

C2.13 In 2018, the three BBEC OFTOs decided to take steps to align their insurance policies to a common renewal date and then seek to secure a portfolio benefit by placing an insurance policy that covered all three OFTOs.

C2.14 Since the three OFTOs had different renewal dates and slightly different insurers with slightly different risk holdings, the approach taken to setting up the consolidated pool of insurers was to focus attention on the insurers that were already participating in one of the three OFTO's policies.

C2.15 Placing insurance for OFTO assets generally requires a pool of insurers as no insurer is prepared to accept more than 50% (often much less) of the risk in any one asset. Typically, the following approach is followed to secure the required coverage:

(a) approach insurers that will be prepared to offer lead terms; and then

(b) select preferred lead insurer; and then

(c) market the lead insurer's terms in the wider market to attract followers; and then

(d) if that does not secure 100% coverage, then market the second placed lead insurer and seek to fill the balance of the coverage required.

C2.16 The 2017 policy period was extended by a month to provide more time to prepare the groundwork necessary to consolidate the insurance policies for the three OFTOs. At 1 August 2018, a new two-year portfolio policy was placed (Humber Gateway OFTO and Thanet OFTO were included in the portfolio policy at 15 October 2018 and 19 December 2018 respectively, at the expiry of their individual policies).

C2.17 Despite WTW again holding discussions with insurers about removing the 2015 Root Cause Exclusion from the risk, it remained a prerequisite for insurers before they would commit their capacity to the policy.

C2.18 The 2018 policy was placed with 100% of the insurance panel agreeing to a LEG 3 exclusion. The 2015 Root Cause Exclusion continued to be required by all insurers.

C2.19 The following table summarises the insurers that were approached by WTW and the risk share that was ultimately allocated to each of them.

Insurer	Status	Comments
Chaucer	10.00%	Agreed to provide lead insurer terms
Delta Lloyd	23.50%	Followed Chaucer on terms and premium
GCube	10.00%	Followed Chaucer on terms and premium
Canopius Synd 4444	15.00%	Followed Chaucer on terms and premium
Allianz	10.00%	Followed Chaucer on terms and premium
Axis	6.00%	Followed Chaucer on terms and premium
Swiss Re	10.00%	Followed Chaucer on terms and premium
Pioneer	10.00%	Followed Chaucer on terms but required a higher premium
Codan	5.50%	Followed Chaucer on terms but required a higher premium
HDI	Not used	Not selected as they would only offer LEG 1 for the offshore cables

C2.20 In addition, the following insurers were approached by WTW but declined to participate:

Insurer	Status	Comments
Travelers	Declined	No appetite for OFTOs
Talbot	Declined	Would not accept LEG 3 cover
Helvetia	Declined	Poor losses in OFTOs; RCA for 25 Sept 2015 loss was inconclusive
Gothaer	Declined	Only consider offshore exposure for Insureds with onshore portfolios
Macquarie (MIG)	Declined	OFTOs did not fit their risk appetite
AXA UK	Declined	Maintaining policy of not accepting OFTO risks

C2.21 Finally, WTW did not approach Munich Re, SCOR or Markel on behalf of BB, because it was known that they participated on the GCube panel of insurers and would not be able to accept an independent share of the risk.

2019 Insurance Renewal

C2.22 The insurance market significantly hardened in 2019 however, the existing insurers honoured their two-year commitment to the Licensee and did not withdraw in October 2019.

C2.23 The insurance policy renewed with a small increase in premium.

2020 Insurance Renewal

C2.24 The insurance market continued to harden in 2020 and insurers either withdrew from the sector completely or became more selective of the risks they were prepared to accept.

C2.25 Several insurers (including Canopius, Pioneer, Delta Lloyd and Axis) on the 2019 Insurance policy decided to withdraw from insuring OFTOs or subsea cables, mainly due to continued poor loss experience.

C2.26 Swiss Re also declined to renew having become more selective of the OFTOs they were prepared to write, only accepting the ones that they perceived not to have adverse issues.

C2.27 Consequently, at the 15 October 2020 renewal approximately two thirds of the placement (64.5% part of 100%) declined to renew the policy.

C2.28 This resulted in the insurance panel having to be restructured and 45% of the renewal policy was placed with effect from 15 October 2020 with the remaining 55% of the placement agreeing to extend the expiring policy to 13 November 2020, other than Swiss Re's 10% share which was extended only to 31 October 2020 and was thus replaced effective from 1 November 2020.

C2.29 In addition to the hardened market conditions, the failure of the SSEC3 subsea cable at Gwynt y Môr which occurred on 15 October 2020 made securing the renewal even more complex and difficult. The renewal policy was finally placed at significantly more restrictive terms. Most of the policy was placed subject to LEG 1 exclusion being applicable in respect of the cables: [REDACTED]

C2.30 [REDACTED]

C2.31 The 2015 Root Cause Exclusion remained in place [REDACTED].

C2.32 Increased deductibles were also imposed [REDACTED] and the premiums were also significantly increased.

C2.33 Securing 100% support for the renewal placement in 2020 necessitated discussions with a large number of insurers, including both the incumbent insurers as well as many others. The following is a list of the insurers approached and the outcome of the discussions with them:

(a) Incumbent insurers:

Insurer		
Chaucer	[REDACTED]	
Codan		
Allianz		
GCube		
Swiss Re		
Axis		
Canopius		
Nat Nederlanden		
Pioneer		

(b) Other insurers approached:

Insurer		
China Life	[REDACTED]	
PICC		
CPIC		
Taiping		
Sompo		
HDI		
Travelers		
Talbot		
IGI		
Scor		
Markel		
Berkshire Hathaway		
Munich Re		
Helvetia		
Zurich		
Generali		
Chubb		
Albus		
Risk Point		
Perse		
Aegis		
Aviva		
Gothaer		
Basler		
VIG		
AXA		

C3. The extent of insurance cover available to the Licensee in connection with the SSEC3 fault

C3.1 The insurance position is complicated because the Cable Failure occurred on what should have been the first day of the new policy.

C3.2 At the 15 October 2020 renewal, the Licensee had not secured 100% cover for a renewal and instead it had a hybrid policy with some insurers having extended the existing policy for a further period and some insurers that had entered a new policy as set out below: [REDACTED]

C3.3 The extension allowed the Licensee to finalise renewal terms with Chaucer as the lead insurer and then secure the balance of cover to fill the gap left by the departure of Canopius and Swiss Re.

C3.4 [REDACTED]

C3.5 On that basis, the Licensee expects it will not have insurance cover [REDACTED] the Cable Repair [REDACTED].

C3.6 For this reason, the Licensee considers that it is able to request IAE protection due to uninsurability.

[REDACTED]

C4. The current view of the insurance market towards the OFTO sector

C4.1 It is apparent that the insurance market in the OFTO sector has hardened in the past two years as a result of a number of insurers exiting the sector.

C4.2 The Licensee's experience is that insurers participating in a 65% share of the Licensee's 2019 policy have exited in 2020 and some of those insurers would have exited in 2019 if they had not been committed by the long-term agreement that applied from 2018.

C4.3 The insurers that remain have taken the opportunity to increase premiums and require more onerous terms and conditions. The Licensee's experience in 2020 was that:

(a) Its premiums increased by c.40% even after accepting a materially higher offshore deductible;

(b) Insurers were more reluctant to offer LEG 3 cover for the offshore cables, particularly if an OFTO had a history of cable failures. The implications for Gwynt-y-Môr are set out at paragraph C2.29;

(c) [REDACTED]

C5. Indication of whether the Licensee's insurance policy will respond to the Cable Failure.

[REDACTED]

Appendices

[REDACTED]

D1. Summary

D1.1 The purpose of this Section D is to provide evidence that the SSEC3 repair costs for the [REDACTED] Repair were incurred efficiently and economically. This cable repair was particularly challenging given:

(a) the number of other issues (several FOC Faults across a material distance) that affected SSEC3;

(b) the Covid-19 movement restrictions placed extra pressure on those involved with the operational aspects of the repair; and

(c) the weather conditions that can and did occur at the time of year.

D1.2 In this context, the Licensee considers that the repair was efficiently managed and delivered and this is emphasised by the very small increase in out-turn repair cost relative to the repair cost budget reported to Ofgem. These budgets are summarised below together with the out-turn repair cost.

D1.3 The final repair cost was [REDACTED] of weather delays as set out below.

	Description	Budget 04-Dec-20	Budget 11-Jan-21	Out-turn Cost	Comments
01	FOC tests; cable tests; fault location	51,774	51,774	£76,903	See para D8.1
02	Xodus, Motts, Pinsent, Tomoko, LOC	88,263	88,263	£167,019	See para D5
03	Safety advice, MWS	138,800	136,326	£219,812	
04	OFTO Project Team + Employer's Rep	181,583	176,954	£293,225	
05	Jointer Training	107,222	107,222	£113,796	See para D8.1
06	CAR (£1m deductible) including IPT Endorsement to OAR policy	[REDACTED]			See para D6
07	Joint parts and replacement cable				See para D7
08	Main Repair Cost (excl Weather)				See para D2
09	BBUS facilitation costs	10,000	10,000	£4,278	
10	Determining the Root Cause	24,500	24,500	£44,966	Extra RCA
11	Weather allowance [REDACTED]	[REDACTED]			See para D4.4
12	2% of items with budget cost	114,412	94,288		
	Total	[REDACTED]	[REDACTED] + 1.0%	[REDACTED] +2.1%	

D1.4 This Section D provides details of the following:

(a) Engagement with key stakeholders.

(b) Procuring a repair contractor;

(c) Delivering the repair activities; and

(d) Material costs included in the out-turn cost of the repair;

(e) Detailed summary of outturn cost for the [REDACTED] Repair.

D2. Stakeholder engagement

D2.1 During the course of the repair the Licensee routinely engaged with the key stakeholders as summarised in the table below. All meetings were held on-line, due in part to Covid restrictions.

Stakeholder	Frequency	Comment
Ofgem	Ad-hoc meetings	Check regulatory issues Impact of regulatory decisions / timings
RWE	Weekly meetings	Impact on generation Input on key repair decisions
Natural Resources Wales (NRW)	Ad-hoc briefing notes / calls	Marine licence permissions, engaged via MarineSpace (specialist marine consultants)
The Crown Estate	Two weekly meetings	TCE lease requirement
Insurance Brokers	Ad-hoc meetings	Insurance placement, CAR and OAR
Loss Adjusters x 2 MatDan and LWI	Weekly meetings	Routine updates on project progress
TA	Ad-hoc meetings	Technical support
NGET	Ad-hoc briefing notes	STC requirement
Licensee Shareholders	Weekly report	Authorisation of repair costs Routine updates
Licensee's Board	Weekly meetings	Project guidance and checking
BBUS (O&M contractor)	Weekly meetings	Provision of support to the project repair team
Repair contractor	Daily meetings / calls	Check on repair delivery and management of emerging issues

D2.2 Further details on the interactions with these stakeholders are provided in the following sections.

D3. Actions taken by the Licensee post-failure to appoint a Repair Contractor

D3.1 This section is split into two parts:

(a) Activities to prepare for the cable repair and select a preferred repair contractor.

(b) Determining the repair scope and agreeing a repair contract.

D3.2 Activities up to appointment of repair contractor

D3.2.1 The Licensee followed the process set out in its cable repair contingency plan and immediately:

(a) established a Project Repair Team (PRT) managed by personnel from within the two shareholders, Balfour Beatty Investments (BBI) and Equitix. Accountancy support for the PRT was provided by BBI under the terms of the professional services agreement.

(b) Appointed specialist advisors to support the PRT: MarineSpace (marine licences specialists to secure the necessary permits), Xodus (technical marine consultants), Safety services (health and safety consultant) and Tomoko (legal / commercial consultant).

D3.2.2 The PRT prepared tender documentation for a cable repair and established an evaluation criterion based on three determining factors (i) speed of response, (ii) probability of success and (iii) price.

D3.2.3 The Licensee invited tenders from four repair contractors:

(a) Boskalis, one of the Licensee's framework agreement contractors

(b) Global Marine (GM), one of the Licensee's framework agreement contractors

(c) Briggs Marine Contractors Limited (BMCL), framework Agreement contractor for the windfarm

(d) NKT, an experienced repair contractor who supplied the original subsea cable for the Licensee.

D3.2.4 Boskalis and NKT could not offer a viable repair solution as they offered inappropriate vessels that were also expensive (so scored poorly on two of the three evaluation criteria).

D3.2.5 The Licensee reviewed in detail the offers from GM and BMCL.

(a) The GM offer was more expensive. Its cable repair vessel had a very high day rate with time constraints for starting and finishing the repair work that did not allow much contingency for weather delay. It required a six day clear weather window for starting to make each of the two cable joints and the PRT was concerned that the vessel constraints for wave height and wind strength meant there was a very high risk that weather delays would prevent the vessel being able to complete the tasks within the time constraints that it had.

(b) BMCL offered a less common cable repair process using a jack up vessel (the Blue Tern) and a support vessel (the Zwerver 1) that would also de-bury and prepare the cable for jointing. This approach had previously been used to good effect on a repair for Walney OFTO in 2015/16. The PRT agreed this was a viable proposal, with no constraints for the critical activities of starting to make the two joints, with no apparent vessel hire time constraints and a lower repair cost than GM.

D3.2.6 BMCL offered the Licensee a fully wrapped repair solution (taking on considerable weather risk for the transit to / from the mobilisation port) using jointing and testing resource provided by EDS HV Management (a respected jointing and SAP contractor).

D3.2.7 The PRT concluded that BMCL offered the best overall solution in terms of the three evaluation criterion and the Licensee's Board agreed. BMCL was declared the preferred bidder and a letter of intent was prepared and signed on 10 November to allow BMCL to prepare for the repair.

D3.2.8 The following table sets out the key steps (from the activity log) to select the repair contractor:

Date	SSEC3 Event log - Activity
Week 1	
15-Oct-20	SSEC3 tripped at 16:54
16-Oct-20	Notify Framework Agreement repair contractors (Boskalis and Global Marine) and ask them to provide proposals for a subsea repair.
Week 2	
19-Oct-20	Boskalis: reviewed initial repair proposals. Asked Boskalis to develop budget priced options for a meeting on 20/10.
20-Oct-20	Boskalis: reviewed repair options. Licensee requested Boskalis to formalise their options for a repair and present by 14:00 21-Oct.
	PRT approach BMCL and NKT as neither Boskalis nor GM have offered a fast response proposal with a high success probability. RWE recommended BMCL as their framework contractor.
21-Oct-20	NKT: agree to submit a proposal for a repair.
	BMCL: agree to submit a proposal using a 'jack-up' vessel by 14:00, 23-Oct.
	Boskalis: Only option uses the Giant 7 (barge). 4-week delay for classification and c.2 weeks for mobilisation. PRT view: high weather risk and low success probability.
	GM: PRT concerned about weather risk and cost on VTAG8 option (barge). GM will revise proposal using the Maersk Connector and present by 16:00 22/10.
22-Oct-20	GM: Previous project finishes on 6-Dec. GM assumes 10 days weather delay before committing to the SSEC3 repair. High day rate (£175,850) for Maersk Connector.
23-Oct-20	NKT initial proposal received (based on Elektron) and sent to PRT for review.
	NKT meeting: query high Elektron day rate and concern re keel depth for the full repair. NKT cannot supply joints. No weather allowances.
24-Oct-20	External commercial advisor review of RWE's Framework Agreement with BMCL. PRT considers that using the RWE FA would speed up the BMCL appointment.
	BMCL: Review 'jack-up' vessel proposal (Wind Server or Resolution, both in NW England). BMCL confirmed they could work with EDS to provide a fully wrapped solution. BMCL will update their proposal and revert next week.
Week 3	
27-Oct-20	BMCL submit an updated proposal.
	Licensee's Board call to review BMC proposal. Agreement to pursue BMLC proposal and ask BMCL to address questions from the Licensee.
28-Oct-20	GM: advise they will only sell their joints as part of a repair contract award.
29-Oct-20	Licensee's Board call:

Date	SSEC3 Event log - Activity
	a) Further examination of BMCL's proposal. Agree BMCL is likely to secure the highest evaluation score. Boskalis' option is not viable (barge); NKT's option is not viable and expensive; GM's option is expensive and time constrained b) Anticipate it may take some time to agree a contract with BMCL so consider providing an advance works agreement for critical path activities so that BMCL's repair programme can be maintained.
30-Oct-20	BMCL meeting: OFTO team keen to identify actions to keep BMCL on programme, critical path items are survey and manufacture side chute, agree to cover these with a Letter of Intent (LoI) ahead of signing the repair contract.
	Licensee's Board call: a) Confirm BMCL is the preferred contractor – they can be notified. b) Agree to issue LoI to BMCL for enabling works (£550k) to maintain programme while contract is negotiated.
Week 4	
02-Nov-20	Draft LoI issued to Pinsent Masons for DD review
03-Nov-20	Review of repair options. The key issues are the availability of cable and joints within a reasonable time frame. There is no simple answer to address all faults.
06-Nov-20	LoI issued for BMCL review.
	Licensee's Board meeting: a) Review pros and cons of the various repair options (power core only, power core/Spare FOC, power core/ Main FOC etc). b) Difficult conundrum of focusing on the immediate problem of repairing the power core fault versus reducing the risk of future failures from the other FOC breaks, all in the context of the Licensee's cash constraints.
Week 5	
09-Nov-20	PRT Call: a) Agree to focus on the power core repair due to limited cable availability; retain option to repair the Main FOC faults if circumstances allow. b) Detailed Scope of Works (SoW) to be provided to BMCL.
10-Nov-20	PRT:BMCL call. BMCL ask Licensee to confirm repair scope (power core repair only or include FOC repairs as this – the choice will determine vessel selection). Discussed how the solution could adapt to repair the FOC breaks if needed.
	Letter of Intent issued for BMCL signature

D3.3 Determining the repair scope and agreeing a repair contract

D3.3.1 Through the selection process, the Licensee was also considering the most appropriate scope for the repair given the other known FOC faults on the SSEC3 cable across a considerable cable length. The Licensee scoured the market for additional cable and cable joints that could be made available at short notice that would enable a more extensive repair than could be achieved using the Licensee's strategic spares.

D3.3.2 Repairs of this nature are carefully planned, and it is not really possible to include optionality for materially different repair plans in the repair contract. Although the Licensee did identify and procure additional cable joints, it was not possible to secure a reasonable length of cable to remove all the FOC faults, the Licensee concluded that it should focus on repairing the power core fault alone, which it could do using its strategic spares.

D3.3.3 One further reason supported this approach. The power core failure was located on the boundary of the scoter duck over-wintering ground and there is an exclusion for work activity between December and March each year. Extending the repair further onshore to include some or all of the other known FOC faults would extend work activity towards the centre of the over-wintering area and make it more difficult to secure a repair licence from NRW.

D3.3.4 The Licensee had a choice of repair contract to use for the repair,

(a) the version negotiated with its own framework contractors, or;

(b) the version agreed between BMCL and RWE.

Following a comprehensive review of the two contract forms, the Licensee determined that it would be simpler and more efficient to use the RWE framework agreement as the starting point and then mark it up for any material differences between the two agreements.

D3.3.5 The Licensee anticipated that it may take some time to agree the repair contract and wanted to avoid this delaying the repair programme. It therefore agreed to fund the critical enabling activities under a Letter of Intent so that these activities could progress in parallel with the contract negotiation.

D3.3.6 The following table sets out the key steps (from the activity log) to sign the repair contract.

Date	SSEC3 Event log - Activity
Week 5	
10-Nov-20	Letter of Intent issued for BMCL signature
12-Nov-20	BMCL confirm that the UXO survey from construction is not sufficient for the jack-up vessel and a new survey will be required.
13-Nov-20	Licensee's Board: Board agree to engage BMCL to conduct a power core repair only but want a priced option from BMCL to collect extra cable from Sunderland / Velsen.
14-Nov-20	OFTO legal advisor drafting repair contract, in discussion with BMCL and PRT.
15-Nov-20	OFTO legal advisor drafting repair contract, in discussion with BMCL and PRT.
Week 6	
16-Nov-20	PRT meeting: a) Confirm HSE plans for the repair including Covid. b) Aiming for Draft contract to be with BMCL by 20 Nov.
19-Nov-20	PRT: review of draft contract to resolve issues before sending to BMCL.
20-Nov-20	Licensee's Board call: BMCL has engaged Global Energy to fabricate a 4.0m chute having been unable to locate a suitable chute on the open market. Cost £160k, six-week timeline, approved by the Board under the terms of the LoI.
Week 7	
23-Nov-20	PRT meeting:

Date	SSEC3 Event log - Activity
	a) Draft contract with BMCL for review. b) Survey works and testing to start 24/11. c) Chute fabrication is on the critical path for the repair programme
24-Nov-20	BMCL offshore survey works and cable testing to pin-point the fault location.
25-Nov-20	BMCL confirm that the 4.5m chute identified by the insurers is not suitable for shallow water as per the repair location.
	Licensee issues CDM letters to BMCL appointing them as Principal Designer and Principal Contractor (they will acknowledge and accept at contract signing).
	BMCL call re finalising contract details: Payment terms and liquidated damages.
28-Nov-20	BMCL call to review key points on the draft contract: Payment milestones, Covid and Brexit clauses, Programme, EDS costs, PCG, Weather risk, LoI costs to be included.
	BMCL ask to extend the LoI and increase the value to £800k in order to cover the additional chute and survey costs until the contract can be placed.
29-Nov-20	PRT and BMCL continue to develop the repair contract.
Week 8	
29-Nov-20	Pinsent Masons complete legal DD of contract.
	NRW grant permission for the repair as per the Licensee's method statement amended for the power core repair only.
	Licensee's Board call: a) PRT present case for signing a repair contract. Provisional approval to proceed b) Agree to extend LoI (for advanced work needed to maintain repair programme) for one week until contract is in place.
02-Dec-20	Licensee's Board directors secure shareholder approval to sign the repair contract.
	[REDACTED]
05-Dec-20	PRT and BMC work on updating and reviewing the contract.
06-Dec-20	PRT and BMC work on updating and reviewing the contract.
Week 9	
07-Dec-20	PRT:BMCL call to discuss weather delay costs for vessels other than the repair vessels.
08-Dec-20	PRT:BMCL call to review final contract issues. Liverpool is not available for mob and de-mob and the Clyde is suitable with no impact on the programme.
09-Dec-20	BMCL and Licensee sign repair contract for SSEC3 Power Core repair

D4. Delays during the Repair and their impact on out-turn cost

D4.1 The repair project suffered 16 days delay against the contract programme (issued 7 January 2021) (that was the basis of the programme included in the update issued to Ofgem on 11 January 2021).

D4.2 The 16-day delay included 12.2 days due to weather, 2.8 days due the error by BMC in over-boarding the second joint and 1 day due to the repair activities taking longer than planned.

D4.3 The only delay that increased the repair cost was the agreed waiting on weather cost [REDACTED].

D4.4 Weather Delays

D4.4.1 The agreed programme used in the repair contract was issued by BMC on 7 January 2021. The dates from this programme were also used in the update issued to Ofgem on 11 January 2021.

D4.4.2 This contract programme indicated that SSEC3 would be returned to service on 19 February 2021. SSEC3 was finally returned to service on 7 March, a delay of 16 days.

D4.4.3 12.2 days (of this 16-day delay) was due to agreed weather delays, primarily where conditions were unsuitable for the Resolution to jack-down after completing the first and second joints.

D4.4.4 During the over-boarding of the second joint on 3 March, there was an uncontrolled lowering from the quadrant (used to securely lay the cable on the seabed). The cable settled on the seabed with a loop in the cable that is assessed to be below the minimum bend radius (MBR) of the cable.

D4.4.5 Following a review of cable test results (fibre OTDR tests) and a review of the cable geometry, the Licensee agreed that the cable should be put on soak test on 6 March and returned to service on 7 March. An additional 2.8 days were added to the programme before reverting to the planned activities associated with re-energising the cable.

D4.4.6 The balance of 1 day (to make up the 16 days delay) is due to the work activities taking slightly longer than anticipated.

D4.4.7 The weather delay for the Zwerver 1 did not delay the programme but did increase the repair cost.

Repair Activities		Contract Programme			Out-turn Programme			WoW		Joint 2 event
		day	Start	End	Start	End	Δ	Zw1	Res'n	
1	Pre-engineering, commercial et al	4.0	02/11/20	22/01/21	02/11/20	22/01/21	+0.0			
2	Pre-repair surveys	32.0	21/11/20	23/12/20	21/11/20	23/12/20	+0.0			
3	Deliver cable	8.5	14/01/21	22/01/21	14/01/21	22/01/21	+0.0			
4	Mobilise Zwerver1	4.0	19/01/21	23/01/21	19/01/21	26/01/21	+3.0			
5	De-bury/prepare cable	6.25	23/01/21	29/01/21	26/01/21	03/02/21	+5.0	+1.2		
6	Mobilise Resolution	9.0	20/01/21	29/01/21	20/01/21	30/01/21	+2.0		+1.3	
7	Cable Repair	19.4	29/01/21	17/02/21	30/01/21	03/03/21	+14.0		+10.9	
8	Support /re-bury cable	21.0	30/01/21	19/02/21	04/02/21	06/03/21	+15.0	+4.1		
9	Phase test, soak test, re-energise	1.5	17/02/21	19/02/21	06/03/21	07/03/21	+16.0			+2.8
10	Demobilisation	5.0	18/02/21	23/02/21	04/03/21	07/03/21	+12.0			
					Totals			+5.4	+12.2	+2.8

D4.4.8 The agreed value of waiting on weather for the two vessels was agreed as follows:

	Description	Delay	
1	Repair activity took longer than expected	+1.0 days	[REDACTED]
2	Waiting on weather – Resolution (12.2 days)	+12.2 days	
3	Waiting on weather – Zwerver 1 (5.4 days)		
4	Delay associated with uncontrolled Lowering	+2.8 days	
	Total	+16.0 days	

D4.4.9 The following table sets out the waiting on weather claims that were rejected:

	Vessel	Standby Rate at sea	Total WoW claims rejected	
1	Zwerver 1	£55,000	26.03 hours	[REDACTED]
2	Resolution	£107,000	29.05 hours	
	Total			

D5. Project Management of the Repair Activities

D5.1 Summary

D5.1.1 The Project Repair Team (PRT) was established shortly after the cable fault occurred on 15 October (as set out at paragraph D3.2.1 above).

	Description	Supplier	Cost
1	Licensee's Resources Project Director – John Sinclair Project Manager – Ben Burgess Back-office support	 BBI Equitix BBI	£241,972
2	Health and Safety support for repair procedures	Safety Services	£35,630
3	Technical support for repair activity	Xodus	£92,875
4	Commercial support for repair contract	Tomoko	£16,350
5	Legal review of repair contract	Pinsent Mason	£9,913
	Total		£396,688

D5.1.2 Once the repair activities started (vessel mobilisation and cable transfer), the Licensee deployed additional resources as follows:

	Description	Supplier	Cost
1	Client Representative on repair vessels	Xodus	£49,471
2	Marine Warranty Surveyor on repair vessels and for cable loading / unloading	LOC	£184,182
	Total		£233,653

D5.1.3 After the Zwerver 1 had completed the cable de-burial and preparation activities, the client representative on the Zwerver 1 was stood down and the client representative on the Resolution covered the remaining repair activities across both vessels.

D5.1.4 The Licensee is required to provide a marine warranty service under the terms of its insurance. Part of this service is to deploy marine warranty surveyors (MWS) on each of the repair vessels from mobilisation to demobilisation and also to oversee the cable loading and unloading operation. The Licensee used LOC to provide these MWS as they are a recognised leader in the field of MWS services and have been used on each of the previous cable repairs for the Licensee.

D5.1.5 The Licensee believes that the size and make-up of the PRT struck the right balance between cost and full coverage of all the skills needed to manage a repair in accordance with good industry practice. The out-turn cost of the PRT, Client Representatives and Marine Warranty Surveyors amounted to [REDACTED]% of BMCL's contract value (including weather delay) or [REDACTED]% of the out-turn repair cost. These proportions represent excellent value for money.

D5.2 Examples of challenges faced by the PRT that were resolved without cost impact

D5.2.1 Cable Chute

(a) The Licensee issued BMCL with a letter of intent (LoI) on 10-November to cover the cost of enabling works and pre-engineering for the repair, including fabrication of a cable chute and subsea survey works.

(b) One of the consequences of using a jack-up vessel solution offered by BMCL was the need to fabricate a bespoke cable chute; this would not have been needed for a conventional repair

vessel that is fitted with a cable chute. This activity was a critical path item on BMCL's repair programme.

(c) A new cable chute needed to be fabricated as there was no suitable ready-made alternative; even Codan (an important insurer for the windfarm) could not identify a suitable alternative.

(d) The cable chute was fabricated as planned by 5 January 2021. The out-turn cost was significantly above BMCL's allowance but the Licensee would not accept this additional cost and, instead, took a decision to allow BMCL to retain ownership of the chute following the cable repair.

D5.2.2 Blue Tern Contract

(a) Securing the Licensee's letter of intent on 10 November, allowed BMCL to move to detailed formal negotiations with Fred Olsen Windcarrier (FOW), the owners of the *Blue Tern* (and with Van Stee Offshore Support BV, the owners of the *Zwerver I*) via BMCL's agent (David Nielsen, 3 Offshore).

(b) After signing the repair contract on 9 December, BMCL moved to finalise the commercial discussions that would commit both repair vessels *Zwerver I* and *Blue Tern*. The activities required to complete this exercise were different for each vessel. It was more complex for the *Blue Tern* as it depended on:

Securing necessary site-specific information	Shallow water depths meant the vessels are operating close to their limits. So accurate depth information was required. The Blue Tern also required an unexploded ordnance (UXO) as low as reasonably practicable (ALARP) sign off certificate as a condition of contract. This is an important document for jack-up vessels because of the way they interact with the seabed. Surveys occurred between 21-Nov and 14-Dec; survey data was processed and issued between 30-Nov and 23-Dec; the UXO ALARP certificate was provided on 23-Dec as per the programme.
Agree special conditions to the standard form contract that reflect the operational complexity.	Using a Jack-Up vessel for the proposed repair required special conditions that the *Blue Tern* vessel owner was unfamiliar with. This negotiation started when the LoI between Licensee and BMC was agreed and continued after the Licensee and BMC signed their repair contract. Agreeing the final form of these conditions is always an iterative process.

(c) Each of these activities progressed in parallel and on 21 December the Blue Tern contract was in an agreed form and presented to senior management (Fred Olsen Windcarrier) for signing.

(d) In parallel, a new Covid-19 variant had been detected in the UK and started to spread to other European countries. The status escalated dramatically from 20 December with some countries closing their borders to the UK and several others stopping flight corridors (see document *210114_SSEC3_ActivityLog-Covid ISSUED* that was shared with Ofgem on 15 January 2021).

(e) Senior management at Fred Olsen were extremely concerned by the developments and particularly the risk posed to their employees and use of the vessel if the UK entered an extended lock-down. This led to a decision to withdraw the *Blue Tern* and this was confirmed by e-mail received at 13:32 on 22 December 20 by BMC's agent (David Nielsen, 3 Offshore):

> *I hope this email finds you well in these unusual times.*

In relation to the cable repair job on Gwynt y Môr, the recent development in the Covid-19 pandemic unfortunately means that we will not be able to utilize Blue Tern for the above scope. The uncertainty and complications around mobilization in the UK, the operational issues (getting supplies etc), and off course conducting crew change, when all flights at the moment are suspended, entry ban enforced and the potential outlook of a complete UK lock down.

We appreciate your understanding in the matter.

(f) On hearing of the loss of the Blue Tern, RWE and Codan both contacted Fred Olsen to explore their decision and determine if the decision could be reversed, neither were successful.

(g) With the Blue Tern no longer available, BMCL acted quickly to secure a similar repair vessel through Van Oord (focussed on MPI Adventure and MPI Resolution).

(h) MPI Resolution became the preferred vessel and BMCL contract negotiations progressed swiftly with the expectation that the vessel could be under contract with no increase to the repair cost.

(i) On 28 December, BMCL informed the Licensee that the MPI Resolution had suffered engine failure. BMCL immediately started dialogue to secure the MPI Adventure as an alternative repair vessel.

(j) The engine fault on the MPI Resolution was resolved and on 6 January BMCL confirmed that they had secured the MPI Resolution for the repair.

(k) BMCL's contracted repair programme was issued on 7 January 2021. This programme showed the MPI Resolution being available to mobilise from 20 January 2021 and SSEC3 being returned to service on 19 February 2021.

D6. Insurance costs

D6.1 The repair contract assigned the following responsibilities for placing insurances:

	Insurance description	Allowance (includes IPT)	Actual (includes IPT)
1	Contractor's All risk Insurance: • Limit of liability - [REDACTED] • Includes surrounding property up to Operations all risk policy deductible • Deductible £1,000,000.00	[REDACTED]	
2	Operations All Risk Policy – surrounding property insurance		
	Insurances placed by Licensee		
3	CAR Deductible infill (to reduce BMCL's liability to £100k)	[REDACTED]	
4	Third Party Public / Products Liability • £25m liability • Deductible £25,000.00		
5	Charterer's liability for vessels		
	Insurances placed by BMCL		

D6.2 The CAR insurance (Item 1) was placed with Codan [REDACTED].

(a) The premium offered originally included a [REDACTED] broker fee [REDACTED] including IPT) but the Licensee negotiated this fee down to [REDACTED], a saving of [REDACTED].

(b) Codan offered CAR insurance with a [REDACTED] deductible for an additional [REDACTED] including IPT but this was not considered to represent good value for money.

D6.3 Surrounding property cover (Item 2) is required to cover the additional risk to the OAR insurers by virtue of the repair contractor's activities adjacent to the other assets owned by the Licensee.

[REDACTED]

D7. Replenishing the Licensee's strategic spares

D7.1 Replacement Cable

D7.1.1 The Licensee organised a tender for procuring new cable sufficient to resolve the remaining issues with SSEC3 and also replenishing the Licensee's strategic spares stock.

D7.1.2 The enquiry was issued to five suppliers and four tenders were received:

Supplier				
A	[REDACTED]			
B				
C				
D				
E				

D7.1.3 Supplier A and B where shortlisted for a further pricing and evaluation stage, which resulted in the following outcome:

Supplier			
B	[REDACTED]		
A			

D7.1.4 An order was placed with Supplier B on 30 March for 8.5km of new cable available ex-factory by 30 September 2021. The price adjustment mechanism (for metal prices and currency) in the contract resulted in a small increase [REDACTED].

D7.1.5 The maximum single length that either supplier could offer was 7.5km. The balance of 1km from the order will be supplied ex-factory on 30 November 2021 and be delivered separately [REDACTED]. This 1km will be treated as the Licensee's strategic spare.

D7.1.6 The effective cost of 1km of strategic spare cable is therefore [REDACTED] plus an allowance of

(a) £100,000.00 to offload the cable from the delivery vessel into the Licensee's stores; and

(b) £12,000.00 for the factory acceptance tests that will occur in September 2021.

D7.2 Replacement Joints

D7.2.1 The Licensee placed an order with Global Marine to purchase three Universal Joints in December 2020 at a time when the Licensee was considering its options for the 2020 Cable Failure repair.

D7.2.2 They were available for delivery in an appropriate time frame for use on the cable repair if required and the Licensee's Board agreed to purchase them at a cost of [REDACTED] per joint.

D7.2.3 The Licensee has included the cost of two of these joints in its IAE claim as replacement for the two joints (a cost of [REDACTED]) that it has used in the cable repair.

D8. Summary of overall costs

D8.1 The following table provides a broad explanation of the cost categories used in the [REDACTED] Repair.

Category	Description
01.Testing	In every repair there are several types of tests undertaken, for example to test: • the integrity of the fibre optic cables (FOC) before and after the repair • the location of the power core fault • the phasing of the power core cables tests; This category also includes any associated costs to facilitate this testing.
02.TA/legal/comm	This category covers general support from external advisors in: • preparing the scope of the repair (Xodus), • preparing and checking the contractual arrangements from a commercial and legal perspective (Tomoko and Pinsent Masons) • ensuring it is satisfactory from a lender perspective (Motts) • securing necessary consents (MarineSpace) • investigating the circumstances or potential causes (outside of the Root Cause Analysis) of the FOC faults (SDC)
03.Safety	This category covers support in: • reviewing the safety procedures and RAMS for the repair (Safety Services) • fulfilling the requirements of the Licensee's insurance policy to provide a marine warranty surveyor to oversee various phases of a project and issue their approval of documents, specific operations, vessel and equipment suitability, certificates of approval and suitability inspections (LOC).
04.Repair Mgmt	This category covers project management support onshore and offshore: • Project management from the Licensee's shareholders (BBI and Equitix) • Employer's Representative on the repair vessels (Xodus)
05.Training	This category covers any training needs in preparing to deliver an efficient repair activity. Primarily, these costs covered an exercise organised by the Licensee to provide specific training for the jointer team (and reserve jointers) in the procedure for jointing the SEI joints that would be used for the repair. All subsea joints have subtle differences, so it was appropriate for the Licensee to provide training for EDS jointers. The Covid-19 restrictions added extra expense to the training costs. The Licensee arranged for a one-week training course in the UK given by SEI trainers from Japan.
06.Insurance	The category covers the insurances arranged by the Licensee: • Construction All-Risks (CAR) cover for the repair activities • Endorsements from the Operational All-Risks (OAR) insurers for the extra risk exposure to the surrounding property as a result of the repair activities • Brokers fee for placing the insurances
07.Parts	This category covers: • Any necessary parts needed to conduct the repair

Category	Description
	• Replenishment of the Licensee's strategic spares stockholding for the parts used in the repair (SEI for cable and Global Marine for Joints)
08.Repair contract	This category covers the main repair contractor's costs (excluding waiting on weather costs) together with relevant variations (cost adjustments allowed by the repair contract) or variation orders (additional scope items requested by the Licensee) implemented during the repair
09.Cable loading	This category covers any costs associated with cable loading costs for cable leaving or returning to the Licensee stores that is not included within the Repair contract category (BBUS generally).
10.RCA Investigate	Costs associated with determining the Root Cause of the failure (RINA Tech)
11.WoW Actual	Cost of actual weather delays incurred during the repair operation

D9. Summary of overall costs incurred and included in this IAE claim

D9.1 The following table provides a headline summary of the costs incurred during the repair of SSEC3:

Category	Description	SSEC3 Total
01.Testing	FOC tests; cable tests; fault location	£76,902.83
02.TA/legal/comm	Xodus, Mott MacDonald, Pinsents, Tomoko, Marine Space, SDC	£167,019.05
03.Safety	Safety advice, MWS	£219,811.72
04.Repair Mgmt	BBI / Equitix mgmt + Employer's Rep	£293,224.69
05.Training	Jointer Training	£113,796.05
06.Insurance	CAR cover plus endorsements for existing	[REDACTED]
07.Parts	Replacement cable and joints + joint parts	
08.Repair contract	Main Repair Cost (excl Weather)	
09.Cable loading	Loading / unloading from storage	£4,278.08
10.RCA Investigate	Determining the Root Cause	£44,965.50
11.WoW Actual	Actual weather delays incurred	[REDACTED]
Total	Total SSEC3 Repair	[REDACTED]

D9.2 The following table provides a detailed summary of the costs incurred during the repair of SSEC3:

ID1	Category	Supplier	Description	
1	01.Testing	BBUS	A174: FOC Testing	[REDACTED]
2		BBUS	A177: LIRA Test	
3		BBUS	A186: Support for DAS Testing by Powersure	
4		BBUS	A197: FOC Testing Q3-20	
5		BBUS	A202: SSEC3 Trip Oct-15 Initial Response	
6		BBUS	A208: Access to S/S for EDS testing Oct-20	
7		BBUS	A213: Prepare cable basket ends for testing	
8		BBUS	A214: BBUS checking HGY ABB Joints	

ID1	Category	Supplier	Description	
9		BBUS	A215: Lifting cable sections for EDS training	[REDACTED]
10		BBUS	A217: BBUS support to EDS (training)	
11		BBUS	A218: Access to Onshore Substation for EDS	
12		BBUS	A244: CTC handback, cable soak & re-energise	
13		EDS	Fault location testing & HV safety management	
14	02.TA /legal /comm	MarineSpace	Marine Licence consent compliance	
15		Motts	Lenders TA (Mott MacDonald)	
16		Pinsent Mason	Legal DD on Repair Contract	
17		SDC	Investigation of FOC failure mechanism	
18		Tomoko	Framework review and OFTO calls	
19		Xodus	Technical Advisor support services	
20	03.Safety	LOC	Marine Warranty Surveyor	
21		Safety Services	HSE services for repair	
22	04.Repair Mgmt	BBI	Support in managing the repair	
23		BBUS	A239: To change SSEC3 RISSP Under CTC	
24		Equitix	Support in managing the repair	
25		Xodus	Employers Agent on the vessel	
26	05.Training	SEI	132kV repair joint training	
27		EDS	Jointer training: Logistical support and jointers	
28		EDS	Jointer training: Additional costs	
29	06.Insurance	WTW	CAR Insurance	
30		WTW	Endorsements on existing operational policies	
31	07.Parts	BBUS	A175: Perishable items for SEI Joints	[REDACTED]
32		BBUS	A235: BBUS loading spares for BMC	
33		BBUS	A226: SEI cable trans-spooling at Sunderland	
34		BBUS	A238: BBUS Transport of 3x GM Joints	
35		Power CSL	Replacement FOC joints for Universal Joints	
36		Global Marine	2 x 500mm or 630mm joints	
37		SEI	Hydraulic Ram for SEI Joints	
38		SEI	New cable for Strategic Spares	
39		Allowance	Unloading SEI cable from vessel into stores	
40		Allowance	Factory Acceptance Tests for SEI Cable	
41	08.Repair contract	Briggs Marine	Main Repair Cost - Insurance cost rebate	
42		Briggs Marine	Main Repair Cost (excl Weather)	
43		Briggs Marine	Variations: V01 and V02	
44		BBUS	A252: BBUS unloading spare Joints from BMC	

ID1	Category	Supplier	Description	
45	09.Cable loading	BBUS	A253: BBUS unloading used cable from BMC	[REDACTED]
46	10.RCA Investigate	Rina Tech	Cable failure investigation	
47		Rina Tech	2nd FOC fault in recovered cable	
48		Rina Tech	Stress tests on FOC	
49	11.WoW	Briggs Marine	Waiting on Weather: Power Core - BMC	
			Total Repair Cost	

D10. A reconciliation of the costs incurred with the invoices that have been received

D10.1 The following reconciliation has been prepared by cost category:

Cost Category	Value	Invoiced	Outstanding
01.Testing	£76,902.83	£59,671.37	£17,231.46
02.TA/legal/comm	£167,019.05	£167,019.05	£0.00
03.Safety	£219,811.72	£219,811.72	£0.00
04.Repair Mgmt	£293,224.69	£293,224.69	£0.00
05.Training	£113,796.05	£113,796.05	£0.00
06.Insurance	[REDACTED]	[REDACTED]	
07.Parts			
08.Repair contract			
09.Cable loading	£4,278.08	£4,278.08	£0.00
10.RCA Investigate	£44,965.50	£25,165.50	£19,800.00
11.WoW Actual	[REDACTED]	[REDACTED]	
Totals	[REDACTED]	[REDACTED]	

D10.2 The following reconciliation has been prepared by supplier:

Supplier	Repair cost	Invoiced	Outstanding
LOC	£184,181.72	£184,181.72	£0.00
MarineSpace	£12,947.50	£12,947.50	£0.00
Mott Macdonald	£17,849.25	£17,849.25	£0.00
Pinsent Masons	£9,912.80	£9,912.80	£0.00
Rina Tech	£44,965.50	£25,165.50	£19,800.00
Safety Services	£35,630.00	£35,630.00	£0.00
Tomoko	£16,350.00	£16,350.00	£0.00
Xodus	£92,874.50	£92,874.50	£0.00
Xodus_Agent	£49,471.01	£49,471.01	£0.00
WTW	[REDACTED]	[REDACTED]	£0.00

Supplier	Repair cost	Invoiced	Outstanding
	[REDACTED]	[REDACTED]	
BBI	£159,895.18	£0.00	£159,895.18
Equitix	£82,025.67	£82,025.67	0.00
Briggs Marine	[REDACTED]	[REDACTED]	
BBUS	£146,160.48	£114,434.02	£31,726.46
EDS	£55,475.05	£55,475.05	£0.00
Power CSL	£25,120.00	£0.00	£25,120.00
SDC	£17,085.00	£17,085.00	£0.00
Allowance	£112,000.00	£0.00	£112,000.00
Totals	[REDACTED]	[REDACTED]	

D10.3 Invoices for the following activities are outstanding

ID2	Supplier	Description	Balance
4	BBUS	A186: Support for DAS Testing by Powersure SSEC3	4,200.00
6	BBUS	A202: SSEC3 Trip Oct-15 Response to check relays et al	3,800.00
12	BBUS	A218: Access to Onshore Substation for EDS	911.53
13	BBUS	A226: SEI cable transpooling & EDS work at sunderland	14,495.00
17	BBUS	A244: SSEC3 CTC Handback, Cable Soak and Re-Energise	8,319.93
23	Power CSL	Replacement FOC joints for Universal Joints	25,120.00
[REDACTED]			
107	RINA Tech	Cable failure investigation - balance of allowance	19,800.00
[REDACTED]			
49	Allowance	Unloading SEI cable from vessel into stores	100,000.00
50	Allowance	Factory Acceptance Tests for SEI Cable	12,000.00
		Totals	[REDACTED]

D10.4 On the following page the Licensee has provided a list of all the invoices received to date.

D10.5 The following table sets out the invoices received to date and, if appropriate, the balance of costs that are expected to be invoiced.

ID2	Supplier	Invoice	Description	Date			
1	BBUS	69631	A174: FOC Testing	03-Nov-20	[REDACTED]		
2	BBUS	68831	A175 - Procure Sumitomo joints	12-Nov-20			
3	BBUS	69715	A177: LIRA Test	15-Jan-21			
4	BBUS		A186: Support for DAS Testing by Powersure SSEC3				
5	BBUS	69506	A197: FOC Testing Q3-20	15-Jan-21			
6	BBUS		A202: SSEC3 Trip Oct-15 Response to check relays et al				
7	BBUS	68727	A208: Access to S/S for EDS/Powersure testing 28/29-Oct-20	03-Nov-20			
8	BBUS	69350	A213 - SSEC3 related - Cable basket ends	15-Jan-21			
9	BBUS	69346	A214 - SSEC3 - HGY cable spares inventory	15-Jan-21			
10	BBUS	69347	A215 - SSEC3 - lift cable sections & load lorry	15-Jan-21			
11	BBUS	69344	A217 - SSEC3 - SEI cable testing	15-Jan-21			
12	BBUS		A218: Access to Onshore Substation for EDS				
13	BBUS		A226: SEI cable trans-spooling & EDS work at Sunderland				
14	BBUS	69402	A235 - SSEC3 BMC loading of joints	21-Jan-21			
15		69507	A238 - SSEC3 Transportation of joints	29-Jan-21			
16		69700	A239 - SSEC3 EDS Request to change RISSP under CTC	26-Feb-21			
17			A244: SSEC3 CTC Handback, Cable Soak and Re-Energise				
18		69753	A252 - BMC Unloading spare joints	11-Mar-21			
19		69754	A253 - BMC Unloading used cable	11-Mar-21			
20	EDS	1833	Logistical support and jointers for 132kV repair joint training	11-Jan-21			
21	EDS	1834	Additional costs associated with 132kV repair joint training	11-Jan-21			
22	EDS	2885	Testing	19-Mar-21			

ID2	Supplier	Invoice	Description	Date			
23	Power CSL		Replacement FOC joints for Universal Joints		[REDACTED]		
24	Global Marine	18006	66.67% of invoice for 3 x 150kV universal joints - perishables	21-Jan-21			
25	Global Marine	18007	66.67% of invoice for 3 x 150kV universal subsea joints - Stage 1	21-Jan-21			
26	Global Marine	18137	66.67% of invoice for 3 x 150kV universal subsea joints - Stage 2	15-Mar-21			
27	Global Marine	18263	66.67% of invoice for 3 x 150kV universal subsea joints - Stage 3	15-Apr-21			
28	LOC	24282	Marine Warranty Surveyor - Jan-21	31-Jan-21			
29	LOC	24390	Marine Warranty Surveyor - Feb-21	28-Feb-21			
30	LOC	24423	Marine Warranty Surveyor - Mar-21	30-Mar-21			
31	Motts	417610	Lenders TA (Mott Macdonald)	09-Dec-20			
32	Motts	425462	Lenders TA (Mott Macdonald)	17-Mar-21			
33	Motts	432666	Lenders TA (Mott Macdonald)	15-Mar-21			
34	MarineSpace	19980	Cable repair Marine Licence consent compliance	30-Nov-30			
35	MarineSpace	20044	Cable repair Marine Licence consent compliance	31-Dec-20			
36	MarineSpace	20087	Cable repair Marine Licence consent compliance	31-Jan-21			
37	MarineSpace	20131	Cable repair Marine Licence consent compliance	28-Feb-21			
38	MarineSpace	20179	Cable repair Marine Licence consent compliance	31-Mar-21			
39	MarineSpace	20280	Cable repair Marine Licence consent compliance	31-May-21			
40	Pinsents	6568201	Legal DD on Repair Contract	31-Oct-20			
41	Pinsents	6573619	Legal DD on Repair Contract	30-Nov-20			
42	Pinsents	6576858	Legal DD on Repair Contract	31-Dec-20			
43	Pinsents	6583181	Legal DD on Repair Contract	28-Feb-21			
44	SDC	2020-558	Investigation of FOC failure mechanism	09-Mar-21			
45	SEI	82244	132kV repair joint training	18-Nov-20			

ID2	Supplier	Invoice	Description	Date			
46	SEI	82715	Hydraulic Ram for SEI Joints	17-Dec-20	[REDACTED]		
47	SEI	110235	30% payment for new cable (Strategic Spares) + Transport	30-Mar-21			
48	SEI		70% payment for new cable (Strategic Spares) + Transport				
49	Allowance		Unloading SEI cable from vessel into stores				
50	Allowance		Factory Acceptance Tests for SEI Cable				
51	Safety Services	GYM001	HSE services for repair	30-Nov-20			
52	Safety Services	GYM002	HSE services for repair	31-Dec-20			
53	Safety Services	GYM003a	HSE services for repair	02-Feb-21			
54	Safety Services	GYM003	HSE services for repair	28-Feb-21			
55	Safety Services	GYM005	HSE services for repair	15-Apr-21			
56	Safety Services	GYM006	HSE services for repair	07-Jun-21			
57	Tomoko	0072	Framework review and OFTO calls - Oct-20	30-Oct-20			
58	Tomoko	0074	Framework review and OFTO calls - Nov-20	30-Nov-20			
59	Tomoko	0077	Framework review and OFTO calls - Dec-20	31-Dec-20			
60	Tomoko	0079	Framework review and OFTO calls - Jan-21	04-Feb-21			
61	Tomoko	0081	Framework review and OFTO calls - Feb-21	01-Mar-21			
62	Tomoko	0083	Framework review and OFTO calls - Mar-21	01-Apr-21			
63	Tomoko	0085	Framework review and OFTO calls - Apr-21	01-May-21			
64	Xodus	43036	Technical Advisor support services - Oct-20	06-Nov-21			
65	Xodus	43370	Technical Advisor support services - Nov-20	09-Dec-20			
66	Xodus	43691	Technical Advisor support services - Dec-20	12-Jan-21			
67	Xodus	43968	Technical Advisor support services - Jan-21	05-Feb-21			
68	Xodus	44321	Technical Advisor support services - Feb-21	11-Mar-21			

ID2	Supplier	Invoice	Description	Date			
69	Xodus	44648	Technical Advisor support services - Mar-21	12-Apr-21	[REDACTED]		
70	Xodus	44915	Technical Advisor support services - Apr-21	06-May-21			
71	Xodus	45273	Technical Advisor support services - Apr-21	08-Jun-21			
72	Xodus_Agent	43969	Employers Agent on the vessel - Jan-21	05-Feb-21			
73	Xodus_Agent	44322	Employers Agent on the vessel - Feb-21	11-Mar-21			
74	Xodus_Agent	44649	Employers Agent on the vessel -Mar-21	11-Mar-21			
75	Briggs Marine	81678	Letter of Intent (LoI)	03-Dec-20			
76	Briggs Marine	81734	Letter of Intent (LoI)	09-Dec-20			
77	Briggs Marine	81733	Administration and project management	10-Dec-20			
78	Briggs Marine	81770	Administration and project management	14-Dec-20			
79	Briggs Marine	83175	Project documentation	07-Jun-21			
80	Briggs Marine	82526	Cost of insurances required by Conditions of Contract	18-Mar-21			
81	Briggs Marine	81834	Mobilisation of Vessel, Contractor's Equipment & Personnel	21-Dec-20			
82	Briggs Marine	81811	Mobilisation of Vessel, Contractor's Equipment & Personnel	21-Dec-20			
83	Briggs Marine	82525	Demobilisation of Vessel, Contractor's Equipment & Personnel	18-Mar-21			
84	Briggs Marine	82155	Testing and checks of Free Issued Equipment	31-Jan-21			
85	Briggs Marine	82155	Collection, loading, transport of Free Issued Equipment to Site	31-Jan-21			
86	Briggs Marine	82322	Cable repair 1st Joint	23-Feb-21			
87	Briggs Marine	83223	Cable Repair 2nd Joint	14-Jun-21			
88	Briggs Marine		Cable reburial				
89	Briggs Marine	82525	Transport and unloading of remaining Free Issued Equipment and recovered faulted cable sections to port of Liverpool	18-Mar-21			
90	Briggs Marine	82155	Debury cut and preparation of 1st End	31-Jan-21			

ID2	Supplier	Invoice	Description	Date			
91	Briggs Marine	82230	Debury cut and preparation of 2nd End	12-Feb-21	[REDACTED]		
92	Briggs Marine	82525	Supply and Fit Resistor Box	18-Mar-21			
93	Briggs Marine	82525	Additional Fibre Optic Testing	18-Mar-21			
94	Briggs Marine	82574	Waiting on Weather	25-Mar-21			
95	Briggs Marine	82851	Waiting on Weather	29-Apr-21			
96	Briggs Marine	82851	Extra Cost of insurances required by Conditions of Contract	29-Apr-21			
97	WTW	004PRMR	CAR Insurance (Code 33809G20)	03-Feb-21			
98	WTW	002FEE	CAR Insurance - Willis Fee (Code 33809G20)	07-Jan-21			
99	WTW	032APM	Existing OAR policy: Endorsement – Chaucer (Code 28010G20)	03-Mar-21			
100	WTW	028APM	Existing OAR policy: Endorsement - Codan (Code 28010G20)	25-Feb-21			
101	WTW	033APM	Existing OAR policy: Endorsement - MunichRe_GCube_SCOR_PICC_ChinaLife (Code 28010G20)	03-Mar-21			
102	WTW	026APM	Existing OAR policy: Endorsement - Sompo (Code 28010G20)	25-Feb-21			
103	WTW	031FEE	Existing OAR policy: Endorsement - Willis Fee (Code 28010G20)	01-Mar-21			
104	BBI		Project Management for the Repair	28-May-21			
105	Equitix	2021-212	Project Management for the Repair	04-Jun-21			
106	RINA Tech	000910	Cable failure investigation (up to 21-May-21)	27-May-21			
107	RINA Tech		Cable failure investigation - balance of allowance				
			Totals		[REDACTED]		
			[REDACTED]		[REDACTED]		

Appendices

[REDACTED]