From:	Karen Hamilton (Brodies Solicitors)
To:	HornseaProjectThree@pins.gsi.gov.uk
Subject:	Hornsea 3 Spirit Energy post ISH 8 submission [BRO-D.FID4510105]
Date:	14 March 2019 23:48:19
Attachments:	image013.png image014.png image015.png image016.png image017.png image018.png APPENDIX 3 - DNV GL Technical Note_45157426_1.pdf

CONFIDENTIAL MESSAGE - INTENDED RECIPIENT ONLY

Dear Sirs

I will shortly send you Spirit Energy's post hearing submission. Two appendices to that submission are sent separately to avoid any email problems. The first of these is attached (Appendix 3). The second will follow in a moment.

Yours sincerely

Karen Hamilton
Partner
On behalf of Brodies LLP
Queen Street, UK
www.brodies.com

Direct Line +44(0) 141 245 6225
Mobile [redacted]

APPENDIX 3 TO SPIRIT ENERGY POSITION STATEMENT FOR ISH 8

DNV GL Technical Note

DNV·GL

Noble Denton marine services
Cromarty House
67-72 Regent Quay
Aberdeen
UK
AB11 5AR
Phone +44 1224 289 100
www.dnvgl.com

Technical Note

Date:	12 March 2019	**NDMS Ref:**	TN-782	**Rev:** 0
WS No:	10143303 Task 03	**Client:**	Spirit Energy	
Attn:	Max Rowe, Spirit Energy			
Author:	Robert Sinclair	**Checked:**	Sujit Viswanathan	
Subject:	GAP ANALYSIS OF MGN543 (M+F) REQUIREMENTS AND ORSTED ENERGY HORNSEA 3 NAVIGATIONAL RISK ASSESSMENT			

1 Introduction

As part of the process for gaining consent for the Hornsea 3 Offshore Wind Farm, Orsted Energy is required to produce a Navigational Risk Assessment (NRA) for marine traffic in the vicinity of the site. The current UK Government Guidance on this matter is contained in **Marine Guidance Note 543 (M+F): Safety of Navigation: Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response** and the supporting document **Methodology for Assessing the Marine Navigational Safety Risks & Emergency Response of Offshore Renewable Energy Installations**.

This Technical Note compares the requirements of the MGN, with the outputs of the NRA, submitted by Orsted insofar as they impact on the safety of the gas production platforms operated by Spirit Energy in the Greater Markham area. It should be noted that these installations are sited close to the proposed eastern boundary of the array (J6A: 6.9nm; Chiswick: 1.5nm; ST1: 4.5nm; Grove 2.4nm and West Grove 1.5nm). Sites for future planned wells (C6 & C7) will be encroached upon by the array area.

Gaps identified between the requirements of MGN 543 (M+F) and the associated Guidelines and the submitted NRA are highlighted throughout this document.

2 MGN 543: Introduction

It is recognised by all Parties that MGN 543 is the governing document with regard to the process, and content, to be followed in the NRA. MGN543 requires that it be read in conjunction with the Methodology.

It should be noted that both the MGN and Methodology use the terms of HSE risk assessment and do not use environmental impact assessment terms.

The MGN seeks to assist developers by highlighting the issues associated with marine safety with respect to OREIs and providing guidance as to how these issues may be managed.

3 MGN 543: Content

The content of NRAs is defined by MGN 543 as: *"These should evaluate all navigational possibilities, which could be reasonably foreseeable, by which the siting, construction, extension, operation and de-commissioning of an OREI could cause or contribute to an obstruction of, or danger to, navigation or marine emergency response. They should also be used to assess possible changes to traffic patterns and the most favourable options to be adopted"* and more specifically to include: *"Assessments should be made of the consequences of ships deviating from normal routes and recreational or fishing vessels entering shipping routes in order to avoid proposed sites. Special regard should be given to evaluating situations which could lead to safety of navigation being compromised e.g. an increase in 'end-on' or 'crossing' encounters, reduction in sea-room or water depth for manoeuvring, leading to choke points, etc".*

On page 8, para xii, the MGN specifically highlights offshore oil and gas platforms, including projects in the planning process, amongst the list of factors to be taken in to account when developing an NRA.

Annex 2 to the MGN provides that the effects of weather must be considered on traffic routeing through, and in the vicinity of OREIs must be considered.

Gap1: The effects of weather on traffic, with respect to Spirit Energy assets in the Markham area have not been considered, especially in northern or westerly strong wind conditions.

Gap 2: In general, and taking into account the prevailing winds/tides for the area, whether engine failure or other circumstance could cause vessels to drift in to danger (specifically within this paper, to Spirit Energy installations).

Note that whilst the potential for drifting vessels may be low due to the low frequency of vessels that will pass to windward, the allision risk has not been formally addressed.

MGN 543 Annex 2 states:

"In the UK all vessels have freedom to transit through OREIs, subject to any applied safety zones, and their own risk assessments, which should take account of factors such as vessel size, manoeuvrability, environmental factors and competency of the Master and crew".

Gap 3: The NRA fails to recognise that vessels may transit through the array in future, thus creating an unrealistic predicted set of traffic flows post-construction.

With respect to search and rescue (SAR) and vessels wishing to transit through the array, and this in effect includes Spirit Energy vessels and potentially SAR assets engaged in rescue of Spirit Energy personnel, Annex 2 Para 3.d contains the following guideline *"Developers should plan for at least two lines of orientation unless they can clearly demonstrate that fewer is acceptable"*. No clear justification for the single line of orientation proposed has been given.

Gap 4: The NRA only addresses turbines in a single line of orientation, and the siting of turbines is only given as exemplars.

Annex 3 Paragraph 10 of MGN 543 refers to the PIANC assessment of channel design which indicates that, in the Netherlands, they *"strive for an obstacle free, or buffer, zone of 2nm between wind farms and shipping lanes"*. The annex then goes on to discuss further allowances for vessels meeting end on or in overtaking situations. Given that vessels may pass to the East of the array, it would appear that a 2nm wide continuous channel along a line parallel to a point 2nm west of Chiswick to 2nm West of the Grove subsea well (G5) is not excessive to enable vessels to transit, meet end on, and overtake, and to allow for not under command (NUC) situations.

Finally, in this section, Annex 3 Para 10 d ii of MGN 543 states: *"Displacing a group of traffic into space utilised by other users where available sea room is already confined, must be considered"*.

Gap 5: The confined sea room resulting from the proposed array, around Grove has not been considered in the NRA. A theoretical assumption has been made in the NRA that East/West traffic between the Humber and North-West European ports will pass to the North of the array post construction. However, as the distance to the South is (marginally) shorter and also gives greater clearance from the array, it is inevitable that, in certain weather conditions, traffic around Grove will increase.

4 Methodology for assessing the marine navigational safety risks and emergency response of offshore renewable energy installations

This document is considerably more voluminous than MGN543 and seeks to provide detailed guidelines for applicants to ensure their NRAs meet the requirements of the MCA. MGN 543 clearly states that these guidelines should be *"closely followed through all stages of planning and development"*.

In the introduction to the methodology in section 1.2 Risk Control, it is stated that *"The*

primary duty in law (HSWA 1974) is to reduce risk so far as is reasonably practicable (SFAIRP). The mere fact that a risk falls into a 'tolerable' or 'broadly acceptable' band in a Criticality Matrix (See Appendix 1), or is below some numerical limit, does not prove that it has been reduced SFAIRP. Further reduction may still be reasonably practicable, however small the risk".

Gap 6: The NRA as presented does not show that the risks associated with diverted traffic collisions/allisions to Spirit Energy assets has been reduced to ALARP. This is despite being informed of the HSE recognised Major Accident Hazards associated with allisions/collisions on 20th September 2017.

(The above requirement to reduce risks to ALARP is further reinforced in Section 4 – Marine Navigational Safety Goal which states:

"Due to the lack of specified goals it is therefore prudent to consider the overarching UK principle of reducing risk to that which is "as low as reasonably practical" and that "relevant good practice risk controls are in place". This overarching principle is based on the UK Health and Safety Executive (HSE) document "Reducing Risks Protecting People")

The Methodology document allows for (1.4) Specific (area) Traffic Assessments and this would be appropriate for the Markham Hole given the Major Accident Hazards existing in the area, however as this is not a pre-requisite it is not identified as a gap.

Section 3 outlines the scope and depth of the assessment required by a developer. 3.4 outlines a requirement for a "*comprehensive Hazard Log".* The NRA does not recognise the major accident hazard associated with collisions between vessels and producing gas platforms

Gap 7: By not accepting the concerns of Spirit Energy (20th September 2017) to highlight the Major Accident Hazards (MAH) associated with gas platforms (as highlighted by the Methodology, paragraph B3.3, H1 Accident Category (2) (4) Explosion) and the HSE, the Applicant has, in effect, excluded any consideration of the associated risks and these have 'fallen out' of the NRA process and are therefore not considered despite the potentially catastrophic consequences.

For Spirit Energy, Gap 7 is the critical factor in that the Applicant, by not accepting the input to the Hazard Log of the MAH associated with allisions with gas platforms, has negated their duty to subsequently risk assess, and then mitigate the risks highlighted. Paragraph 6.1 of the Methodology document requires that "*for each entry in the hazard log, the risk shall be assessed against a risk Criticality Matrix"* and assessed against an "*Evidence Matrix".* By incorrectly categorising in environmental impact language the external risk of allision as "minor adverse" and then not applying to that evidence the Methodology, the result is that the Applicant has not accepted the Spirit Energy input to the Hazard Log.

Chapter 5 of the Methodology document gives an overview of the methodology to achieve the marine navigational safety objectives. However, key to the methodology is the creation

of the comprehensive hazard log, which, as considered above, leads to the lack of appreciation of the risks to Spirit Energy installations. The section goes on to discuss techniques and tools for assessing risk and further gaps can be identified in the process as outlined below. The lack of identification of the MAH, has also led to the Applicant not assessing the tolerability of risks and societal concerns as outlined in Chapter 6. of the Methodology Document. However, as this is dealt with above in Gap 7, no further Gap has been identified.

Chapter 9 of the methodology document outlines the indicative process followed by Government Departments in responding to a developer's submission. 9.1 highlights in the background statement: "*The targeting of action: focussing on the most serious risks or where the hazards need greater controls*". From Spirit Energy's perspective, the hazards addressed in the NRA are relatively insignificant when compared to the consequences with a vessel collision with a producing gas platform.

Gap 8: The NRA does not address the most serious risks associated with the proposed wind farm development.

Chapter 10 of the methodology document introduces seven Annexes, providing detailed guidance to developers.

Annex B of the methodology document provides for setting the scene and description of the Marine Environment. Annex C of the methodology document provides for hazard identification under C1 and risk assessment in C2, as well as influences and tolerability. Annex D of the methodology document concerns area assessment and specific assessment techniques. Annex E concerns risk controls.

This paper only addresses annexes where specific issues, relevant to Spirit Energy arise.

Annex B: 3.3 of the methodology document provides an exemplar list of potential activities resulting from navigation activities (which should then be subject to risk assessment) and these include in H1 (2) (4) - 4 Explosions and 4.2 High Severity Outcomes.

Gap 9: The NRA does not assess the high severity outcomes of explosions, associated with allisions with gas platforms in the immediate vicinity of the proposed wind farm.

Annex B.3.4 of the methodology document outlines navigation activities affected by an OREI which require to be assessed: (2) Navigation on Passage (3): Navigating through an OREI; has not been assessed on the basis that the Applicant has no experience of this to date. However, this takes no account of future technology, trends or as a result of increasing areas of sea room being subsumed into wind farms.

Gap 10: The NRA does not assess the affect(s) of traffic navigating in and through the proposed wind farm (as required by the Guidelines) and the potential effects on Spirit Energy installations (Note this is supplemental to Gap 3).

In the NRA process, the applicant has in effect created a traffic 'no-go zone' in the array,

which is contrary to expressed MCA/Trinity House requirement. This has the perverse effect of creating a notional traffic shadow area around the array which gives the associated false impression that the adjacent Spirit Energy assets will somehow be completely shielded from passing traffic, and traffic emerging from the eastern edge of the array.

The Applicant has, therefore, not assessed the true situation of its proposed array (i.e. a vessel permeable array area) in the suggestion that it has assessed a worst case. As such, the Applicant has failed to address the risk to C6 and C7 and to Grove and Chiswick of vessel traffic within and emerging from, as well as going around, the proposed array area

Annex B.3.4 of the methodology document highlights that 6.6: Oil and Gas Operations including 6.5 De-commissioning operations should be considered in the NRA. Gap 7 (above) highlights the point regarding MAH associated with the Spirit Energy Gas Operations.

Gap 11: Although de-commissioning operations are mentioned in the NRA, they are not considered in the NRA such that the risks, or economic consequences can be considered ALARP in relation to Spirit Energy assets.

Annex B.3.7 of the methodology document outlines other structures and features that could affect navigation activities that should be considered in the NRA, including 2: Oil and gas installations (Existing and projected).

Gap 12: The NRA does not address all planned oil and gas activity in the vicinity of the proposed wind farm.

Annex B 3.9 of the methodology document outlines weather conditions affecting navigation activities that should be considered in the NRA including 1.2 Wind strength and direction. Gap 1 (above) covers this point.

Annex C.3.2 of the methodology document outlines a series of risk factors to be considered in the NRA, these include 1: Location; 2: Alignment of OREI; 3: Interrelations between vessels and, especially 9: Reduction in searoom for manoeuvring. These factors conspire, especially around the Grove platform, and any jack-up rig servicing the Grove 5 well, and the C6 and C7 wells, to potentially considerably increase the risks associated with vessel to vessel/installation collisions. This is particularly the case as no layout has yet been proposed by the developer.

Gap 13: In failing to have identified the Major Accident Hazard of explosion, resulting from vessel/installation collisions, the NRA then does not address the risks associated with the risk factors noted above in relation to the Spirit Energy installations, especially Grove, and the associated G5 subsea well (during well work over activity) and the projected sub-sea wells in the locations of C6 and C7.

In the absence of a defined layout at this stage of the consent process, the risks associated

with layout cannot be determined with any certainty. The potential consequences for Spirit Energy however can be considered as catastrophic. It is strongly recommended that a Protective Provision is imposed with respect to searoom to mitigate the risk factors identified.

Annex C.3.5 1.1 of the methodology document again highlights that vessels *"intentionally navigating within a wind farm or other OREI site en route or to carry out activities"* are a circumstance that should be addressed in the NRA. Gaps 3 & 10 (above) adequately address this point, however this reinforces the gaps in the NRA undertaken.

Annex C3.3.6 of the methodology document outlines influences on consequences (e.g. search and rescue (SAR) or emergency response operations required as a result of an unforeseen incident). In the context of Spirit Energy, this includes SAR or emergency response as a result of a collision between a third party vessel, diverted because of the proposed wind farm, with a gas platform.

Gap 14: The NRA does not address the potential effects on SAR or emergency response to an unforeseen incident at a Spirit Energy installation.

Section C4 of the methodology document again highlights the need to reduce risk so far as is reasonably practicable. Gap 6 (above) covers this point.

Annex D of the methodology document outlines an overview of appropriate risk assessment and techniques. One of the quoted sources for informing NRAs is comparison with real-world experience. Whilst the NRA does indeed use real world experience in terms of collisions and MAIB data it does not contain any reference to the major accident hazard associated with real world collisions with producing gas platforms.

Gap 15: The NRA does not draw on real world experience of the consequences of vessel collisions with producing gas platforms.

5 Conclusion

Overall, the NRA produced presents a considerable volume of information and would appear to meet an accepted standard. However, on proper scrutiny of the review criteria in MGN 543 and in the Methodology required to be applied as outlined above, significant gaps remain in relation to the installations owned and operated by Spirit Energy in the Markham Hole area. There are three main reasons for the above gaps:

- The failure to recognise the major accident hazard, clearly recognised by the Methodology and UK HSE associated with collisions between vessels and producing and projected gas platforms;
- The theoretical computer assumption input to the traffic model that no traffic will pass through the proposed wind farm. It is clear from the guidelines that this is not an acceptable model, as vessels can lawfully transit the proposed array. The model must be forward looking and must allow for this traffic;
- The assumption in the traffic model that diverted East/West traffic in the area will pass to the North of the proposed array at all times. Because the southern route is (marginally) shorter, and offers significant benefits in certain weather conditions, the traffic predictions in the NRA cannot be considered reliable or realistic in relation to SE assets, existing and proposed.

Finally, and potentially one of the most critical gaps identified in the NRA relates to the lack of reducing the risks identified to ALARP as required by UK Health and Safety Legislation, and the regulatory authority, the HSE. The Applicant's contentions at the recent Hearing that it is it not required to ALARP risks is both contrary to the Government's stated goal, and evidences that, in substance, the Applicant has not addressed expressly the Methodology and its requirement to ALARP risks.

A Risk Criticality Matrix, of a type acceptable to the MCA is appended under Section 6 of this document as an exemplar.

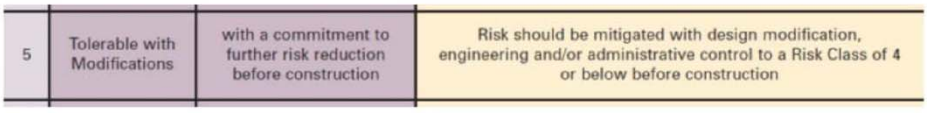
6 Appendix: International Maritime Organisation (IMO) Risk Criticality Matrix

Whilst the current revision of the Guidelines for the NRA does not promote the use of any specific risk assessment tool, preferring to leave the choice of tool to Developers, the previous revision of the Guidelines (2006) promoted the use of the IMO criticality matrix as a tool to assess the criticality of risk. The use of such a matrix serves to highlight the criticality of the risks associated with gas platforms noted above, and indicates how these may be addressed.

Figure 1: IMO Style Criticality Matrix

Using the criteria specified by IMO, it can be seen that it is highly likely that, as a result of a vessel collision with a gas platform:

- Consequence would be considered 'Catastrophic', with multiple fatalities both on the platform and the colliding vessel;
- Frequency would conservatively be considered 'Remote'. Since the advent of the North Sea oil and gas industry there have been numerous collisions between vessels and platforms including the recent product tanker Elsa Essberger collision with an unmanned offshore gas platform (Jan 2018) in the Dutch Sector of the North Sea;
- This gives a risk tolerability score of 5.



5	Tolerable with Modifications	with a commitment to further risk reduction before construction	Risk should be mitigated with design modification, engineering and/or administrative control to a Risk Class of 4 or below before construction

Figure 2: Example risk tolerability score

A risk score of 5 – Tolerable with Modifications would appear to suggest a solution to the potential affects (catastrophic consequences of crystallised risks) to which the Spirit Energy assets and activities would be exposed to as a result of the proposed

wind farm. In effect by re-designing the array, and providing a wider corridor of 2nm along the eastern boundary of the proposed array, and Spirit Energy installations, more sea room can be provided for passing/crossing/overtaking vessels, hence reducing the potential for the pinch points at Grove and Chiswick to become potential accident black spots

NOBLE DENTON CONSULTANTS LTD

Signed: Robert Sinclair

Robert Sinclair

Marine Consultant

Countersigned: [redacted] Digitally signed by Viswanathan, Sujit Date: 2019.03.12 19:07:07 Z

Sujit Viswanathan

Marine Operations and DP Manager

Aberdeen, 12th March 2019