East Anglia ONE North Offshore Windfarm

Appendix 14.4

Consequences Assessment

Preliminary Environmental Information
Volume 3
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Consequences Assessment (Appendix 14.4)

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Revision Number	Date	Summary of Change
00	21st December 2018	Initial Draft
01	14th January 2019	Updates following changes to layout

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Abbreviations Table

Abbreviation	Definition
DfT	Department for Transport
FSA	Formal Safety Assessment
IMO	International Maritime Organization
ITOPF	International Tanker Owners Pollution Federation
MAIB	Marine Accident Investigation Branch
MEHRA	Marine Environmental High Risk Area
MSC	Maritime Safety Committee
PLL	Potential Loss of Life
POB	People on Board
Ro Ro	Roll on Roll Off
TSS	Traffic Separation Scheme
UK	United Kingdom

1 Introduction

1. This Appendix presents an assessment of the consequences of collision and allision incidents, in terms of people and the environment, due to the impact of the wind farm structures to be installed within the East Anglia ONE North windfarm site.

2. The significance of the impact of the proposed East Anglia ONE North project is also assessed based on risk evaluation criteria and comparison with historical accident data in UK waters[1].

[1] In this technical note, UK waters is defined as the UK Exclusive Economic Zone (EEZ) and UK territorial waters means within the 12nm limit.

2 Risk Evaluation Criteria

2.1 Risk to People

3. With regard to the assessment of risk to people two measures are considered, namely;

- Individual risk; and
- Societal risk.

2.1.1 Individual Risk (per Year)

4. This measure considers whether the risk from an accident to a particular individual changes significantly due to the presence of the wind farm structures. Individual risk considers not only the frequency of the accident and the consequence (likelihood of death), but also the individual's fractional exposure to that risk, i.e. the probability of the individual of being in the given location at the time of the accident.

5. The purpose of estimating the individual risk is to ensure that individuals, who may be affected by the presence of the wind farm structures, are not exposed to excessive risks. This is achieved by considering the significance of the change in individual risk resulting from the presence of the windfarm relative to the background individual risk levels.

6. Annual individual risk levels to crew (the annual fatality risk of an average crew member) for different vessel types are presented in *Figure 2.1* (IMO, 2001). The figure also highlights the upper and lower bounds for risk acceptance criteria as suggested in International Maritime Organization (IMO) Maritime Safety Committee (MSC) 72/16 (IMO, 2001). The annual individual risk level to crew falls within the ALARP region for each of the vessel types presented.

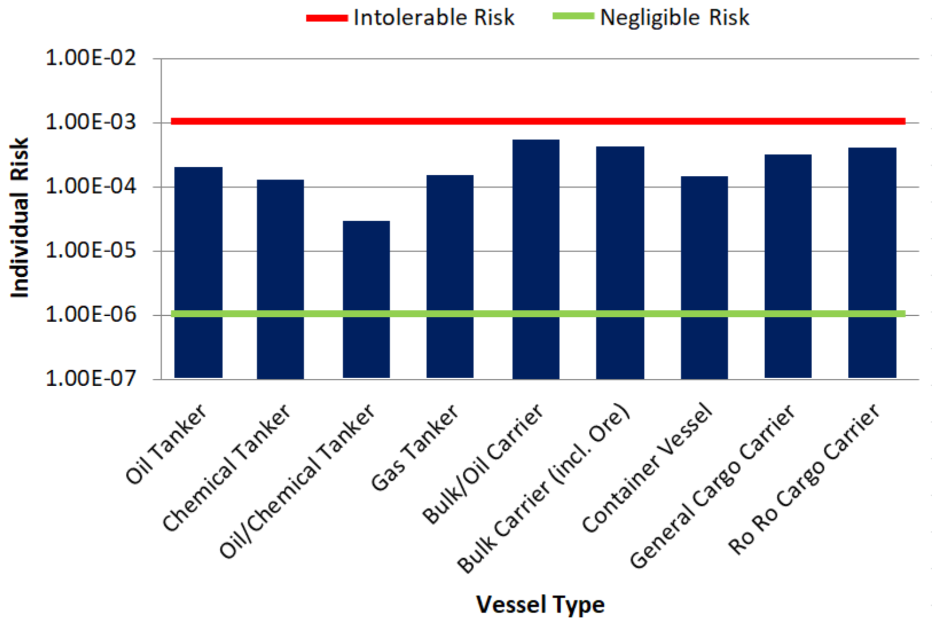

Figure 2.1 Individual Risk Levels and Acceptance Criteria per Vessel Type

7. Typical bounds defining the ALARP regions for decision making within shipping are presented in *Table 2.1*.

Table 2.1 Individual Risk ALARP Criteria

Individual	Lower Bound for ALARP	Upper Bound for ALARP
To crew member	10^{-6}	10^{-3}
To passenger	10^{-6}	10^{-4}
Third party	10^{-6}	10^{-4}
New vessel target	10^{-6}	Above values reduced by one order of magnitude

8. On a UK basis, the Maritime and Coastguard Agency (MCA) website presents individual risks for various UK industries based on HSE data for 1987 to 1991. The risks for different industries are presented in *Figure 2.2*.

9. The individual risk for sea transport of 2.9×10^{-4} per year is consistent with the worldwide data presented in *Figure 2.1*, whilst the individual risk for sea fishing of 1.2×10^{-3} per year is the highest across all of the industries listed.

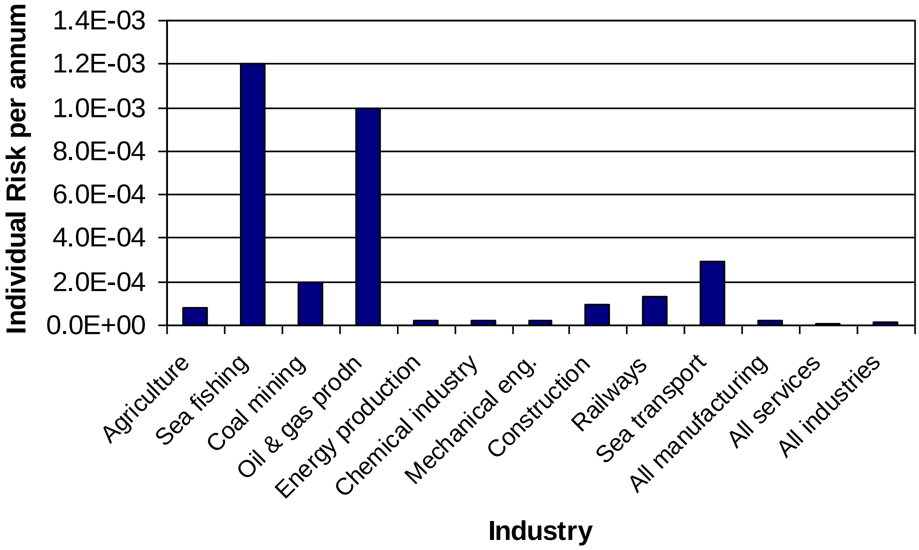

Figure 2.2 Individual Risk per Year for various UK Industries

2.1.2 Societal Risk

10. Societal risk is used to estimate risks of accidents affecting many persons, e.g. catastrophes, and acknowledging risk averse or neutral attitudes. Societal risk includes the risk to every person, even if a person is only exposed on one brief occasion to that risk. For assessing the risk to a large number of affected people, societal risk is desirable because individual risk is insufficient in evaluating risks imposed on large numbers of people.

11. Within this assessment societal risk (navigational based) can be assessed for the proposed East Anglia ONE North project, giving account to the change in risk associated with each accident scenario caused by the introduction of the wind farm structures. Societal risk may be expressed as:

- Annual fatality rate where frequency and fatality are combined into a convenient one-dimensional measure of societal risk. This is also known as Potential Loss of Life (PLL); and
- FN-diagrams showing explicitly the relationship between the cumulative frequency of an accident and the number of fatalities in a multi-dimensional diagram.

12. When assessing societal risk this study focuses on PLL, which takes into account the number of people likely to be involved in an incident (which is higher for certain vessel types), and assesses the significance of the change in risk compared to background risk levels for the UK.

2.2 Risk to Environment

13. For risk to the environment the key criteria considered in terms of the effect of the proposed East Anglia ONE North project is the potential amount of oil spilled from the vessel involved in an incident.

14. It is recognised there will be other potential pollution, e.g. hazardous containerised cargoes; however oil is considered the most likely pollutant and the extent of predicted oil spills will provide an indication of the significance of pollution risk due to the proposed East Anglia ONE North project compared to background pollution risk levels for the UK.

3 Marine Accident Investigation Branch Incident Analysis

3.1 All Incidents

15. All UK-flagged commercial vessels are required to report accidents to the Marine Accident Investigation Branch (MAIB). Non-UK flagged vessels do not have to report unless they are in a UK port or are within 12 nm territorial waters and carrying passengers to a UK port. There are no requirements for non-commercial recreational craft to report accidents to the MAIB; however a significant proportion of these incidents are reported to and investigated by the MAIB.

16. The MCA, harbour authorities and inland waterway authorities also have a duty to report accidents to MAIB. Therefore, whilst there may be a degree of under-reporting of accidents with minor consequences, those resulting in more serious consequences, such as fatalities, are likely to be reported.

17. Only incidents occurring in UK waters have been considered within this assessment for which the MAIB data is most comprehensive. It is also noted that incidents occurring in ports/harbours and rivers/canals have been excluded since the causes and consequences may differ from an accident occurring offshore, which is the location of most relevance to the proposed East Anglia ONE North project.

18. Taking into account these criteria, a total of 13,374 accidents, injuries and hazardous incidents were reported to the MAIB between 1994 and 2014 involving 15,212 vessels (some incidents such as collisions involved more than one vessel).

19. The locations[2] of incidents reported in the vicinity of the UK are presented in *Figure 3.1*, colour-coded by type. It can be seen that most incidents occurred in coastal waters.

[2] MAIB aim for 97% accuracy in reporting the locations of incidents.

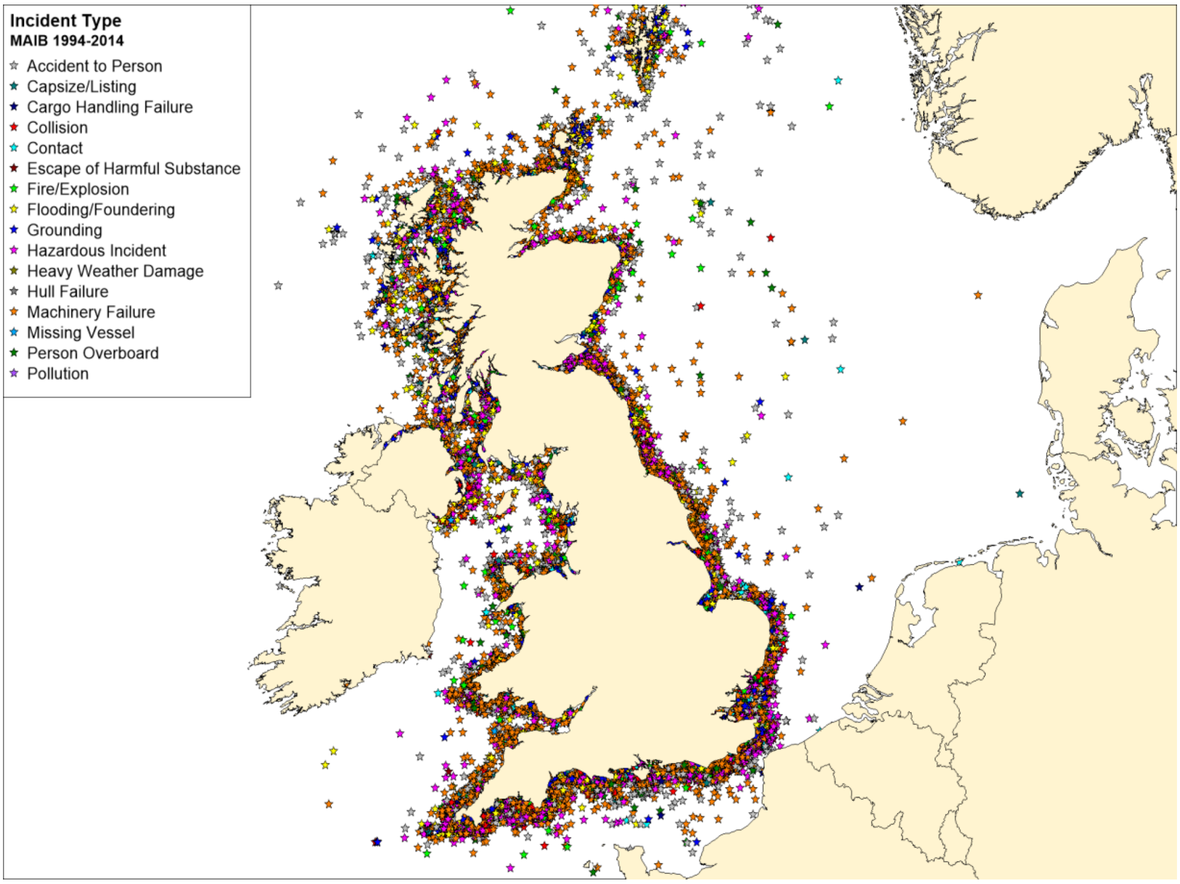

Figure 3.1 Incident Locations by Type within UK Waters (MAIB 1994-2014)

20. The distribution of incidents by year is presented in *Figure 3.2*.

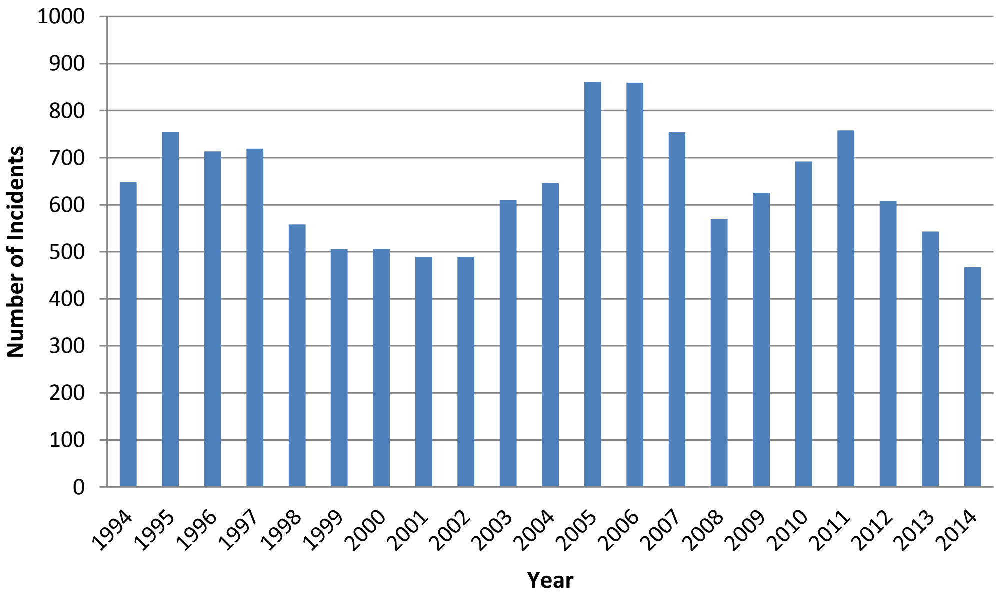

Figure 3.2 Incidents per Year within UK Waters (MAIB 1994-2014)

21. The average number of incidents per year was 637. There has generally been a fluctuating trend in incidents over the 21 year period.

22. The distribution of incidents by incident type is presented in *Figure 3.3*.

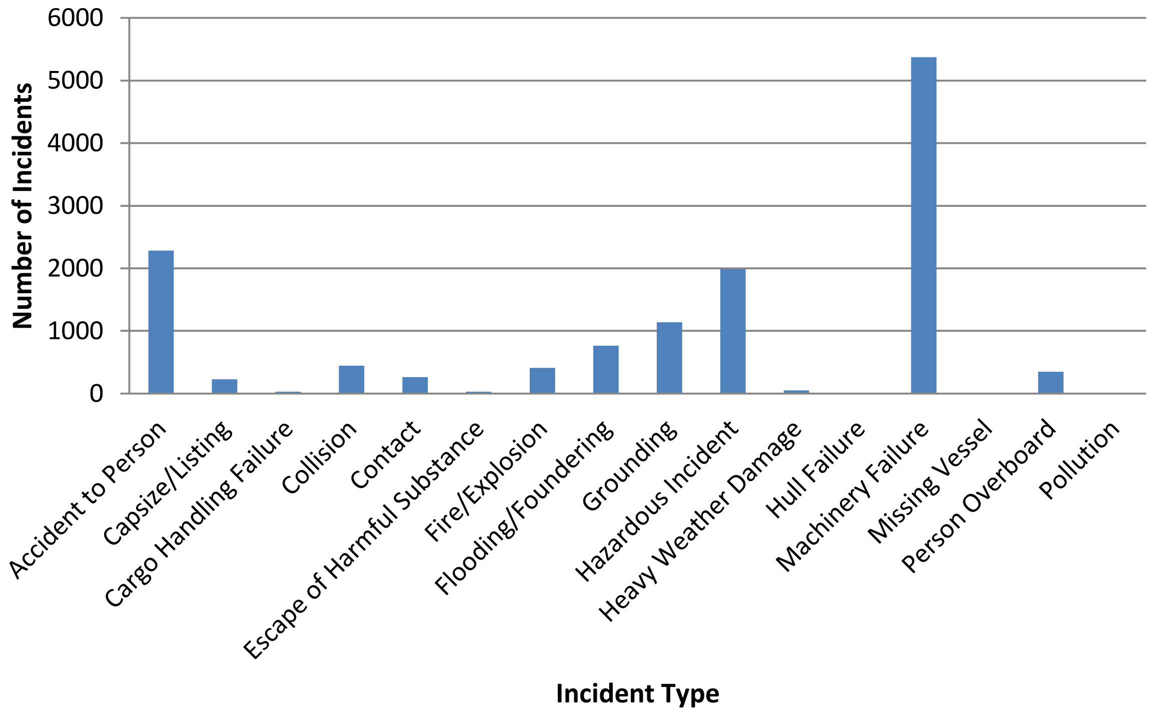

Figure 3.3 Incidents by Incident Type within UK Waters (MAIB 1994-2014)

23. The most common incident types were "Machinery Failure" (40%), "Accident to Person"[3] (17%) and "Hazardous Incident" (15%). "Collisions" and "Contacts" represented 3% and 2% of the total incidents, respectively.

24. The distribution of incidents by vessel type is presented in *Figure 3.4*.

[3] Where the incident is an accident to a vessel, e.g., collision or machinery failure, it would be reported under the vessel accident category.

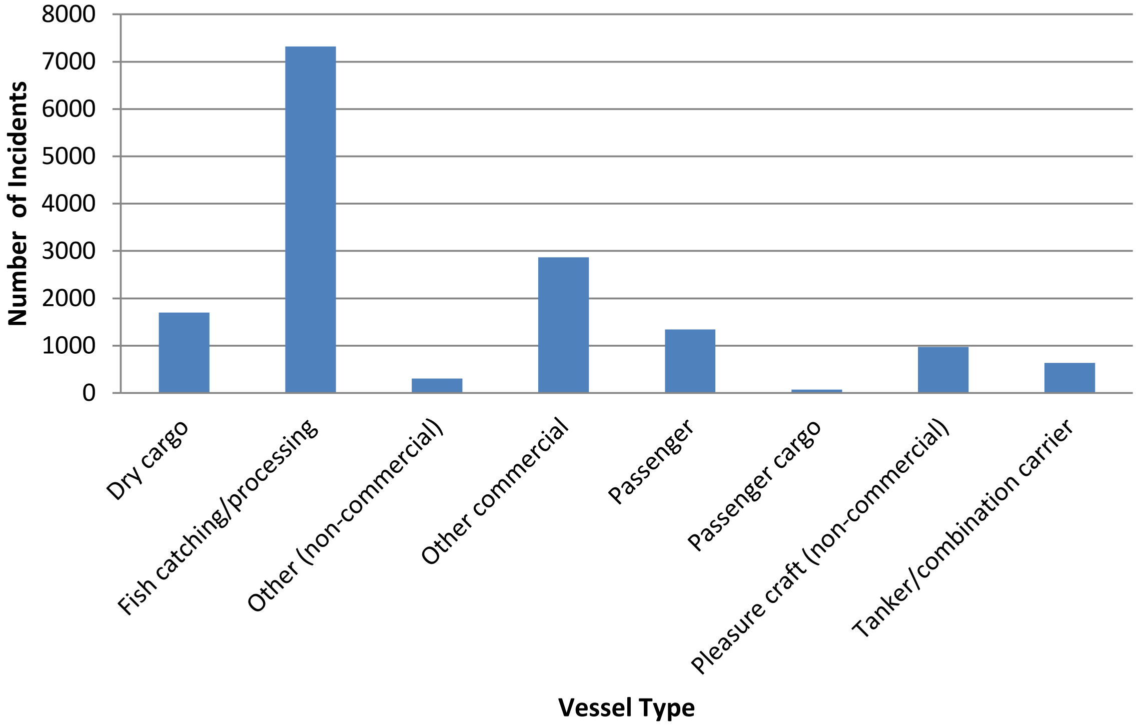

Figure 3.4 Incidents by Vessel Type within UK Waters (MAIB 1994-2014)

25. The most common vessel types involved in incidents were fishing vessels (48%), other commercial vessels (17%) (which include offshore industry vessels, tugs, workboats and pilot vessels) and dry cargo vessels (11%).

26. The total number of fatalities reported in the MAIB incidents from 1994 to 2014 was 428, giving an average of 20 fatalities per year.

27. The distribution of fatalities in UK waters by vessel type and person category (namely crew, passenger and other) is presented in *Figure 3.5*.

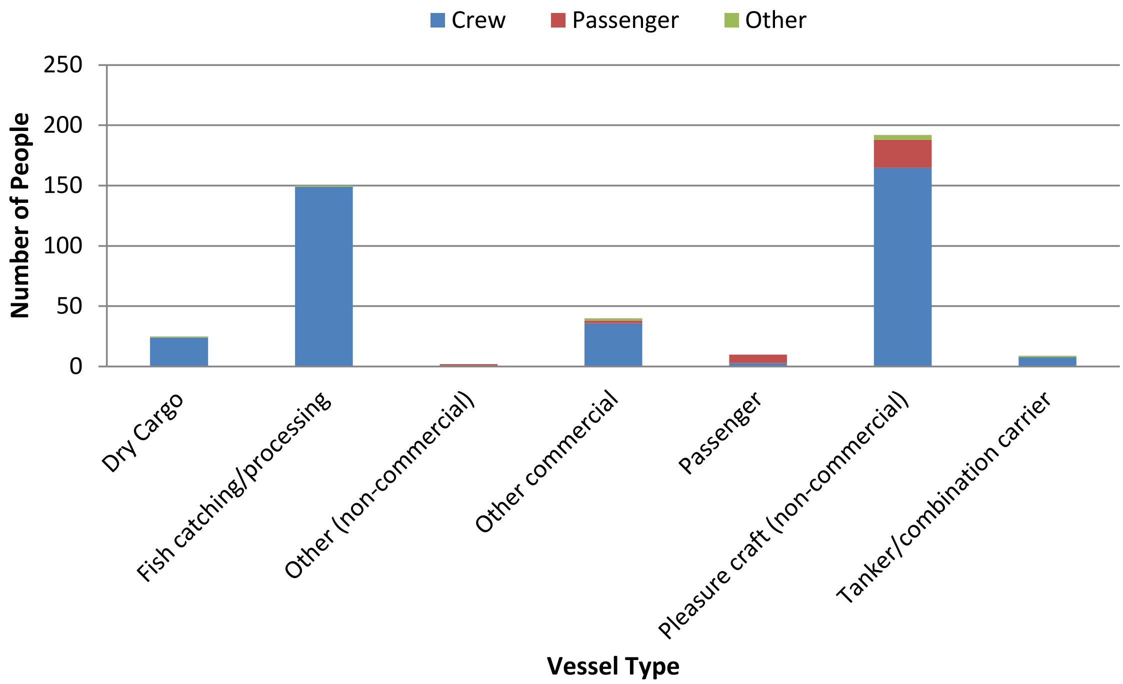

Figure 3.5 Fatalities by Vessel Type for Incidents within UK Waters (MAIB 1994-2014)

28. It can be seen that the majority of fatalities occurred to crew members of pleasure craft and fishing vessels.

3.2 Collision Incidents

29. MAIB define a collision incident as "vessel hits another vessel that is floating freely or is anchored (as opposed to being tied up alongside)."

30. A total of 447 collision incidents were reported to MAIB in UK waters (excluding ports, etc.) between 1 January 1994 and 31 December 2014 involving 889 vessels (in a small number of cases the other vessel involved was not logged).

31. The locations of collision incidents reported in the vicinity of the UK are presented in *Figure 3.6*. Following this, the number of vessels involved in a collision incident by year is presented in *Figure 3.7*.

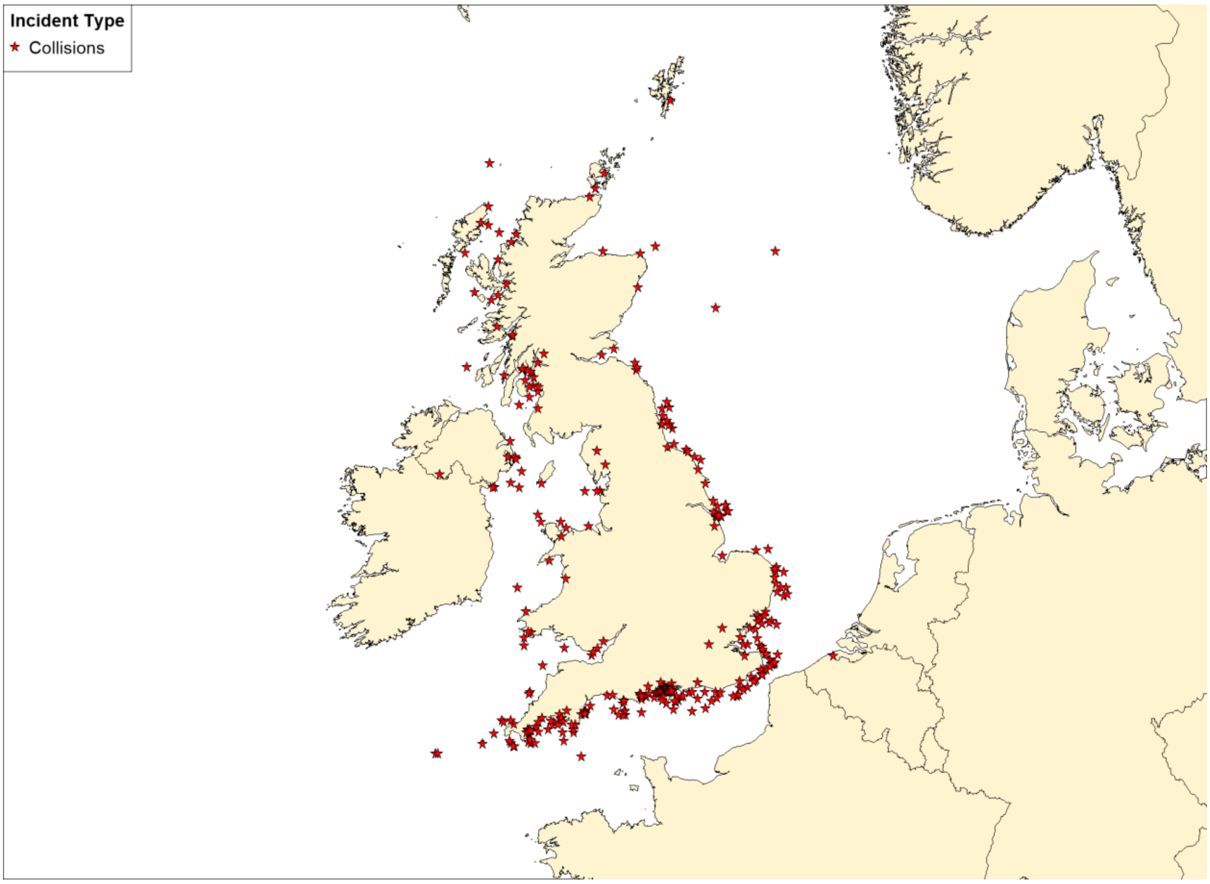

Figure 3.6 Collision Incident Locations within UK Waters (MAIB 1994-2014)

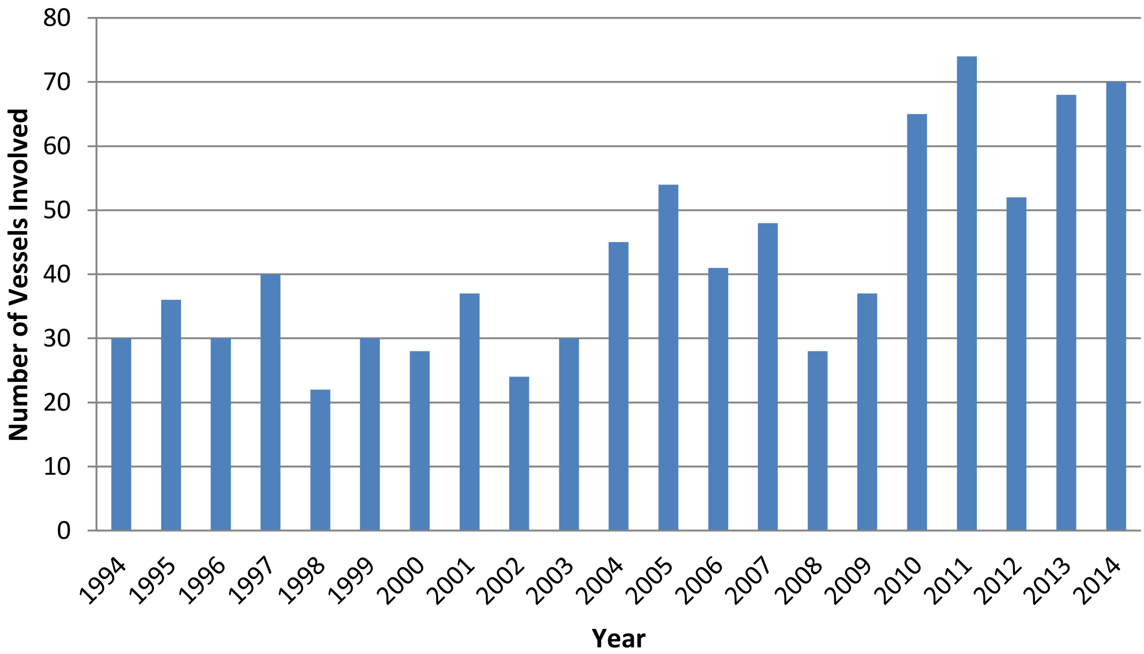

Figure 3.7 Collision Incidents per Year within UK Waters (MAIB 1994-2014)

32. The average number of vessels involved in a collision per year was 42. There has been an overall increasing trend in collisions over the study period, which may be due to better reporting of less serious incidents in recent years.

33. The distribution of collision incidents by vessel type is presented in *Figure 3.8*.

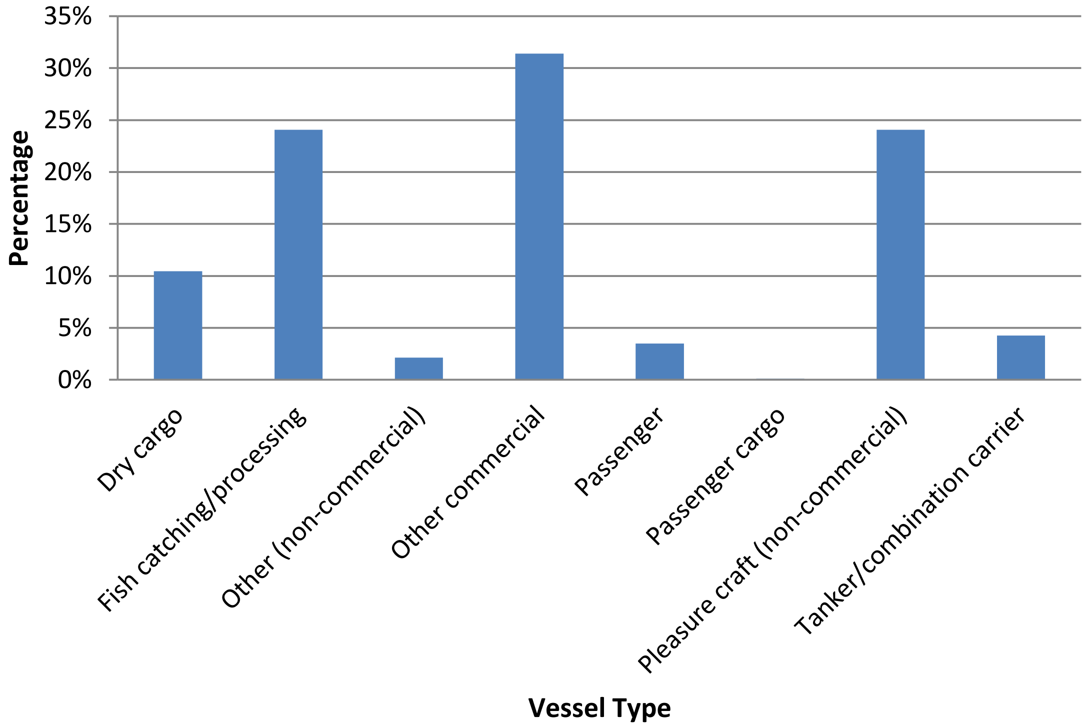

Figure 3.8 Collision Incidents by Vessel Type within UK Waters (MAIB 1994-2014)

34. The most common vessel types involved in collision incidents were other commercial vessels (31%), fishing vessels (24%), non-commercial pleasure craft (24%) and dry cargo vessels (10%).

35. The total number of fatalities reported in MAIB collision incidents within UK waters between 1994 and 2014 when excluding incidents occurring in ports and harbours was four. Details of each of these fatal incidents reported by the MAIB are presented in *Table 3.1.*

Table 3.1 Fatal Collision Incidents (MAIB 1994-2014)

Date	Description	Fatalities
October 2001	A dry cargo vessel and a chemical tanker collided in the south-west traffic lane of the Dover Strait Traffic Separation Scheme (TSS) to the south-east of Hastings. Although the weather and visibility were good, both watchkeepers were too late to take effective avoiding action. The collision resulted in the sinking of the dry cargo vessel from which	1

Date	Description	Fatalities
	five out of six crew members were rescued.	
August 2002	Two speedboats collided resulting in one fatality and one injury. The visibility was good and the weather was calm. Police were called to the scene and both drivers were arrested.	1
July 2005	Mawes resulted in the death of one of the helmsmen. The incident occurred during the night with both vessels unlit whilst transiting through the area. Both helmsmen had consumed alcohol prior to the incident which is suspected to have caused reduced peripheral vision, deterioration of judgment and slower reaction times from both helmsmen, resulting in the collision.	1
August 2010	An Italian registered Ro Ro passenger ferry collided with a UK registered fishing vessel around four miles off St Abb's Head. As a result of the collision, the fishing vessel sank. The skipper was recovered from the sea but, despite an extensive search by the rescue services and a large number of local fishing vessels, the remaining crew member was lost.	1

3.3 Contact Incidents

36. MAIB define a contact incident as when "a vessel hits an object that is immobile and is not subject to the collision regulations e.g. buoy, post, dock (too hard), etc. Also, another ship if it is tied up alongside. Also floating logs, containers etc."

37. A total of 262 contact incidents were reported to MAIB in UK waters (excluding ports, etc.) between 1994 and 2014 involving 294 vessels (a small number of contact incidents involved a moving vessel contacting a stationary vessel).

38. The locations of contact incidents reported in the vicinity of the UK are presented in *Figure 3.9*. Following this, the distribution of contact incidents by year is presented in *Figure 3.10*.

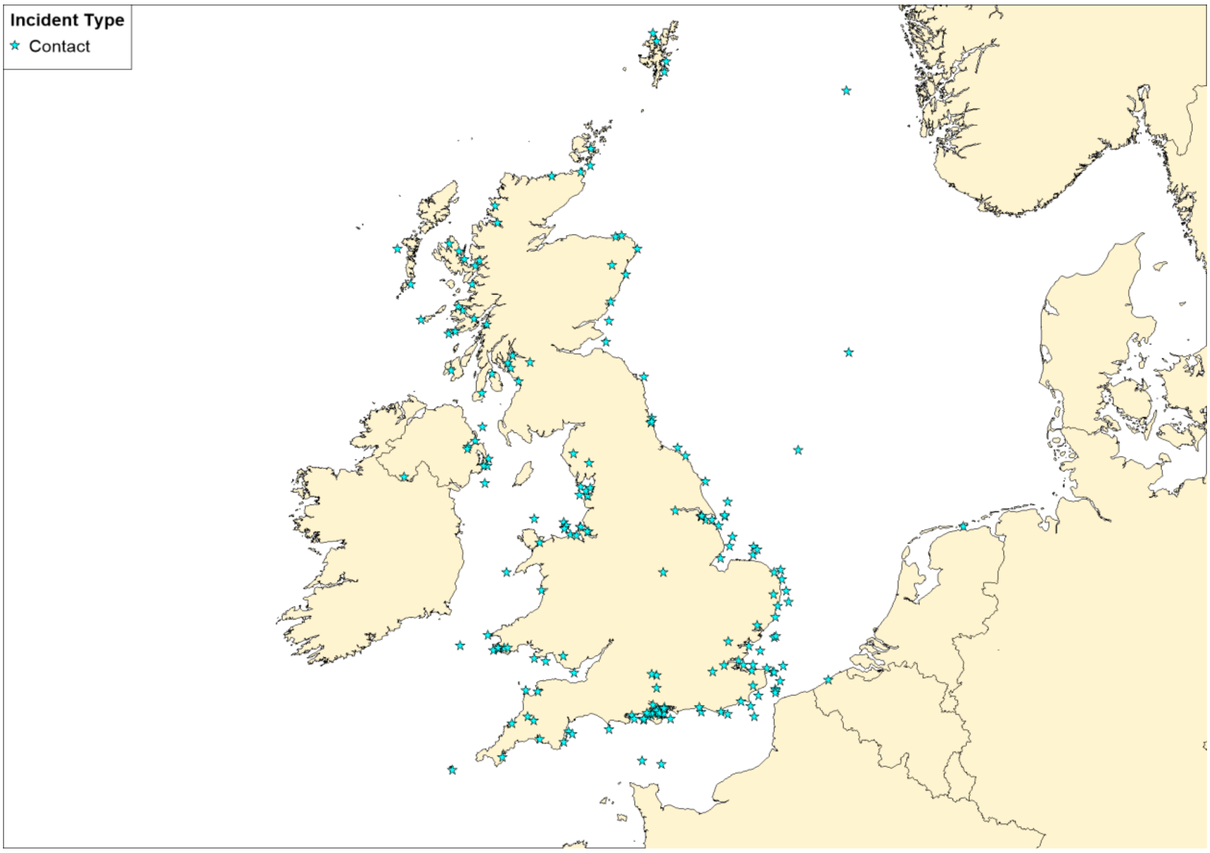

Figure 3.9 Contact Incident Locations within UK waters (MAIB 1994-2014)

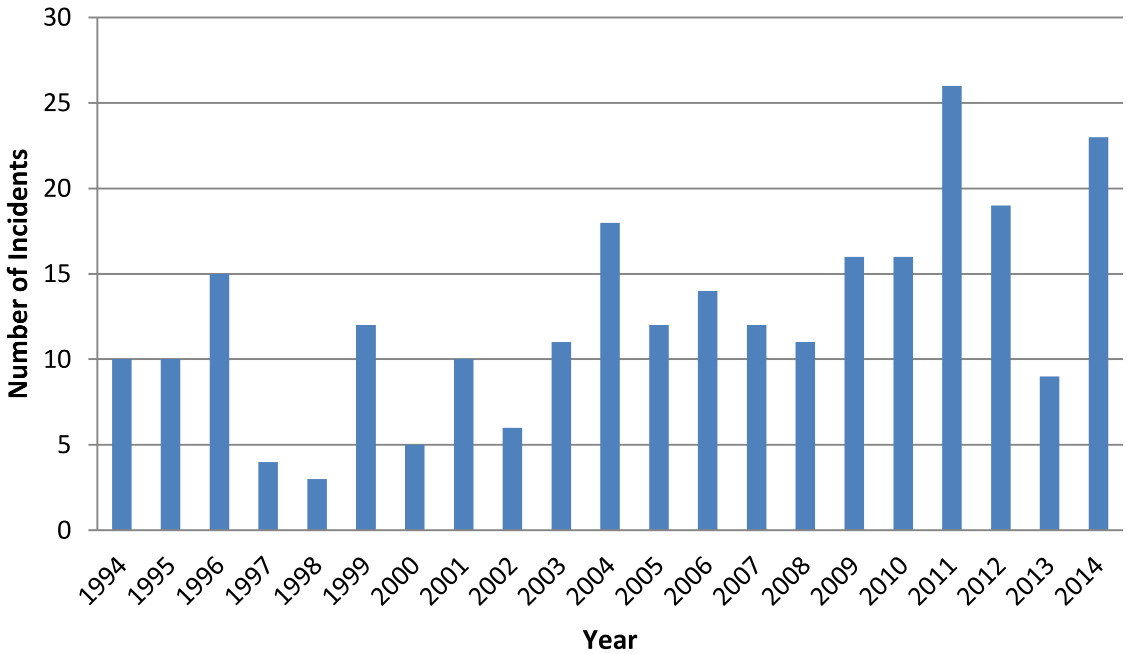

Figure 3.10 Contact Incidents per Year within UK Waters (MAIB 1994-2014)

39. The average number of contact incidents per year was 13. As with collision incidents there has been an increasing trend over the 21 year period, which may be due to improved reporting of less serious incidents in recent years.

40. 42. The distribution of vessel types involved in contacts is presented in *Figure 3.11.*

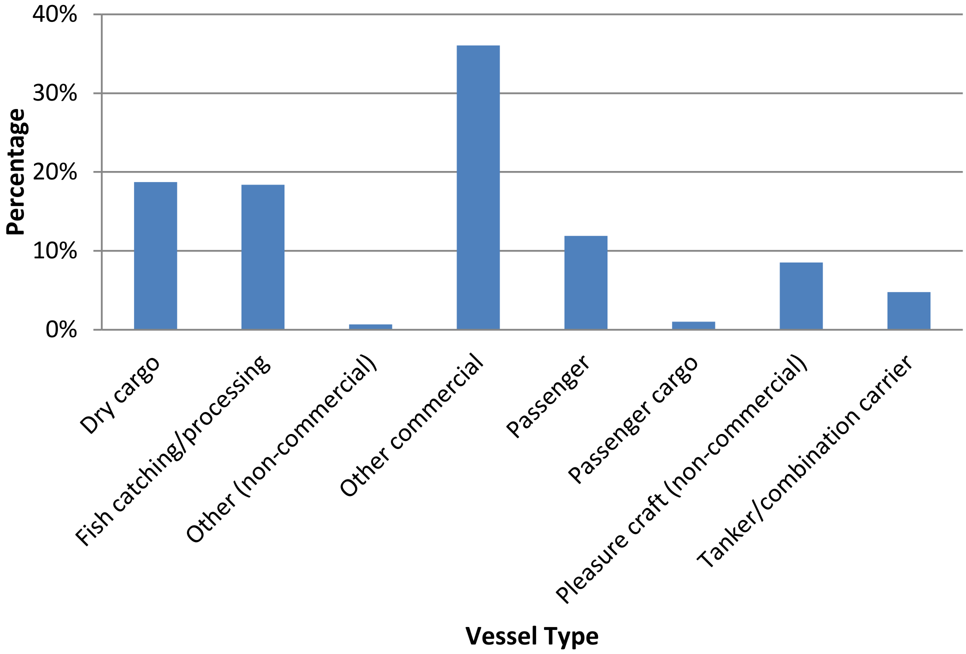

Figure 3.11 Contact Incidents by Vessel Type within UK Waters (MAIB 1994-2014)

41. The most common vessel types involved in contact incidents were other commercial vessels (36%), dry cargo vessels and fishing vessels (both 18%).

42. There were no fatalities reported in any of the MAIB contact incidents within UK waters between 1994 and 2014 when excluding incidents occurring in ports and harbours.

4 Fatality Risk

4.1 Introduction

43. This section uses the MAIB incident data along with information on average manning levels per vessel type to estimate the probability of fatality in a marine incident associated with the proposed East Anglia ONE North project.

44. The proposed East Anglia ONE North project is assessed to have the potential to affect the rates of the following incidents:

- Vessel to vessel collision;
- Powered vessel to structure allision;
- Drifting vessel to structure allision; and
- Fishing vessel to structure allision.

45. Of these incidents, only vessel to vessel collisions match the MAIB definition of collisions and hence the fatality analysis presented in section 3.2 is considered to be directly applicable to these types of incidents.

46. The other scenarios of powered vessel to structure allision, drifting vessel to structure allision and fishing vessel to structure allision are technically contacts since they involve a vessel striking an immobile object in the form of a wind turbine, substation or accommodation platform. From section 3.3 it can be seen that none of the 262 contact incidents reported by MAIB between 1994 and 2014 resulted in fatalities.

47. However, as the mechanics involved in a vessel contacting a wind turbine may differ in severity from hitting, for example, a buoy, quayside or moored vessel, the MAIB collision fatality risk rate has also been conservatively applied for these incidents.

4.2 Fatality Probability

48. Four of the 447 collision incidents reported by the MAIB in UK waters between 1994 and 2014 resulted in one or more fatalities. This gives a 0.89% probability that a collision incident will lead to a fatal accident.

49. To assess the fatality risk for personnel on-board a vessel, either crew, passenger or other, the number of persons involved in the incidents needs to be estimated. From analysis of the MAIB incident data, the average commercial passenger vessel had approximately 193 people on board (POB) (total of crew and passengers). For commercial cargo / freight vessels there was an average of approximately 14 POB. For fishing vessels the average POB was approximately 3.3 and for pleasure craft the average POB was approximately 6.4.

50. It is recognised that these numbers can be substantially higher or lower on an individual vessel basis depending upon size, subtype, etc., but applying reasonable averages is considered sufficient for this analysis.

51. Using the average number of persons carried along with the vessel type information involved in collision incidents reported by the MAIB (see *Figure 3.8*), gives an estimated 12,966 personnel on-board the vessels involved in the collision incidents.

52. Based on four fatalities, the overall fatality probability in a collision for any individual on-board is approximately 3.1×10^{-4} per collision.

53. It is considered inappropriate to apply this rate uniformly as the statistics indicate that the fatality probability associated with smaller craft is higher. Therefore the fatality probability has been subdivided into three categories of vessel as presented in *Table 4.1*.

Table 4.1 Fatality Probability per Collision per Vessel Category (1994-2014)

Vessel Category	Sub Categories	Fatalities	People Involved	Fatality Probability
Commercial	Dry cargo, passenger, tanker, etc.	1	9,718	1.0×10^{-4}
Fishing	Trawler, Potter, Dredger, etc.	1	708	1.4×10^{-3}
Pleasure Craft	Yacht, small commercial motor vessel, etc.	2	2,540	7.9×10^{-4}

54. It can be seen the risk is approximately one order of magnitude higher for people on-board small craft compared to larger commercial vessels.

4.3 Fatality Risk due to the East Anglia ONE North Project

55. The base case and future case annual collision frequency levels without and with the proposed East Anglia ONE North project are summarised in *Table 4.2*. The "base case" is as per the terminology of the Formal Safety Assessment (FSA) (IMO, 2007) and describes the scenario whereby marine traffic levels remain at the current baseline level. The future case presents the scenario whereby current baseline traffic is increased by 10%.

Table 4.2 Summary of Annual Collision Frequency Results

Collision/Allision	Base Case	Future Case

Scenario	Without	With	Change	Without	With	Change
Vessel to vessel collision	5.33×10^{-2}	5.53×10^{-2}	2.00×10^{-3}	6.45×10^{-2}	6.69×10^{-2}	2.47×10^{-3}
Powered vessel to structure allision	--	7.07×10^{-3}	7.07×10^{-3}	--	7.78×10^{-3}	7.78×10^{-3}
Drifting vessel to structure allision	--	2.53×10^{-3}	2.53×10^{-3}	--	2.78×10^{-3}	2.78×10^{-3}
Fishing vessel to structure allision	--	1.10×10^{-1}	1.10×10^{-1}	--	1.21×10^{-1}	1.21×10^{-1}
Total	5.33×10^{-2}	1.75×10^{-1}	1.22×10^{-1}	6.45×10^{-2}	1.98×10^{-1}	1.34×10^{-1}

56. *Table 4.3* presents the estimated average number of POB for the local vessels operating in the area of the proposed East Anglia ONE North project.

Table 4.3 Vessel Types, Incidents and Average Number of POB

Vessel Type	Collision/Allision Incidents	Average Number of POB
Cargo/freight	• Vessel to vessel collision; • Powered vessel to structure allision; and • Drifting vessel to structure allision.	15
Tanker	• Vessel to vessel collision; • Powered vessel to structure allision; and • Drifting vessel to structure allision.	20
Passenger	• Vessel to vessel collision; • Powered vessel to structure allision; and • Drifting vessel to structure allision.	1400
Fishing vessel	• Vessel to vessel collision; and • Fishing vessel to structure allision	3
Recreational vessel	• Vessel to vessel collision.	4

59. From the detailed results of the collision and allision frequency modelling, the distribution of the predicted change in annual collision and allision frequency by vessel type due to the East Anglia ONE North project for the base and future cases are presented in *Figure 4.1.*

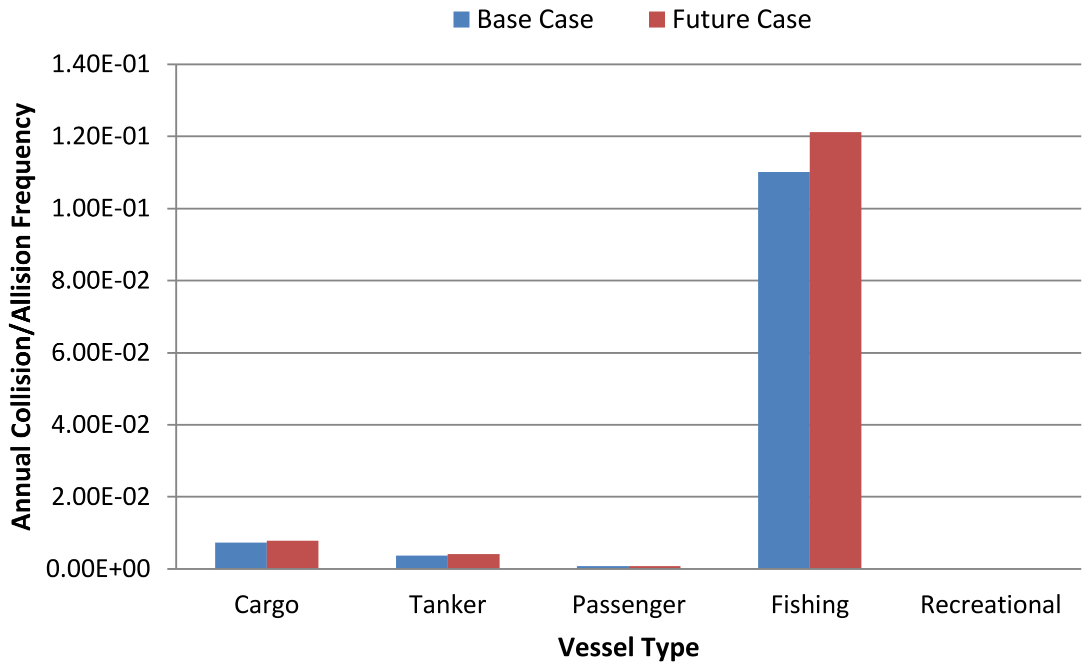

Figure 4.1 Change in Annual Collision and Allision Frequency by Vessel Type

57. It can be seen that the significant majority of the allision/collision risk is to fishing vessels. This was largely due to the assumption that the levels and locations of fishing traffic observed within the East Anglia ONE North windfarm site as part of the baseline assessment will remain consistent post wind farm. This is considered a conservative approach, and is discussed further in the NRA (*Appendix 14.1*). Given that there will be no restrictions on fishing within or transiting through the East Anglia ONE North windfarm site during the operational phase (and hence the decision to fish or transit within the wind farm structures will be at the digression of the vessel's master), the conservative approach was considered appropriate.

58. Combining the annual collision and allision frequency (*Table 4.2*), the estimated number of POB each vessel type (*Table 4.3*) and the estimated fatality probability for each vessel category (*Table 4.1*), the annual increase in PLL due to the impact of the proposed East Anglia ONE North project for the base case is estimated to be 6.00 x 10^{-4}, which equates to one additional fatality in 1,666 years. The annual increase in PLL due to the impact of the proposed East Anglia ONE North project for the future case is estimated to be 6.61 x 10^{-4}, which equates to one additional fatality in 1,512 years.

59. The estimated incremental increases in PLL due to the proposed East Anglia ONE North project, distributed by vessel type for the base and future cases, are presented in *Figure 4.2*.

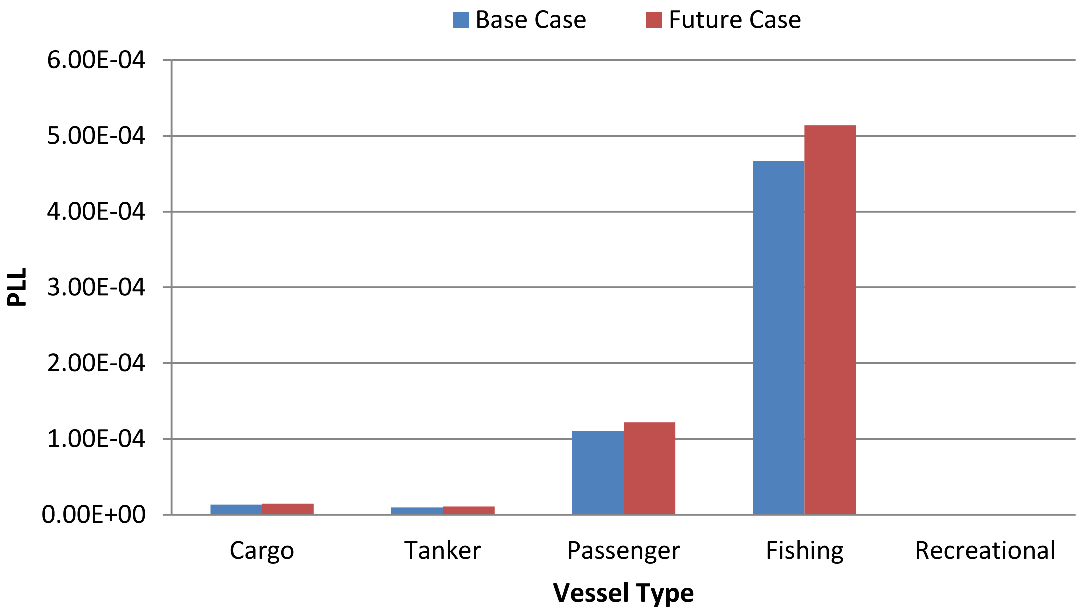

Figure 4.2 Estimated Change in Annual PLL by Vessel Type

60. It can be seen that the majority of change in PLL was associated with fishing vessels, which is due to the assumption that there will not be a reduction in fishing vessel traffic within the East Anglia ONE North windfarm site during its operational life (whereas regular routed traffic is expect to deviate to avoid the structures).

61. PLL can be converted to individual risk, based on the average number of people exposed by vessel type. The results are presented in *Figure 4.3* (this calculation assumes that the risk is shared between 10 vessels of each type, which is considered to be conservative based on the number of different vessels operating in the vicinity of the site).

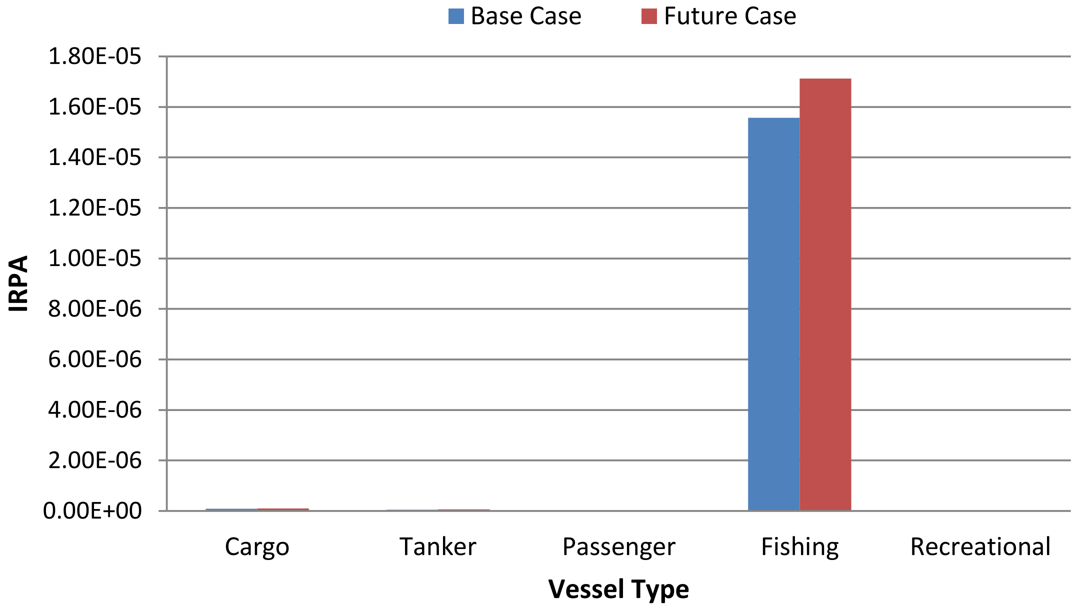

Figure 4.3 Estimated Change in Individual Risk by Vessel Type

62. It can be seen that the majority of change in individual risk was associated with fishing vessels, which again is due to the assumption that there will not be a reduction in fishing within the East Anglia ONE North windfarm site during its operational life (whereas regular routed traffic is expected to deviate to avoid the structures).

4.4 Significance of Increase in Fatality Risk

63. The overall increase in PLL estimated due to the East Anglia ONE North project is 6.00×10^{-4}, which equates to one additional fatality in 1,666 years. In comparison to MAIB statistics, which indicate an average of 20 fatalities per year in UK territorial waters, this is a negligible change.

64. In terms of individual risk to people, the incremental increase for commercial vessels (approximately 1.44×10^{-7} for the base case) is negligible compared to the background risk level for the UK sea transport industry of 2.9×10^{-4} per year.

65. For fishing vessels, the change in individual risk attributed to the proposed East Anglia ONE North project is higher than commercial vessels (approximately 1.56×10^{-5} for the base case). However the increase is considered negligible when compared to the background risk level for the UK sea fishing industry of 1.2×10^{-3} per year.

5 Pollution Risk

5.1 Historical Analysis

66. The pollution consequences of a collision in terms of oil spill depend upon the following:

- Spill probability (i.e., likelihood of outflow following an accident); and
- Spill size (amount of oil).

67. Two types of oil spill are considered in this assessment:

- Fuel oil spills from bunkers (all vessel types); and
- Cargo oil spills (laden tankers).

68. The research undertaken as part of the Department for Transport (DfT) Marine Environmental High Risk Area (MEHRA)s project (DfT, 2001) has been used to estimate the probability of a spill occurring, as it was comprehensive and based on worldwide marine spill data analysis.

69. From this research, the overall probability of a spill per accident was calculated based on historical accident data for each accident type as presented in *Figure 5.1.*

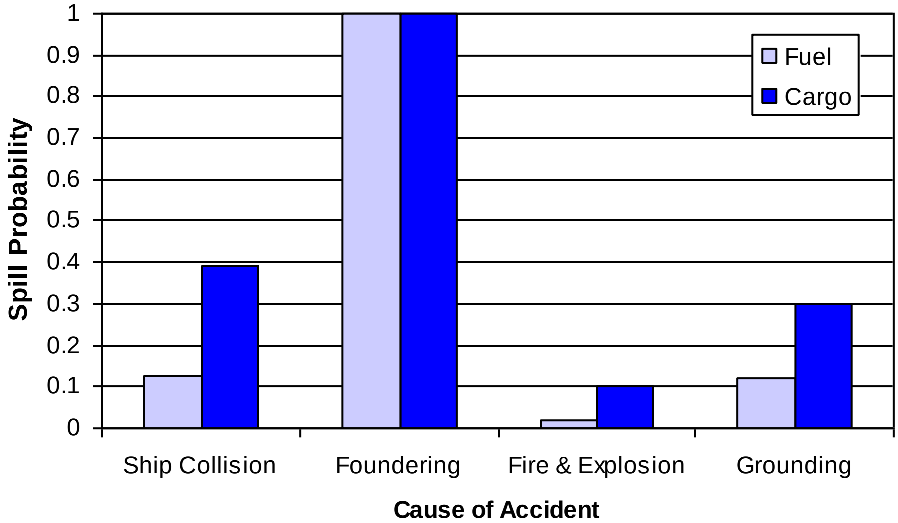

Figure 5.1 Probability of an Oil Spill Resulting from an Accident

70. Therefore, it was estimated that 13% of vessel collisions result in a fuel oil spill and 39% of collisions involving a laden tanker result in a cargo oil spill.

71. In the event of a bunker spill, the potential outflow of oil depends upon the bunker capacity of the vessel. Historical bunker spills from vessels have generally been limited to a size below 50% of the bunker capacity, and in most incidents much lower. For the types and sizes of vessels exposed to the structures within the East

Anglia ONE North windfarm site, an average spill size of 100 tonnes of fuel oil is considered to be a conservative assumption. This assumption is based on historical oil spills and the high average is conservative due to a few large spills within UK waters for example the 1996 Sea Empress oil spill.

72. For cargo spills from laden tankers, the spill size can vary significantly. The International Tanker Owners Pollution Federation (ITOPF) reports the following spill size distribution for tanker collisions between 1974 and 2004:

- 31% of spills below seven tonnes;
- 52% of spills between seven and 700 tonnes; and
- 17% of spills greater than 700 tonnes.

73. For fishing vessel collisions, comprehensive statistical data is not available. Consequently it is conservatively assumed that 50% of all collisions involving fishing vessels will lead to oil spill with the quantity spilled being on average five tonnes. Similarly for recreational vessels, due to a lack of data, 50% of collisions are assumed to lead to a spill with an average size of one tonne.

5.2 Pollution Risk due to the East Anglia ONE North Project

74. Applying the above probabilities to the annual collision and allision frequency by vessel type presented in *Figure 4.1* and the average spill size per vessel, the amount of oil spilled per year, due to the impact of the proposed East Anglia ONE North project, is estimated to be 0.96 tonnes per year for the base case and 1.07 tonnes per year for the future case.

75. The estimated increase in tonnes of oil spilled distributed by vessel type for the base and future cases are presented in *Figure 5.2*.

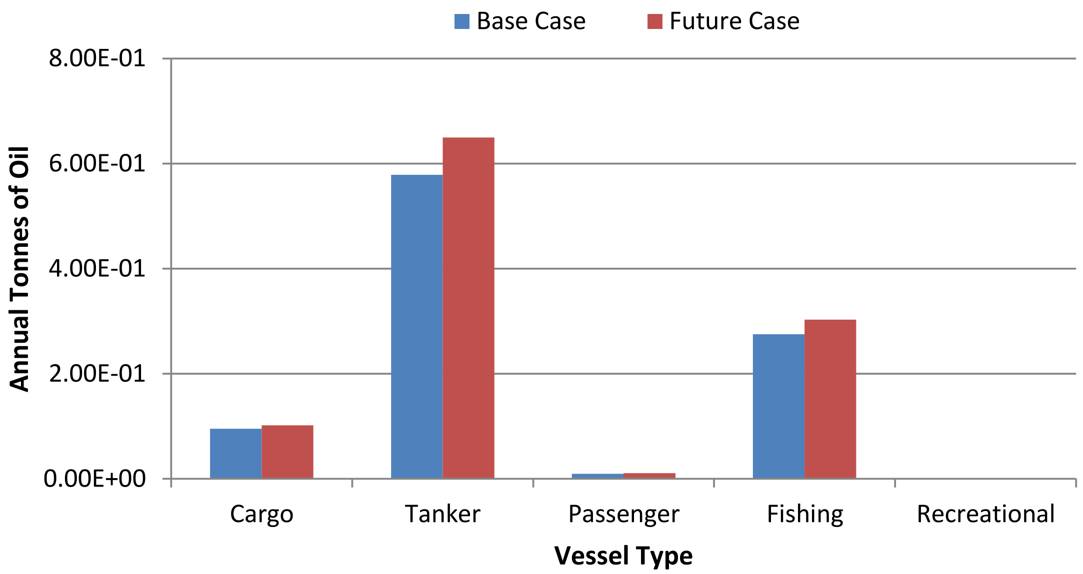

Figure 5.2 Estimated Change in Pollution by Vessel Type

76. It can be seen that tankers and fishing vessels are the highest contributors.

5.3 Significance of Increase in Pollution Risk

77. To assess the significance of the increased pollution risk from marine vessels caused by the proposed East Anglia ONE North project, historical oil spill data for the UK has been used as a benchmark.

78. From the MEHRAs research (DfT, 2001) the annual average tonnes of oil spilled in the waters around the British Isles due to marine accidents in the 10 year period from 1989 to 1998 were 16,111. This is based on a total of 146 reported oil pollution incidents of greater than one tonne (smaller spills are excluded as are incidents which occurred within port and harbour areas or as a result of operational errors or equipment failure). Commercial vessel spills accounted for approximately 99% of the total, while fishing vessel incidents accounted for less than 1%.

79. As previously stated, the amount of oil spilled per year due to the impact of the proposed East Anglia ONE North project is estimated to be 0.96 tonnes per year for the base case and 1.07 tonnes per year for the future case. In the base case scenario, this is an overall increase in annual pollution of 0.0060% when compared to the historical average pollution quantities from marine accidents in UK waters (16,111 tonnes). The future case scenario results in an increase in annual pollution of approximately 0.0066%. Therefore the estimated increase in annual pollution due to the impact of the proposed East Anglia ONE North project is considered negligible.

6 Conclusions

80. This appendix has assessed the fatality and pollution risk associated with the proposed East Anglia ONE North project. The quantitative risk assessment indicates that the collision and allision risk associated with fishing vessels is highest.

81. Overall, the impact of the proposed East Anglia ONE North project on people and the environment is relatively low compared to the existing background risk levels in UK waters. However, it should be noted that this is the localised impact of a single project and there will be additional maritime risks associated with other offshore wind farm developments in the Southern North Sea area and the UK as a whole.

82. Further discussion of mitigation measures and monitoring is provided in section 21 and section 22 of *Appendix 14.1*.

7 References

- DfT. (2001) Identification of MEHRAs in the UK. DfT: London.
- IMO. (2001) Maritime Safety Committee, 74th Edition, Agenda Item 5 (MSC 74/5/X), Bulk Carrier Safety – Formal Safety Assessment. IMO: London.
- IMO. (2007) Consolidated Text of the Guidelines for FSA for use in the IMO rule-making Process. (MSC/ Circ. 2013-MEPC/ Circ.392). IMO: London.