RWE Renewables UK Dogger Bank South (West) Limited

RWE Renewables UK Dogger Bank South (East) Limited

Dogger Bank South Offshore Wind Farms

Consultation Report

Volume 5

Appendix B – Section 42 Consultation (Part 2 of 3)

June 2024

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RWE Renewables UK Dogger Bank South (West) Limited

RWE Renewables UK Dogger Bank South (East) Limited

Dogger Bank South Offshore Wind Farms

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Dogger Bank South Offshore Wind Farms

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Registered office:

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CONTENTS

1 Introduction ... 1
1.1 Project Background ... 1
1.2 Purpose of this Document ... 4
1.3 The Applicant ... 5
1.4 Project Description ... 6
1.4.1 Offshore ... 8
1.4.2 Landfall ... 14
1.4.3 Onshore ... 15
1.4.4 Summary of Indicative Project Parameters ... 18
1.4.5 Indicative Programme ... 20
1.5 Site Selection ... 22
1.5.1 Site Selection Process Overview and Current Status ... 22
1.5.2 Defining the Landfall Areas of Search ... 23
1.5.3 Defining the Offshore Study Area ... 25
1.5.4 Defining the Onshore Study Areas ... 26
1.5.5 Detailed Site Selection Process ... 26
1.6 Consultation ... 27
1.6.1 Technical Consultation ... 27
1.6.2 Public Engagement ... 30
1.7 Environmental Impact Assessment Methodology ... 31
1.7.1 Characterisation of the Existing Environment ... 31
1.7.2 Assessment of Impacts ... 32
1.8 Policy and Legislative Context ... 38
1.8.1 Need for the Projects ... 38
1.8.2 Summary of Climate Change and Renewable Energy Policy and Legislation ... 39
1.8.3 Planning Policy and Legislation ... 40
1.8.4 Environmental Legislation ... 42

2 Offshore 45
2.1 Marine Physical Processes 45
2.1.1 Existing Environment 46
2.1.2 Approach to Data Collection 53
2.1.3 Potential Impacts 55
2.1.4 Approach to Impact Assessment 59
2.2 Marine Sediment and Water Quality 63
2.2.1 Existing Environment 63
2.2.2 Approach to Data Collection 66
2.2.3 Potential Impacts 67
2.2.4 Approach to Impact Assessment 70
2.3 Offshore Air Quality 71
2.3.1 Existing Environment 71
2.3.2 Potential Impacts 72
2.4 Offshore Airborne Noise 73
2.4.1 Existing Environment 73
2.4.2 Potential Impacts 73
2.5 Benthic and Intertidal Ecology 76
2.5.1 Existing Environment 76
2.5.2 Approach to Data Collection 84
2.5.3 Potential Impacts 86
2.5.4 Approach to Impact Assessment 91
2.6 Fish and Shellfish Ecology 92
2.6.1 Existing Environment 94
2.6.2 Approach to Data Collection 101
2.6.3 Potential Impacts 102
2.6.4 Approach to Impact Assessment 110
2.7 Marine Mammals 111
2.7.1 Existing Environment 111

2.7.2 Approach to Data Collection 115
2.7.3 Potential Impacts 118
2.7.4 Approach to Impact Assessment 121
2.8 Offshore Ornithology 122
2.8.1 Existing Environment 122
2.8.2 Approach to Data Collection 126
2.8.3 Potential Impacts 127
2.8.4 Approach to Impact Assessment 130
2.9 Commercial Fisheries 132
2.9.1 Existing Environment 134
2.9.2 Approach to Data Collection 142
2.9.3 Potential Impacts 143
2.9.4 Approach to Impact Assessment 146
2.10 Shipping and Navigation 148
2.10.1 Existing Environment 149
2.10.2 Approach to Data Collection 155
2.10.3 Potential Impacts 157
2.10.4 Approach to Impact Assessment 161
2.11 Aviation and Radar 164
2.11.1 Existing Environment 164
2.11.2 Approach to Data Collection 168
2.11.3 Potential Impacts 169
2.11.4 Approach to Impact Assessment 171
2.12 Infrastructure and Other Users 172
2.12.1 Existing Environment 172
2.12.2 Approach to Data Collection 179
2.12.3 Potential Impacts 180
2.12.4 Approach to Impact Assessment 182
2.13 Offshore Archaeology and Cultural Heritage 183

2.13.1 Existing Environment ... 183
2.13.2 Approach to Data Collection ... 187
2.13.3 Potential Impacts ... 189
2.13.4 Approach to Impact Assessment ... 193
2.14 Seascape, Landscape and Visual Impact ... 194
2.14.1 Existing Environment ... 194
2.14.2 Approach to Data Collection ... 197
2.14.3 Potential Impacts ... 197
3 Onshore ... 200
3.1 Terrestrial Ecology and Onshore Ornithology ... 200
3.1.1 Existing Environment ... 201
3.1.2 Approach to Data Collection ... 218
3.1.3 Potential Impacts ... 220
3.1.4 Approach to Impact Assessment ... 224
3.2 Geology and Land Quality ... 225
3.2.1 Existing Environment ... 225
3.2.2 Approach to Data Collection ... 247
3.2.3 Potential Impacts ... 248
3.2.4 Approach to Impact Assessment ... 252
3.3 Flood Risk and Hydrology ... 254
3.3.1 Existing Environment ... 254
3.3.2 Approach to Data Collection ... 278
3.3.3 Potential Impacts ... 280
3.3.4 Approach to Impact Assessment ... 283
3.4 Land Use ... 285
3.4.1 Existing Environment ... 285
3.4.2 Approach to Data Collection ... 290
3.4.3 Potential Impacts ... 291
3.4.4 Approach to Impact Assessment ... 294

3.5 Human Health ... 295
3.5.1 Existing Environment ... 295
3.5.2 Approach to Data Collection ... 299
3.5.3 Potential Impacts ... 299
3.5.4 Approach to Impact Assessment ... 302
3.6 Onshore Archaeology and Cultural Heritage ... 303
3.6.1 Existing Environment ... 304
3.6.2 Approach to Data Collection ... 311
3.6.3 Potential Impacts ... 314
3.6.4 Approach to Impact Assessment ... 318
3.7 Landscape and Visual Impact ... 321
3.7.1 Existing Environment ... 321
3.7.2 Approach to Data Collection ... 326
3.7.3 Potential Impacts ... 327
3.7.4 Approach to Impact Assessment ... 330
3.8 Traffic and Transport ... 332
3.8.1 Existing Environment ... 332
3.8.2 Approach to Data Collection ... 339
3.8.3 Potential Impacts ... 341
3.8.4 Approach to Impact Assessment ... 346
3.9 Noise and Vibration ... 350
3.9.1 Existing Environment ... 350
3.9.2 Approach to Data Collection ... 356
3.9.3 Potential Impacts ... 358
3.9.4 Approach to Impact Assessment ... 362
3.10 Air Quality ... 364
3.10.1 Existing Environment ... 364
3.10.2 Approach to Data Collection ... 366
3.10.3 Potential Impacts ... 367

3.10.4 Approach to Impact Assessment 369
4 Project Wide Aspects 371
4.1 Socio-economics, Tourism and Recreation 371
4.1.1 Existing Environment 372
4.1.2 Approach to Data Collection 374
4.1.3 Potential Impacts 374
4.1.4 Approach to Impact Assessment 378
4.2 Climate Change 379
4.2.1 Existing Environment 379
4.2.2 Approach to Data Collection 382
4.2.3 Potential Impacts 382
4.2.4 Approach to Impact Assessment 384
4.3 Major Accidents and Disasters 385
5 Conclusions 386
References 387

TABLE OF FIGURES

Figure 1-1 Study Areas 2
Figure 1-2 Offshore Temporary Construction Area 9
Figure 1-3 Study Areas and Constraints 24
Figure 2-1 Offshore Bathymetry........ 47
Figure 2-2 Peak Flow for a Mean Spring Tide Across the Offshore Study Area 48
Figure 2-3 Annual Mean Significant Wave Height Across the Offshore Study Area 49
Figure 2-4 Seabed Sediment 50
Figure 2-5 Seabed Habitat........ 78
Figure 2-6 Designated Sites and Protected Benthic Habitats 81
Figure 2-7 Fish and Shellfish Ecology Study Area 93
Figure 2-8 Fish Spawning and Nursery Areas (Source: Ellis *et al.*, 2012) 95
Figure 2-9 Fish Spawning and Nursery Areas Continued (Source: Ellis *et al.*, 2012)........ 96
Figure 2-10 Sandeel Spawning Potential Across the Fish and Shellfish Study Area........ 98
Figure 2-11 Herring spawning Potential Across the Fish and Shellfish Study Area........ 99
Figure 2-12 Marine Disposal Sites within and Surrounding the Fish and Shellfish Study Area 104
Figure 2-13 Dogger Bank South Offshore Wind Farms Scoping Area and Aerial Survey Area 124
Figure 2-14 Commercial Fisheries Study Area........ 133
Figure 2-15 Value of Fish Landings (UK vessels) by Passive Gears 2016 - 2019........ 138
Figure 2-16 Value of Fish Landings (UK vessels) by Mobile Gears 2016 - 2019 140
Figure 2-17 Fishing Effort by Gear Type - 2017 141
Figure 2-18 Overview of Study Area........ 150
Figure 2-19 Navigational Features in Proximity to Dogger Bank South Offshore Wind Farms 151
Figure 2-20 14 days AIS (Summer 2019) by Vessel Type 153
Figure 2-21 14 days AIS (Winter 2019) by Vessel Type........ 154
Figure 2-22 Aviation and Radar Study Area........ 165
Figure 2-23 Other Marine Users........ 173

Figure 2-24 Recorded Losses 185
Figure 2-25 SLVIA Study Area 195
Figure 3-1 Nature Conservation Areas: Hawthorn Pit 207
Figure 3-2 Nature Conservation Areas: Creyke Beck 212
Figure 3-3 Nature Conservation Areas: South of Humber 216
Figure 3-4 Superficial Geology: Hawthorn Pit 226
Figure 3-5 Superficial Geology: Creyke Beck 227
Figure 3-6 Superficial Geology: South of Humber 230
Figure 3-7 Bedrock Geology: Hawthorn Pit 232
Figure 3-8 Bedrock Geology: Creyke Beck 233
Figure 3-9 Bedrock Geology: South of Humber 236
Figure 3-10 Historical and Authorised Landfill Sites: Hawthorn Pit 244
Figure 3-11 Historical and Authorised Landfill Sites: Creyke Beck 245
Figure 3-12 Historical and Authorised Landfill Sites: South of Humber 246
Figure 3-13 Surface Water Features: Hawthorn Pit 255
Figure 3-14 Groundwater Features: Hawthorn Pit 257
Figure 3-15 Flood Risk: Hawthorn Pit 260
Figure 3-16 Surface Water Features: Creyke Beck 262
Figure 3-17 Groundwater Features: Creyke Beck 264
Figure 3-18 Flood Risk: Creyke Beck 269
Figure 3-19 Surface Water Features: South of Humber 271
Figure 3-20 Groundwater Features: South of Humber 273
Figure 3-21 Flood Risk: South of Humber 277
Figure 3-22 Land Use Categories: Hawthorn Pit 287
Figure 3-23 Land Use Categories: Creyke Beck 288
Figure 3-24 Land Use Categories: South of Humber 289
Figure 3-25 Designated Heritage Assets: Hawthorn Pit 305
Figure 3-26 Designated Heritage Assets: Creyke Beck 307
Figure 3-27 Designated Heritage Assets: South of Humber 309
Figure 3-28 LVIA for Hawthorn Pit 322

Figure 3-29 LVIA for Creyke Beck 323
Figure 3-30 LVIA for South of Humber 324

TABLE OF TABLES

Table 1-1 Foundation Descriptions 11
Table 1-2 Key Indicative Project Characteristics for the Projects (DBS East and DBS West Combined) 18
Table 1-3 Consultation Groups........ 28
Table 1-4 Example of the Significance of an Impact Resulting From Each Combination of Receptor Sensitivity and the Magnitude of the Effect Upon It........ 33
Table 1-5 Summary of Relevant Climate Change Policies........ 39
Table 1-6 Key Relevant Environmental Legislation........ 42
Table 2-1 Existing Datasets 53
Table 2-2 Site-Specific Data........ 54
Table 2-3 Summary of Impacts Relating to the Marine Physical Processes. Topics to be Scoped In (✓) and Out (x) 58
Table 2-4 Marine Physical Processes Receptors........ 61
Table 2-5 WFD Water Bodies to be Considered (Environment Agency 2021)........ 65
Table 2-6 Existing Datasets 66
Table 2-7 Site-Specific Survey Data 66
Table 2-8 Summary of Impacts Relating to Marine Water and Sediment Quality. Topics to be Scoped In (✓) and Out (x) 70
Table 2-9 Summary of Impacts Relating to Offshore Air Quality. Topics to be Scoped In (✓) and Out (x) 72
Table 2-10 Summary of Impacts Relating to Offshore Airborne Noise. Topics to be Scoped In (✓) and Out (x)........ 75
Table 2-11 Designated Sites for Benthic Features Within the Offshore Study Area........ 82
Table 2-12 Key Sources of Benthic Ecology Data for the Projects 84
Table 2-13 Key Sources of Benthic Ecology Data for the Projects 86
Table 2-14 Summary of Impacts Relating to Benthic Habitats. Topics to be Scoped In (✓) and Out (x) 90
Table 2-15 Summary of Impacts Relating to Fish and Shellfish Ecology. Topics to be Scoped In (✓) and Out (x)........ 109
Table 2-16 Marine Mammal Digital Area Survey Results (March to May 2021)........ 114

Table 2-17 Existing Marine Mammal Datasets 116
Table 2-18 Summary of Impacts Relating to Marine Mammal Ecology. Topics to be Scoped In (✓) and Out (x) 120
Table 2-19 Species Specific Definitions of Biological Seasons (Furness 2015) for Bird Species Expected to be Present on the Array Areas. 125
Table 2-20 Summary of Impacts Relating to Offshore Ornithology. Topics to be Scoped In (✓) and Out (x) 129
Table 2-21 Summary of Impacts Relating to Commercial Fisheries. Topics to be Scoped In (✓) and Out (x) 145
Table 2-22 Key Sources of Shipping and Navigation Data 156
Table 2-23 Summary of Impacts Relating to Shipping and Navigation. Topics to be Scoped In (✓) and Out (x) 160
Table 2-24 Risk Ranking Matrix 162
Table 2-25 Data Sources – Aviation and Radar 168
Table 2-26 Summary of Impacts Relating to Aviation and Radar. Topics to Be Scoped In (✓) and Out (x) 170
Table 2-27 Offshore Wind Farm Projects Within 50km of the Array Areas 174
Table 2-28 Offshore Wind Farm Projects Export Cables Within the Offshore Study Area... 174
Table 2-29 Pipelines Within Array Areas 175
Table 2-30 Licensed Blocks That Overlap With the Array Areas 176
Table 2-31 Summary of Impacts Relating to Infrastructure and Other Users. Topics to be Scoped In (✓) and Out (x) 182
Table 2-32 Data Sources to be Used for the Assessment of Offshore Archaeology and Cultural Heritage 187
Table 2-33 Site-Specific Data 188
Table 2-34 Summary of Impacts Relating to Offshore Archaeology and Cultural Heritage. Topics to be Scoped In (✓) and Out (x) 192
Table 2-35 Summary of Impacts Relating to Seascape, Landscape and Visual Impact. Topics to be Scoped In (✓) and Out (x) 199
Table 3-1 Ecological Desk Study Data Sources 201
Table 3-2 Designated Sites Within the Hawthorn Pit Onshore Study Area 202
Table 3-3 Designated Sites Within the Creyke Beck Onshore Study Areas 209

Table 3-4 Designated Sites Within the South of Humber Onshore Study Area 214
Table 3-5 Ecological Scoping Surveys Required in Relation to each Onshore Study Area .. 218
Table 3-6 Summary of Impacts Relating to Terrestrial Ecology and Onshore Ornithology. Topics to be Scoped In (✓) and Out (x) 223
Table 3-7 Summary of Geology and Aquifer Designations 238
Table 3-8 Summary of Inland Rivers.. 241
Table 3-9 Existing Datasets 247
Table 3-10 Summary of Impacts Relating to Geology and Land Quality. Topics to be Scoped In (✓) and Out (x) 251
Table 3-11 Hawthorn Pit WFD Water Bodies 258
Table 3-12 Creyke Beck WFD Water Bodies 265
Table 3-13 South of Humber WFD Surface Water Bodies. 274
Table 3-14 Secondary Data to be Used in the EIA 278
Table 3-15 Primary Data to be Used in the EIA 279
Table 3-16 Summary of Impacts Relating to Flood Risk and Hydrology. Topics to be Scoped In (✓) and Out (x)... 282
Table 3-17 Existing Datasets 290
Table 3-18 Summary of Impacts Relating to Land Use. Topics to be Scoped In (✓) and Out (x) 293
Table 3-19 Summary of Impacts Relating to Human Health. Topics to be Scoped In (✓) and Out (x) 301
Table 3-20 Existing Datasets 311
Table 3-21 Proposed Baseline Surveys Onshore Archaeology and Cultural Heritage......... 312
Table 3-22 Summary of Impacts Relating to Onshore Archaeology and Cultural Heritage. Topics to be Scoped In (✓) and Out (x) 317
Table 3-23 Summary of Impacts Relating to Landscape and Visual Impact. Topics to be Scoped In (✓) and Out (x) 329
Table 3-24 Hawthorn Pit Background Traffic Flows 334
Table 3-25 Creyke Beck Background Traffic Flows 336
Table 3-26 South of Humber Background Traffic Flows 339
Table 3-27 Data Sources Used to Define the Traffic and Transport Existing Environment .. 340
Table 3-28 Potential Construction Traffic Impacts 342

Table 3-29 Summary of Impacts Relating to Traffic and Transport. Topics to be Scoped In (✓) and Out (x) 345
Table 3-30 Supplementary Technical Transport Guidance 346
Table 3-31 Example Definitions of the Different Sensitivity Levels 347
Table 3-32 Magnitude of Effect Thresholds 349
Table 3-33 Definitions of the Different Types and Sensitivity Levels for Noise 355
Table 3-34 Existing Datasets 356
Table 3-35 Summary of Impacts Relating to Noise and Vibration. Topics to be Scoped In (✓) and Out (x) 361
Table 3-36 Summary of Impacts Relating to Air Quality. Topics to be Scoped In (✓) and Out (x) 368
Table 4-1 Summary of Impacts Relating to Socio-Economics. Topics to be Scoped In (✓) and Out (x) 377
Table 4-2 UK Carbon Budgets 381
Table 4-3 Summary of Impacts Relating to Climate Change. Topics to be Scoped In (✓) and Out (x) 384
Table 5-1 Impacts Scoped Out From Further Assessment 386

GLOSSARY OF ACRONYMS

ADBA	Archaeological Desk-Based Assessment
AEP	Annual Exceedance Probability
AIP	Aeronautical Information Publication
AIS	Automatic Identification System
ALC	Agricultural Land Classification
AMSL	Above Mean Sea Level
AONB	Area of Outstanding National Beauty
AoS	Area of Search
AQMA	Air Quality Management Area
BEIS	Department for Business, Energy and Industrial Strategy
BERR	Department for Business, Enterprise and Regulatory Reform
BMV	Best and Most Versatile
BGS	British Geological Survey
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CCC	Committee for Climate Change
CfD	Contract for Difference
CIA	Cumulative Impact Assessment
CIEEM	Chartered Institute of Ecology and Environmental Management
DCO	Development Consent Order
DBS	Dogger Bank South
DECC	Department of Energy and Climate Change
DMRB	Design Manual for Roads and Bridges

DTI	Department of Trade and Industry
EcIA	Ecological Impact Assessment
EEA	European Economic Area
EEZ	Economic Exclusion Zone
EIA	Environmental Impact Assessment
EMF	Electromagnetic Field
EPP	Evidence Plan Process
EPUK	Environmental Protection UK
ES	Environmental Statement
ESO	Electricity System Operator
ETG	Expert Topic Group
EU	European Union
EUNIS	European Nature Information System
FIR	Flight Information Region
FL	Flight Level
FRA	Flood Risk Assessment
FSA	Formal Safety Assessment
GEART	Guidelines for the Environmental Assessment of Road Traffic
GHG	Greenhouse Gases
GIS	Geographical Information Systems
HAT	Highest Astronomical Tide
HDD	Horizontal Direction Drill
HER	Historic Environment Record
HGVs	Heavy Goods Vehicles
HIA	Health Impact Assessment

HMRI	Helicopter Main Routeing Indicator
HND	Holistic Network Design
HRA	Habitats Regulations Assessment
HSC	Historic Seascape Character
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IAMMWG	Inter-Agency Marine Mammal Working Group
IAQM	Institute of Air Quality Management
ICES	International Council for the Exploration of the Sea
IEMA	Institute of Environmental Management and Assessment
IFCA	Inshore Fisheries and Conservation Authority
IMO	International Maritime Organization
IOF	Important Ornithological Features
JCP	Joint Cetacean Protocol
JHWS	Joint Health and Wellbeing Strategy
JNAPC	Joint Nautical Archaeology Policy Committee
JNCC	Joint Nature Conservation Committee
LLFA	Lead Local Flood Authority
LNR	Local Nature Reserve
LVIA	Landscape and Visual Impact Assessment
MAGIC	Multi-Agency Geographic Information for the Countryside
MAIB	Marine Accident Investigation Branch
MarLIN	Marine Information Network

MCA	Maritime and Coastguard Agency
MCZ	Marine Conservation Zone
MGN	Marine Guidance Note
MHCLG	Ministry of Housing, Communities and Local Government
MHWS	Mean High Water Spring
MLWS	Mean Low Water Spring
MMO	Marine Management Organisation
MPCP	Marine Pollution Contingency Plan
MPS	Marine Policy Statement
NATS	National Air Traffic Service
NBN	National Biodiversity Network
NCA	National Character Area
NCR	National Cycle Route
NERC	Natural Environment and Rural Communities
NHLE	National Heritage List of England
NM	Nautical Miles
NNR	National Nature Reserve
NO_2	Nitrogen Dioxide
NPS	National Policy Statement
NRA	Navigation Risk Assessment
NRMM	Non-Road Mobile Machinery
NSIP	Nationally Significant Infrastructure Project
OCP	Offshore Converter Platform
ONS	Office of National Statistics
OREIs	Offshore Renewable Energy Installations

OS	Ordnance Survey
OSP	Offshore Substation Platform
OTNR	Offshore Transmission Network Review
PEIR	Preliminary Environmental Information Report
PEXA	Practice and Exercise Areas
PHE	Public Health England
PPG	Planning Practice Guidance
PRA	Preliminary Risk Assessment
PRoW	Public Rights of Way
pSPAs	Proposed Special Protection Areas
REC	Regional Environmental Characterisation
RIAA	Report to Inform an Appropriate Assessment
RNLI	Royal National Lifeboat Institution
RRH	Remote Radar Head
RSPB	Royal Society for the Protection of Birds
RYA	Royal Yachting Association
SAC	Special Area of Conservation
SCADA	System Control and Data Acquisition
SCANS	Small Cetaceans in the European Atlantic and North Sea
SCI	Site of Community Importance
SCOS	Special Committee on Seals
SEGL	Scotland England Green Link
SLVIA	Seascape, Landscape and Visual Impact Assessment
SPA	Special Protected Area
SPZ	Source Protection Zone

SRN	Strategic Road Network
SSS	Side Scan Sonar
SSSI	Site of Special Scientific Interest
TJB	Transition Joint Bay
UKCP18	United Kingdom Climate Projections 2018
UKHO	United Kingdom Hydrographic Office
UXO	Unexploded Ordnance
VMS	Vessel Monitoring Systems
WFD	Water Framework Directive
ZTV	Zone of Theoretical Visibility

GLOSSARY OF TERMINOLOGY

Array areas	The two distinct offshore wind farm areas (Dogger Bank South East and Dogger Bank South West) which are collectively known as Dogger Bank South offshore wind farms.
Array cables	Cables which link the wind turbine generators and the offshore substation platform.
Construction compound	Area set aside to facilitate construction. To be located adjacent to the onshore export cable route, with access to the highway (locations not yet defined).
EIA Regulations	Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.
Evidence Plan Process	A voluntary consultation process with specialist stakeholders to agree the approach to EIA and information to support HRA.
Habitats Regulations	Conservation of Habitats and Species Regulations 2017 and Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended).
Haul routes	The track alongside the onshore export cable route used by construction traffic to access different sections of the onshore export cable route.
Horizontal Directional Drilling (HDD)	A method of cable installation where a cable is drilled beneath a feature without the need for trenching.
Jointing bay	Underground structures constructed at regular intervals along the onshore export cable route to join sections of cable and facilitate installation of the cables into the buried ducts.
Landfall	The location where the offshore cables come ashore.
Landfall Area of Search	The areas being considered within which the landfall would be located.
Offshore export cables	The cables which bring electricity from the offshore substation platform to the transition joint bay.

Offshore study area	The area encompassing the array areas and options for the offshore transmission works.
Onshore export cables	The cables which take the electric from the transition joint bay to the onshore substation.
Onshore grid connection point	The electricity transmission network connection location for the Projects (not yet defined).
Onshore study areas	Areas encompassing the potential landfall locations and the potential locations for onshore transmission works.
Onshore substation	A compound containing electrical equipment required to transform and stabilise electricity generated by the Projects so that it can be connected to the electricity transmission network.
Reactive compensation platform	An offshore structure housing electrical reactors for the purpose of limiting electrical losses in the course of HVAC transmission by providing reactive compensation.
RWE Renewables	RWE Renewables UK (Swindon) Ltd.
Safety zones	An area around a vessel which should be avoided during offshore construction.
Scour protection	Protective materials used to avoid sediment being eroded away from the base foundations and cables as a result of the water flow.
Transition joint bay	An underground structure at the landfall that houses the joint between the offshore export cables and the onshore export cables.
The Projects	Dogger Bank South West and Dogger Bank South East (collectively referred to as Dogger Bank South offshore wind farms).

1 INTRODUCTION

1.1 Project Background

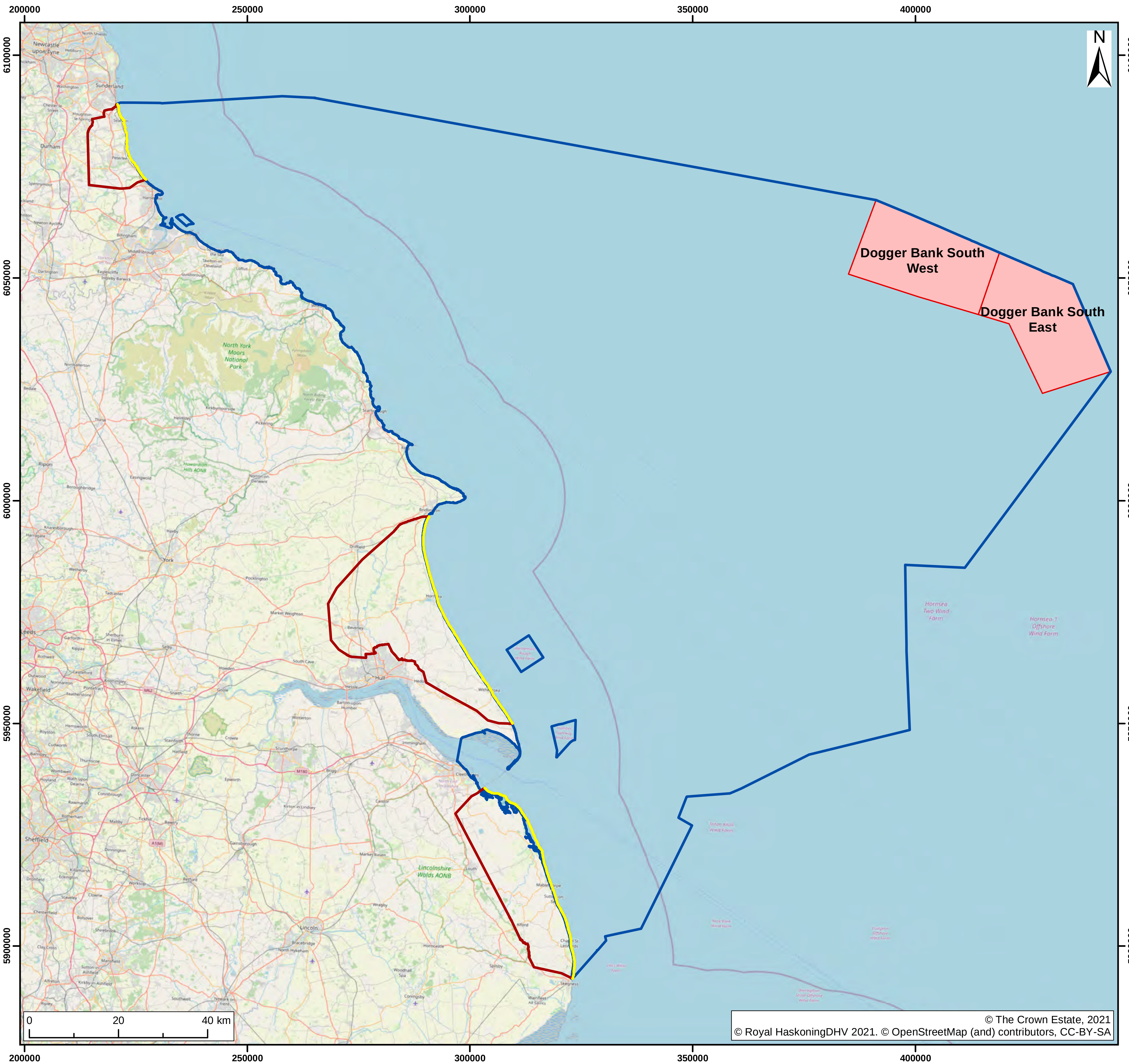
1. In November 2017, The Crown Estate announced a new round of offshore wind leasing. In September 2019, the final bidding areas were announced, and the Offshore Wind Leasing Round 4 was launched. As part of the Round 4 process, developers were able to identify preferred sites within bidding areas defined by The Crown Estate. Applications were then submitted by developers under a competitive bidding process, culminating in an auction held in February 2021. RWE Renewables UK (Swindon) Ltd (RWE Renewables) was successful in this auction process, securing preferred bidder status on two adjacent projects, Dogger Bank South (DBS) East and DBS West, collectively known as DBS offshore wind farms (hereafter 'the Projects'). The Projects are subject to a plan-level Habitats Regulations Assessment (HRA), currently being carried out by The Crown Estate as competent authority. This Scoping Report is submitted on the basis that the development rights will be confirmed by The Crown Estate when this HRA has concluded.

2. The array areas are located more than 100km offshore on the Dogger Bank in the southern North Sea and each covers approximately 500km^2.

3. The potential onshore grid connection point(s) are currently being identified through National Grid Electricity System Operator (ESO)'s Holistic Network Design (HND) process. National Grid ESO has provided four broad potential locations for the onshore grid connection point(s):

- Hawthorn Pit, County Durham;
- Creyke Beck Option 1, East Riding of Yorkshire;
- Creyke Beck Option 2, East Riding of Yorkshire; and
- South of Humber, East Lincolnshire.

4. All four of these options are being considered during RWE Renewables' initial site selection process, until National Grid ESO confirm the location of the grid connection point(s) which could be in the same location for both Projects or at two separate locations. These four locations have formed the basis of the onshore study areas for the purposes of scoping (**Figure 1-1**).



Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Onshore Study Area
- Landfall Areas of Search

A1	C01	03/11/2021	Authorized	LB	JF	HC
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Study Areas

Figure: 1-1 Drawing No: PB2340-RHD-ZZ-ZZ-DR-Z-0021

Co-ordinate system:	Page Size:	Scale:
WGS 1984 UTM Zone 31N	A3	1:850,000

Project:	Report:
Dogger Bank South Offshore Wind Farms	Dogger Bank South Offshore Wind Farms EIA Scoping Report

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5. Alongside a conventional connection to the electricity transmission network, other possible connection options that may be considered include connection to an offshore multi-purpose interconnector, private offtake, integration with future hydrogen infrastructure or a combination thereof. As the Projects progress, these options will be the subject of ongoing discussions between RWE Renewables and National Grid ESO.

6. The Department for Business, Energy and Industrial Strategy (BEIS) is currently undertaking an Offshore Transmission Network Review (OTNR). The objective of the OTNR is to ensure that the transmission connections for offshore wind generation are delivered in the most appropriate way, considering the increased ambition for offshore wind to achieve net zero. The OTNR is looking to introduce policy and regulatory changes via the Energy Bill in 2022 which would introduce changes to the way connection points for offshore infrastructure are selected and ensure greater levels of coordination between proposed developments. The outcome of the OTNR could have an impact on the location of the grid connection point(s) for the Projects, with potential for coordinated infrastructure with other developments. However, this will be subject to the timescales of other developments aligning with the Projects (see section 1.4.5).

1.2 Purpose of this Document

7. As the Projects are offshore generating stations each exceeding 100MW installed capacity, they are classified as Nationally Significant Infrastructure Projects (NSIPs) and as such a Development Consent Order (DCO) is required under the Planning Act 2008. In order to support the DCO application, an Environmental Impact Assessment (EIA) is required.

8. This document supports a request for the EIA Scoping Opinion from the Planning Inspectorate for the Projects, in accordance with Regulation 10 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (hereafter the 'EIA Regulations'). The EIA Regulations enable an applicant to request a Scoping Opinion from the Secretary of State on the information to be included in an EIA.

9. The Scoping Report outlines the receptors that will be considered during the EIA and the proposed approach to data gathering and the assessment methodology in order to characterise the existing environment, assess potential impacts and develop mitigation measures. This will be expanded during a programme of consultation with technical stakeholders throughout the EIA process.

10. The Scoping Report assumes that the Projects will form the basis of a single DCO application. The approach to consenting will be confirmed once the onshore grid connection point(s) is confirmed, before a Preliminary Environmental Information Report (PEIR) is consulted on.

11. The PEIR will provide further detail on the interim findings of the site characterisation and impact assessment. An Environmental Statement (ES) containing the results of the EIA will be submitted with the DCO application.

12. Receptors and impacts have been scoped in or out on the basis of lessons learned from a wide range of EIAs for offshore wind farms, recognising that a number of issues cannot be scoped out until further information is known about the Projects and the existing environment. Any further refinement of the impacts scoped out will be justified and agreed with the relevant stakeholders (see section 1.6).

1.3 The Applicant

13. RWE Renewables is one of the world's leading renewable energy companies. It has capacity of around 11 gigawatts based on renewable energy, including hydropower and biomass as well as a highly efficient gas fleet and an international energy trading business. RWE Renewables wants to expand this position by investing in onshore and offshore wind power, photovoltaics and storage technologies. As a driver of the energy transition, the company also focuses on innovative projects such as floating offshore as well as the generation and use of hydrogen.

14. RWE Renewables is the UK's second largest power producer, supplying around 12% of UK electricity with a diverse operational portfolio of onshore wind, offshore wind, hydro, biomass and gas, amounting to over 9.3GW and the third largest renewable generator in the UK, with a diverse operational portfolio of renewables including onshore wind, offshore wind, hydro and biomass . RWE Renewables operates 32 onshore and nine offshore wind farms with an actual total installed capacity of 3.7GW, when factoring in RWE Renewables' work with partners the pro rata share is 2.1GW.

15. RWE Renewables has the UK's largest offshore development pipeline with two projects under construction and six projects in development. Triton Knoll Offshore Wind Farm (857MW) has installed its 90th (and final) turbine – on track to deliver clean power to a further 800,000 UK homes in 2021 and construction is underway on Sofia Offshore Wind Farm (1.4GW).

16. For further information visit: www.rwe.com/rwe-renewables-uk.

1.4 Project Description

17. At this early stage in the development of the Projects, the project description is indicative, based on RWE Renewables' experience of developing and operating offshore wind farms.

18. The Projects' EIA will be based on a design envelope approach in accordance with National Policy Statement (NPS) EN-3 (paragraph 2.6.42) which recognises that: *"Owing to the complex nature of offshore wind farm development, many of the details of a proposed scheme may be unknown to the applicant at the time of the application to the IPC (sic), possibly including:*

- *Precise location and configuration of turbines and associated development;*
- *Foundation type;*
- *Exact turbine tip height;*
- *Cable type and cable route; and*
- *Exact locations of offshore and/or onshore substations.*"

19. NPS EN-3 (paragraph 2.6.43) continues: "*The IPC (sic) should accept that wind farm operators are unlikely to know precisely which turbines will be procured for the site until sometime after any consent has been granted. Where some details have not been included in the application to the IPC (sic), the applicant should explain which elements of the scheme have yet to be finalised, and the reasons. Therefore, some flexibility may be required in the consent. Where this is sought and the precise details are not known, then the applicant should assess the effects the project could… have to ensure that the project as it may be constructed has been properly assessed (the Rochdale [Design] Envelope)*". (DECC, 2011).

20. The design envelope will therefore provide maximum and minimum parameters where appropriate to ensure the worst case scenario can be quantified and assessed in the EIA. This approach has been widely used in the consenting of offshore wind farms and is consistent with the Planning Inspectorate Advice Note nine: Rochdale Envelope (Planning Inspectorate, 2018) which states that: *"The Rochdale Envelope assessment approach is an acknowledged way of assessing a Proposed Development comprising EIA development where uncertainty exists and necessary flexibility is sought".*

21. The project description, including the design envelope, will be detailed in the ES. The following sections provide an overview of the current understanding of the potential infrastructure required for the Projects, including indicative parameters. This will be developed by RWE Renewables, taking into account the Scoping Opinion and other technical work and consultation undertaken prior to submission of the DCO application.

22. The key components of the Projects are illustrated in **Plate 1-1**.

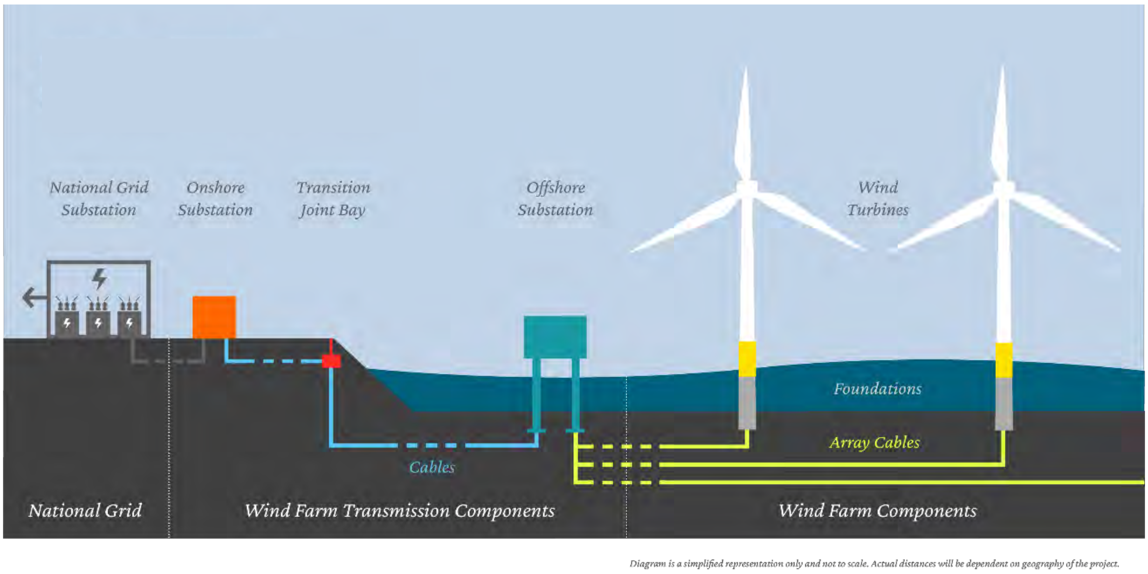


Plate 1-1 Overview of the Projects infrastructure (not to scale)

1.4.1 Offshore

1.4.1.1 Description of the offshore study area

23. The offshore study area lies in the southern North Sea. The Projects' array areas will include wind turbines, array cables and offshore platforms (substations and accommodation).

24. The DBS East array area covers approximately 494km^2 and the DBS West array area covers approximately 495km^2. The DBS East array boundary lies approximately 100km from shore, and the DBS West boundary is approximately 118km from shore at their closest points (Flamborough Head).

25. The seabed in the offshore array areas is between 8m and 35m below sea level and the substrate is predominantly sand and gravel.

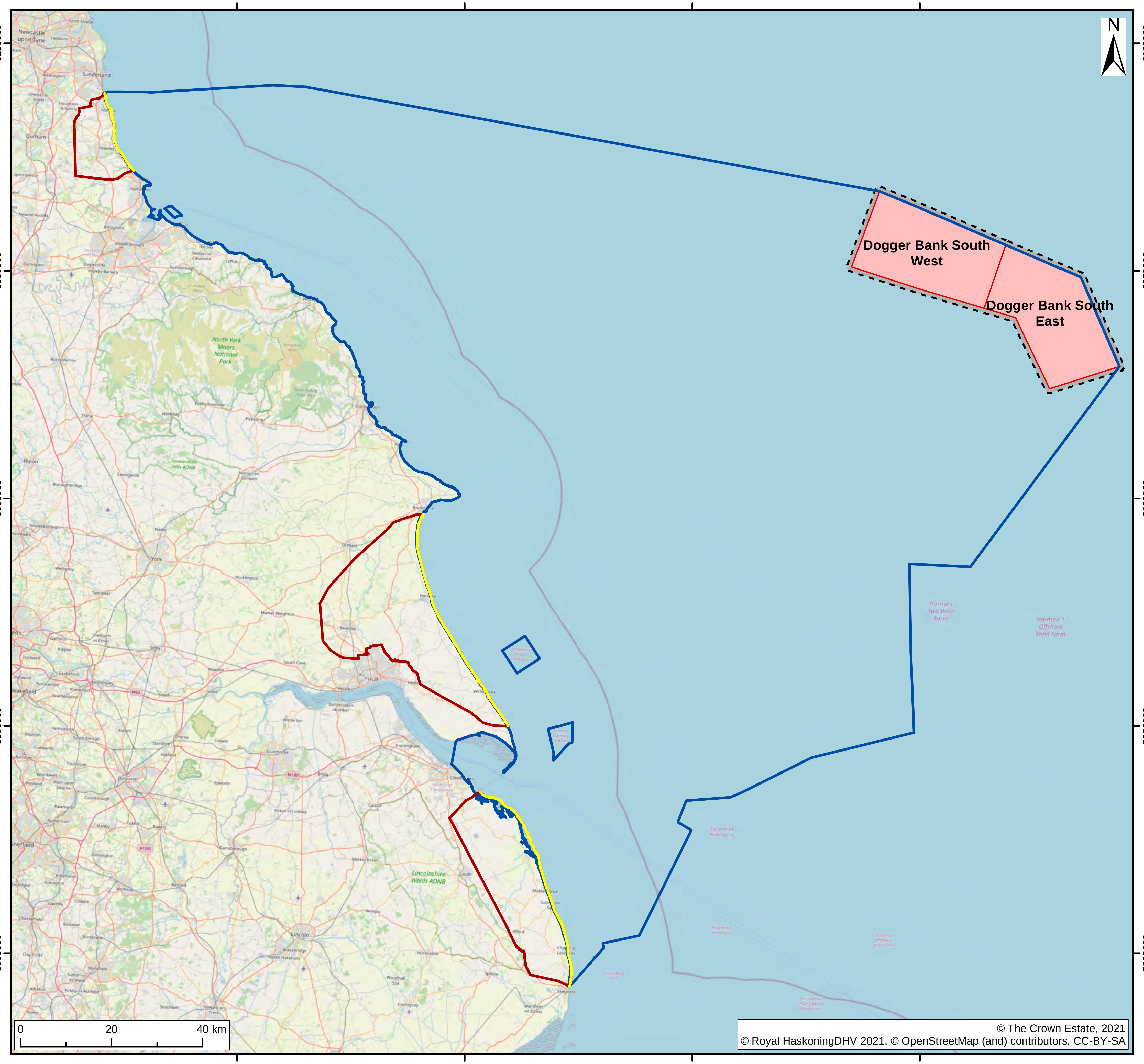
26. The electricity will be connected to the transmission network by export cables which will be located within offshore export cable corridors which run from the array areas to the coast. There are currently three areas being considered as potential landfall locations:

- between Sunderland and Hartlepool;
- between Bridlington and Spurn Point; and
- between Grimsby and Skegness.

27. The precise landfall location(s) will be determined following confirmation of the onshore grid connection point(s) from National Grid ESO and will be subject to further site selection, considering relevant consultation feedback and initial survey data.

28. The Projects' array areas and offshore export cable corridor(s) are collectively referred to as the 'offshore study area'. This offshore study area is shown in **Figure 1-1**. There may be a requirement for additional works to take place outside the array areas / offshore export cable corridor(s) to facilitate any temporary construction works (for example anchor spreads). It is anticipated that this would be in the region of a 1km buffer around the array areas (as shown in **Figure 1-2**) and a 750m buffer around the offshore export cable corridor(s), the extent of these areas will be confirmed during the project design process.

29. Further information on the characteristics of the site and existing use of the offshore study area is provided in section 2 of this Scoping Report.



Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Temporary Construction Area
- Offshore Study Area
- Onshore Study Area
- Landfall Areas of Search

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A1	C01	03/11/2021	Authorized	LB	JF	HC

Title:

Offshore Temporary Construction Area

Figure: 1-2

Drawing No: PB2340-RHD-ZZ-ZZ-DR-Z-0088

Co-ordinate system: WGS 1984 UTM Zone 31N

Page Size: A3

Scale: 1:850,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

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1.4.1.2 Wind turbines

30. 15MW wind turbines are now in production and are expected to represent the lower end of the design envelope. Based on industry developments to date, wind turbine capacity is likely to increase between the time of scoping and construction (see section 1.4.5). Therefore, in order to future proof the EIA and DCO, maximum parameters for larger capacity wind turbines than are currently in existence will be estimated and the EIA will be undertaken on a range of rated capacities (e.g. 15MW and 24MW). The Projects' design envelope allows for up to 200 wind turbines, subject to the wind turbine capacity used. It is possible that more than one wind turbine model could be used across the array areas.

31. The wind turbines typically incorporate tapered tubular towers and three blades attached to a nacelle housing mechanical and electrical generating equipment. It is estimated that the indicative maximum rotor diameter would be 326m.

32. The overall layout of the wind turbines within the wind farm site will be informed by site investigation works and wind resource modelling and will comply with relevant best practice for offshore wind farms in relation to shipping and navigation, fishing interests, offshore health and safety and any relevant aviation interests.

1.4.1.3 Foundations

33. Foundation designs will be informed by a number of factors including environmental characteristics such as ground conditions, water depths and metocean conditions, and techno-economic parameters including the size of wind turbines selected, and supply chain constraints. The findings of the EIA and HRA will also be used to refine the foundation designs. It is possible that more than one type of foundation could be used across the array areas. The following foundation design options are currently being considered:

- monopiles;
- suction bucket foundations (mono-bucket);
- gravity based foundations;
- jackets on pin piles;
- jackets on suction buckets; and
- gravity based jacket foundations.

34. Indicative dimensions and construction materials are outlined in **Table 1-1**.

Table 1-1 Foundation Descriptions

Foundation type	Description
Monopile	Cylindrical steel pile with conical transition – up to 14m diameter for a wind turbine or offshore substation. Average penetration expected to be approximately 40 to 60m below seabed level.
Suction bucket foundation	Maximum bucket diameter up to 40m for a wind turbine or offshore substation. Average penetration expected to be 40m below seabed level.
Gravity based foundation	Circular (or other symmetrical shaped) steel and/or concrete structure that sits on the seabed. Indicative base diameter of 60m for a wind turbine monopile, 4 x 20m diameter feet for a wind turbine jacket, or indicative base diameter of 65m for offshore substation foundation.
Jackets on pin piles	A number of tubular legs supported by braces and fixed to the seabed with up to 4 steel pin piles for wind turbine jackets and up to 8 steel pin piles for offshore substation jackets. Steel pin piles diameter is approximately 3.5m. Spacing between legs is a maximum of approximately 25m at the seabed and 20m at the water surface.
Jackets on suction buckets	Steel suction buckets – up to 4 for wind turbine jackets and up to 8 for offshore substation jackets, maximum diameter 20m each. Spacing between legs is a maximum of approximately 25m at the seabed and 20m at the water surface.
Gravity based jacket foundation	Gravity bases – indicative diameter of up to 60m for wind turbine jackets and 65m for offshore substation jackets. Assumed circular in plan however actual footprint could differ.

35. Scour could occur around the base of foundations; this is when seabed sediment is winnowed away as a result of the flow of water around the structure. The following methods of scour protection may be used around the base of the wind turbines and offshore platform foundations:

- rock or gravel placement;
- concrete mattresses;
- flow energy dissipation devices;
- protective aprons or coverings (solid structures of varying shapes, typically prefabricated in concrete or high-density plastics; and
- bagged solutions.

36. Scour protection installation may involve some seabed preparation prior to installation. The scour protection requirements for the Projects will develop as the Projects progress and will be based on detailed engineering studies.

1.4.1.4 Offshore electrical infrastructure

37. Offshore electrical infrastructure will include the following components:

- array cabling;
- offshore substation platforms (OSPs) and/or offshore converter platforms (OCP); and
- export cabling to bring the electricity from the array areas to the landfall(s).

38. Array cables will be used to connect the wind turbines to the OSPs/OCPs. The maximum length of the array cabling for the Projects is estimated to be 600km. The location and length of the array cabling will be determined post consent, subject to the final layout of the wind turbines.

39. The export cables could be either HVAC or HVDC depending on the location of the onshore grid connection point(s). If HVAC is chosen there could be up to four HVAC cables per Project, with a diameter of approximately 240mm. For HVDC there could be up to two HVDC cables per Project, with a diameter of approximately 145mm. Up to five OSPs/OCPs may be required.

40. If HVAC is chosen there may be a requirement for reactive compensation platforms along the offshore export cable route. If required, these could be located above the sea surface or on the seabed. If an above sea surface design is chosen, the substation will be similar to the substation within the offshore wind farm. If a subsea design is chosen, the electrical plant will be protected within structures permanently attached to the seabed. The number and location of any reactive compensation platforms will be confirmed during the project design process.

41. Fibre optic communications cables (either inside the electrical transmission cables or laid alongside) will be required to allow for System Control and Data Acquisition (SCADA).

42. As per the current rules under the Offshore Transmission Owner regime, the offshore and onshore electrical infrastructure will be sold to an offshore transmission owner.

1.4.2 Landfall

1.4.2.1 Description of the landfall area of search

43. There are currently three potential landfall zones where the export cables could be brought onshore (hereafter referred to as the 'landfall areas of search'). Once National Grid ESO confirm the onshore grid connection point(s) it will be possible to select preferred landfall location(s) for the subsequent EIA through a detailed site selection process.

1.4.2.2 Cable landfall

44. Both trenched and trenchless solutions are currently being considered for the construction of the landfall(s).

45. In the event that a trenchless solution is selected, horizontal directional drilling (HDD) is likely to be used. The HDD method involves drilling pilot holes between the entry (onshore) and the exit (offshore) points which are then enlarged by a larger cutting tool passing through the holes. Cable ducts are then placed through the channels created.

46. The HDD will be undertaken from a Transition Joint Bay (TJB) construction compound which will be temporary in nature and reinstated after completion of the Projects. The size and location of the compound(s) will be confirmed during the project design process. The HDD will exit the seabed in an exit pit at a suitable location. The length of the HDD will depend on the landfall location(s) selected and may be influenced by factors such as shallow geology / soil conditions, environmental constraints, water depth and seabed topography.

47. Should HDD not be possible due to cliff height or difficult drilling conditions alternative trenchless techniques will be considered such as microtunneling and/or using a tunnel boring machine to create segmented tunnel system.

48. The offshore and onshore cables will be jointed using between four and eight TJBs onshore, depending on the choice of transmission technology for the export cables. The onshore TJBs will be located underground. A pit will be dug out and refilled once the transition bays have been installed.

49. The key landfall construction parameters known at this stage are set out in **Table 1-2**.

1.4.3 Onshore

1.4.3.1 Description of the onshore study area

50. The site selection process for the onshore elements of the Projects is at an early stage, with the location of the onshore grid connection point(s) for the Projects yet to be confirmed by National Grid ESO (as set out above). However, in order to progress with the development of the Projects, four potential onshore grid connection locations have been identified by National Grid ESO (Hawthorn Pit, Creyke Beck 1, Creyke Beck 2 and South of Humber). From these RWE Renewables has defined three geographically broad areas (herein referred to as the onshore study areas) known as Hawthorn Pit, Creyke Beck and South of Humber.

51. The onshore study areas comprise approximately 1,366km^2 of land located predominantly within County Durham for Hawthorn Pit (115km^2), East Riding of Yorkshire for Creyke Beck (744km^2) and Lincolnshire for South of Humber (507km^2) and have been dictated by the potential locations for onshore grid connection point(s) provided by National Grid ESO. Further detail on how the onshore study areas have been defined is provided in section 1.5.

52. RWE Renewables is seeking a Scoping Opinion on these areas, which encompass all land under consideration for the siting of onshore infrastructure required to construct the Projects i.e. landfall(s), onshore cables and onshore electrical substations. The onshore study areas are shown in **Figure 1-1**.

53. This approach is aligned with the Planning Inspectorate (2018) Advice Note nine, which states (paragraph 4.5): "*At the time of the Scoping Request, it may be necessary to leave certain matters open. For example, details of the Proposed Development may not have been finalised and, indeed, may not be finalised for some time. For example, in relation to offshore wind farms, detailed information that may not be available at the time of making the request for a Scoping Opinion could include:*

- *type and number of turbines;*
- *foundation type (this may depend upon the height and type of turbine and the seabed conditions);*
- *location of the export cable route (whether this is buried or on the seabed);*
- *location of the landfall point;*
- *the definitive location of any onshore substation;*

- *location of the grid connection point;*
- *construction methods and timing; or*
- *re-powering".*

1.4.3.2 Onshore export cables

54. The onshore export cables will connect the landfall(s) to the onshore substation(s) and will be installed underground. If two separate onshore grid connection locations are chosen for the Projects there will be a requirement for two separate onshore export cable routes.

55. The working width for onshore export cable corridor(s) will be up to 70m wide. This width accounts for the required construction footprint, including cable trenches, haul routes, spoil storage, drainage etc. There may also be a requirement for welfare and storage compounds along the onshore export cable corridor to host parking, welfare and storage facilities. The size and location of these compounds will be confirmed during the project design process. The onshore export cables will generally be installed in trenches which are then backfilled. There will be a maximum of eight trenches required. To avoid specific constraints, there is likely to be a requirement for onshore HDDs or other trenchless installation methods in some locations. Where alternative methods such as HDD are used the onshore export cable corridor may need to be widened to facilitate the work.

56. Jointing bays will be used to pull the cables into ducts and/or to join cable lengths to each other. Link boxes are used for earthing cables and will be installed inside a protective concrete chamber. The jointing bays are subsurface structures, while the link boxes will require access (for inspections) from the surface during operation and therefore will be located at or above ground level. At the jointing locations there will be one link box per circuit. The frequency of jointing bays and link boxes will be approximately every 0.75 to 1.5km.

57. The key indicative construction parameters for the onshore export cables known at this stage are set out in **Table 1-2.**

1.4.3.3 Onshore substation

58. An onshore substation(s) is required to accommodate the connection of the Projects to the transmission grid. Up to two onshore substations may be required, which will operate either HVAC or HVDC technology. The onshore substation(s) will be located in proximity to the onshore grid connection point(s). The onshore substation(s) will contain the necessary electrical and auxiliary equipment and components for transforming the power from the wind farm to 400kV to meet the UK Grid Code for connection to the transmission grid. The maximum design scenario will be set out in the PEIR (e.g. maximum height, footprint, number and type of buildings). The key indicative construction parameters for the onshore substation(s) known at this stage are set out in **Table 1-2**. The need, location and extent of landscaping activities will be identified and agreed with relevant stakeholders during the project design process.

59. Additional electrical infrastructure will also be required at the onshore grid connection point(s) once identified, to connect the onshore substation(s) to the transmission grid. The additional infrastructure is likely to include, for example, National Grid ESO's electrical switchgear into which the Projects will connect. At this stage, the details of the onshore grid connection point(s) have not been finalised by National Grid ESO and therefore details of this infrastructure are not yet known. Further details will be provided as the project design process progresses.

1.4.4 Summary of Indicative Project Parameters

60. **Table 1-2** provides an overview of the indicative parameters for the Projects.

Table 1-2 Key Indicative Project Characteristics for the Projects (DBS East and DBS West Combined)

Feature	Indicative Maximum Parameters
Offshore	
DBS East Array area	494km^2
DBS West Array area	495km^2
Offshore temporary construction works area	1km buffer around array areas
Distance to shore (closest distance, Flamborough Head)	100km
Water depth in the array areas Mean Sea Level (indicative and based on General Bathymetric Chart of the Oceans)	8m to 35m
Number of wind turbines	Up to 200
Maximum swept area of the wind turbines	10.53km^2
Maximum rotor tip height	401m
Minimum clearance above Mean High Water Springs (MHWS)	22m
Maximum number of offshore substation platforms (OSP)	5
Maximum number of other offshore platforms (reactive compensation platforms and accommodation platforms)	4
Approximate array cable length	600km
Approximate offshore export cable route length	To be determined after confirmation of the onshore grid connection point(s).
Maximum number of offshore export cable circuits	8

Feature	Indicative Maximum Parameters
Cable burial	The target is for 100% burial apart from crossings of other infrastructure
Target minimum cable burial depth	1m
Landfall	
Maximum number of Transition Joint Bays (TJBs)	8
Approximate TJB footprint (per TJB)	15 x 25m
Approximate TJB construction compound (per landfall)	250 x 150m
Preferred landfall installation method	Horizontal Directional Drill (HDD) (trenching and other trenchless technologies could also be used)
Onshore	
Electrical connection type	High Voltage Alternating Current (HVAC) and/or High Voltage Direct Current (HVDC)
Maximum number of onshore export cable corridors	2
Maximum number of onshore cable circuits	8
Approximate onshore export cable route length	To be determined after confirmation of the onshore grid connection point(s).
Number of jointing bays	Every 0.75 – 1.5km
Standard onshore export cable corridor construction width	70m
Proposed cable installation method	Trenching and HDD or other trenchless solutions
Number of cable construction compounds	At every joint

Feature	Indicative Maximum Parameters
Cable construction compound dimensions	50 x 50m
Welfare and storage compounds	TBC
Maximum number of onshore substations	2
Maximum onshore substation footprint per substation	200 x 250m
Maximum number of construction compounds per onshore substation	1
Maximum onshore substation construction compound footprint per substation	250 x 150m

1.4.5 Indicative Programme

61. The following indicative programme sets out a number of expected milestones for the Projects. This is subject to change and will be updated during the pre-application stage of the Projects:

- initial Expert Topic Group (ETG) meetings to discuss Scoping – September / October 2021;
- submission of the Scoping Report to the Planning Inspectorate – November 2021;
- alternatives consultation – Q2 2022;
- statutory consultation on PEIR – Q4 2022 / Q1 2023; and
- DCO application submission – Q4 2023.

62. Construction of the Projects will begin no earlier than 2026. The programme for construction and operation of the Projects will depend on the outcome of the HND process. If the same onshore grid connection point is selected for both Projects, RWE may seek an integrated approach to installation of transmission assets. This approach could particularly benefit the planning and construction of the electrical infrastructure and reduce the overall environmental impact.

63. The Scoping Report considers both the Projects being built concurrently and sequentially. A sequential option allows for a phased approach, which would bring one Project into operation earlier. Therefore, the worst case scenario presented by the construction programme will be determined by the receptor and impact in question (which will be identified in the EIA and assessed accordingly).

64. It is anticipated that the assets would have an operational life of 30 years. As part of the Offshore Wind Leasing Round 4 the developers will enter into a seabed lease for up to 60 years, this allows sufficient time for two complete asset lifecycles. At the end of the operational phase, it is a condition of The Crown Estate lease as well as a statutory requirement (through the provisions of the Energy Act 2004 (as amended)) that the Projects are decommissioned.

1.5 Site Selection

1.5.1 Site Selection Process Overview and Current Status

65. Due to the timescales involved in developing the Projects, RWE Renewables is requesting a Scoping Opinion at this early stage whilst site selection relating to export cable corridors and onshore substation locations is still ongoing, subject to the determinations made through the National Grid ESO's HND process. The reason for this is to allow the EIA and DCO application to progress in a timescale which will enable the Projects to contribute to the UK greenhouse gas (GHG) emission reduction target of reducing emissions by 68% by 2030 (HM Government, 2020a), including contributing to an offshore wind generating capacity of 40GW (HM Government, 2020b).

66. Feedback from the scoping consultation will help to inform the ongoing site selection, as well as informing the EIA.

67. The offshore array areas were defined as part of the ongoing Offshore Wind Leasing Round 4 process (The Crown Estate, 2021). The array areas will be confirmed following the conclusion of Leasing Round 4 in Spring 2022.

68. The ongoing site selection process to date has identified broad areas of search for the placement of offshore infrastructure, potential landfall locations and onshore infrastructure based on currently available information. This includes information supplied by National Grid ESO regarding the potential onshore grid connection point(s).

69. Further site selection work by RWE Renewables is necessarily limited until National Grid ESO notify RWE Renewables of the location(s) of the onshore grid connection point(s). However, site selection work will progress based on all four of the potential onshore grid connection points to define potential onshore substation locations and export cable routes. Therefore, when National Grid ESO have notified RWE Renewables of the onshore grid connection point(s), the final detailed site selection process can be concluded, including definition and refinement of potential cable routes and the Projects substation locations.

1.5.2 Defining the Landfall Areas of Search

70. The landfall areas of search have been drawn to MLWS and have been based on the potential onshore grid connection point locations provided by National Grid ESO.

1.5.2.1 Sunderland to Hartlepool

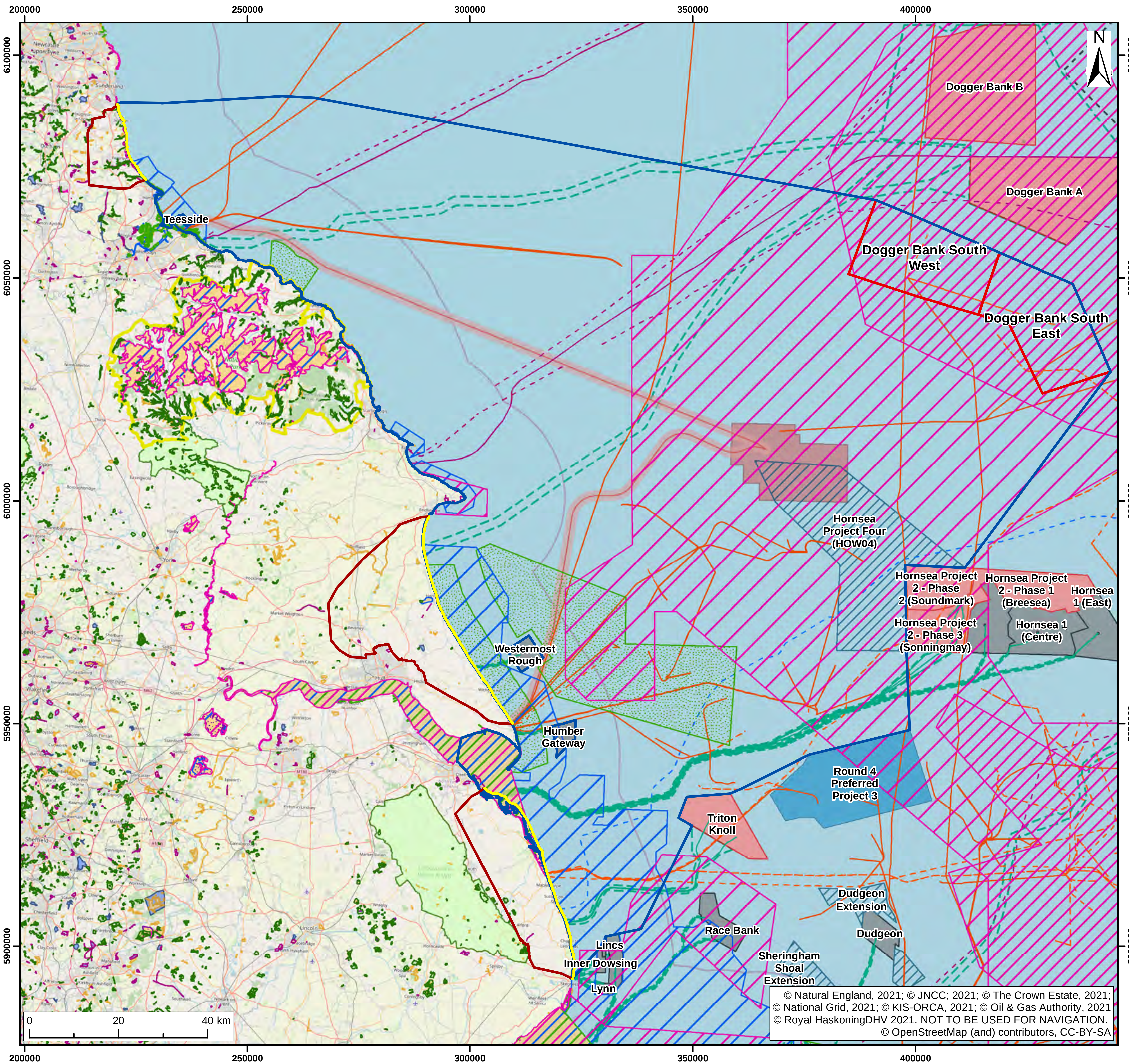
71. In order to avoid large urban areas, this landfall Area of Search (AoS) extends from south of Sunderland to north of Hartlepool.

1.5.2.2 Bridlington to Spurn Point

72. The Bridlington to Spurn Point landfall AoS extends from south of Bridlington to north of the Dimlington Gas Terminal. Environment Agency Lidar data were used to assess cliff heights in this region and it was determined that the area north of Bridlington would not be practicable due to cliff height, distance from the potential onshore grid connection point and the number of protected areas (including the Flamborough and Filey Coast Special Protection Area (SPA) and the Flamborough Head Special Area of Conservation (SAC) (**Figure 1-3**)). The area south of the Dimlington Gas Terminal was ruled out due to a large number of pipeline crossings.

1.5.2.3 Grimsby to Skegness

73. The Grimsby to Skegness landfall AoS extends south of Humberston to north of Skegness. This AoS does not extend further north as there are a number of constraints within the Humber Estuary (ecological, anchorage areas and urban areas) (**Figure 1-3**).



Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Onshore Study Area
- Landfall Areas of Search

Other Offshore Wind Farms

- Government Support on Offer
- Round 4 Preferred Projects
- Pre-planning Application
- Under Construction
- Active/In Operation
- Offshore Wind Export Cable Corridor
- Offshore Wind Farm Export Cable
- Submarine Cable
- Submarine Cable (not in use)
- Viking Link Interconnector (under construction)
- Pipeline
- Pipeline (not in use/ abandoned/removed)

Northern Endurance CCS Project

- Geological Store
- Proposed Corridor
- Proposed Route

Nature Conservation Areas

- Ancient Woodland
- Areas of Outstanding Natural Beauty
- Country Parks
- Local Nature Reserves
- Marine Conservation Zones
- National Nature Reserves
- National Park
- Proposed Ramsar
- Ramsar
- Special Areas of Conservation
- Special Protection Areas
- Sites of Special Scientific Interest

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A1	C01	03/11/2021	Authorized	LB	JF	HC

Title:

Study Areas and Constraints

Figure: 1-3 Drawing No: PB2340-RHD-ZZ-ZZ-DR-Z-0022

Co-ordinate system: WGS 1984 UTM Zone 31N | Page Size: A3 | Scale: 1:850,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

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1.5.3 Defining the Offshore Study Area

74. In order to incorporate all of the possible landfall locations the offshore study area stretches along the coastline from Ryhope in the north and Skegness in the south and from there connects to the northern and southern most points of the Projects' array areas. A small extension has been made to the north to allow for flexibility in routeing around existing and closed marine disposal sites.

75. The turbine array areas (as shown within The Crown Estate datasets) for a number of operational offshore wind farms have been excluded from the offshore study area (**Figure 1-3**). These are:

- Teeside;
- Westermost Rough;
- Humber Gateway;
- Inner Dowsing; and
- Lincs.

76. The turbine array areas of offshore wind farm projects currently under construction have also been excluded from the offshore study area, which includes Triton Knoll and Hornsea TWO.

77. Although the Hornsea FOUR offshore wind farm is currently at the application stage the array area has been included in the offshore study area to take advantage of potential opportunities to route cables between Hornsea TWO and FOUR (if final designs allow).

1.5.4 Defining the Onshore Study Areas

78. The onshore study areas have been based on the broad potential onshore grid connection points provided by National Grid ESO, the landfall AoS and local knowledge. The onshore study areas have been defined to either avoid or provide sufficient space to route around potential constraints such as designated sites, urban areas and other projects. **Figure 1-3** shows the Hawthorn Pit, Creyke Beck and South of Humber onshore study areas.

1.5.5 Detailed Site Selection Process

79. An ongoing process of site selection will take place to identify the preferred locations for the different elements of electrical infrastructure.

80. The process will refine the onshore and offshore study areas into preferred option(s), which will be used as the basis of data gathering to inform the PEIR. Responses to the PEIR will be used to inform the final red line boundary for the EIA and DCO application.

81. The detailed site selection will aim to avoid and minimise impacts as far as practicable and will take account of a range of human and environmental constraints, as well as engineering requirements.

1.6 Consultation

1.6.1 Technical Consultation

82. Consultation is a key element of the EIA process and consultation with technical consultees will be crucial to the development of the assessment and site selection work. The detailed methodologies for data collection and understanding the impact assessment will be agreed with the relevant stakeholders.

83. An Evidence Plan Process (EPP) has been set up and will be followed during the EIA to structure some of the technical stakeholder consultation where there are multiple interested parties. The EPP is a voluntary mechanism to help agree the information required by the Planning Inspectorate as part of an application for development consent to help ensure compliance with the EIA Regulations and Habitats Regulations. The EPP aims to give greater certainty to all parties on the nature, amount and range of evidence RWE Renewables should collect and present to support the application.

84. As the Projects develop and additional data and information become available, including mitigation measures, further impacts may be able to be scoped out. If so, this will be documented through agreement logs with stakeholders.

85. The EPP will include Expert Topic Group (ETG) meetings that provide a platform to discuss and where possible agree the evidence requirements for each topic, between multiple stakeholders. This process has been initiated during the production of this Scoping Report, initial ETG meetings were held in September and October 2021.

86. For topics not included in the EPP direct consultation will occur with stakeholders. This will apply to topics such as fishing, aviation and radar and shipping and navigation. For these, meetings with relevant stakeholders would be held at key points in the programme i.e. prior to scoping, PEIR and DCO submission.

87. **Table 1-3** provides an overview of the likely stakeholders that will be engaged throughout the EIA and the environmental topic areas to be discussed.

Table 1-3 Consultation Groups

Consultation	Purpose of topics included	Stakeholders
Expert Topic Group (ETG)	The following Expert Topic Groups (ETG) have been established: • Seabed o Marine physical processes o Marine water and sediment quality o Benthic and intertidal ecology o Fish and shellfish ecology • Marine mammal ecology and underwater noise • Offshore ornithology • Terrestrial ecology (including onshore ornithology) • Seascape, Landscape and Visual Impact (SLVIA) • Traffic and transport, onshore noise and air quality • Water resource and flood risk (including land use and geology where relevant) • Historic environment (onshore and offshore) Where there is sufficient overlap in technical expertise, topics may be combined to provide efficiency for all parties.	• Natural England • Marine Management Organisation (MMO) • Cefas • Environment Agency • Historic England • National Highways • RSPB • The Wildlife Trusts • Durham Wildlife Trust • Yorkshire Wildlife Trust • Lincolnshire Wildlife Trust • Durham County Council • Hartlepool Borough Council • Sunderland District Council • East Riding of Yorkshire Council • Lincolnshire County Council • North East Lincolnshire Council • East Lindsey District Council • North Eastern Inshore Fisheries and Conservation Association (IFCA) • Eastern IFCA • Water companies

Consultation	Purpose of topics included	Stakeholders
		• Internal drainage boards
Fisheries	This topic typically sits outside the framework of the EPP. Local fisheries organisations and individual fishermen will be contacted at an early stage in the EIA process to provide information about the Projects and to seek information on fishing activity in order to inform the assessment.	• UK fisheries • Foreign fisheries
Aviation and radar	This topic typically sits outside the framework of the EPP. Consultation with aviation stakeholders will be undertaken at an early stage in the EIA process to provide information about the Projects and to seek information on potential issues with regards to aviation and radar in order to inform the assessment.	• Civil Aviation Authority • Ministry of Defence • National Air Traffic Services (NATS) En Route
Shipping and navigation	The topic typically sits outside the framework of the EPP. Consultation with shipping and navigation stakeholders will be undertaken at an early stage in the EIA process to provide information about the Projects and to seek information on potential issues with regards to shipping and navigation in order to inform the navigation risk assessment.	• Maritime and Coastguard Agency (MCA) • Trinity House • Royal Yachting Association • Chamber of Shipping • Port authorities • Shipping companies

1.6.2 Public Engagement

88. Pre-application consultation will be the main opportunity for stakeholders to review the plans, provide comments, submit feedback and to have an influence on elements of the process and shape the development.

89. RWE Renewables will ensure that stakeholders affected by the proposals are consulted and engaged in the development of the Projects throughout the process and have the opportunity to comment on the development of the proposals during each consultation exercise.

90. The development of the Projects will be an iterative process with opportunity for the public to input throughout the process, however, there will be specific consultation periods where RWE Renewables will ask for comments related to defined elements of the proposal including the statutory consultation on the PEIR. How consultation and engagement on the Projects will be undertaken will be set out in a Statement of Community Consultation and will be timed to allow RWE Renewables to effectively gather opinions and feedback.

91. RWE Renewables will investigate the use of both traditional and online consultation methodologies including:

- virtual exhibitions via the Projects' website;
- digital consultation;
- community / public events;
- newsletter (online and hard copy);
- direct mail (letters, invitations and information materials) to those within the consultation area;
- advertising in local newspapers;
- establishment of community liaison groups as applicable;
- meetings with local representatives including parish, district and county councillors;
- project specific website (www.rwe.com/doggerbanksouth);
- social media; and
- project-specific email address (dbs@rwe.com).

1.7 Environmental Impact Assessment Methodology

1.7.1 Characterisation of the Existing Environment

92. The characterisation (description) of the existing environment will be undertaken in order to determine the baseline conditions in the areas with potential to be affected by the Projects. This will require the following steps:

- study areas defined for each receptor based on the zone of influence and relevant characteristics of the receptor (e.g. mobility/ range);
- review available information;
- review likely or potential impacts that might be expected to arise from the development;
- determine if the available data are adequate to make the EIA judgement with sufficient confidence;
- if further data are required, ensure data gathered are targeted and directed at answering the key questions and filling important data gaps; and
- review information gathered to ensure the environment can be characterised in sufficient detail.

93. Existing data from research, government and industry, will be used alongside data collected by RWE Renewables specifically for the Projects. The proposed data and information sources are outlined in the Existing Environment subsections within sections 2, 3 and 4.

94. Consideration will also be given to the evolution of the baseline in the absence of the Projects. This will take account of wider issues such as climate change and biodiversity loss (in line with Schedule 4 of the EIA Regulations).

95. The approach to establishing a robust baseline is summarised under each topic within this Scoping Report (see sections 2 to 4), and RWE Renewables will seek to agree this via consultation e.g. from the views expressed in the Scoping Opinion and additional consultation for example through the EPP.

1.7.2 Assessment of Impacts

96. The EIA team will make balanced assessments with the guidance of EIA and technical specialists. A combination of existing and new data, experience and expert judgement will be applied. In order to provide a consistent framework and system of common tools and terms, where appropriate, a matrix approach will be used to frame and present the judgements made (see **Table 1-4** for an example). However, it should be noted that for each EIA topic the latest guidance or best practice will be used and therefore definitions of sensitivity and magnitude of impact will be tailored to each receptor. The impact assessment will consider the potential for, and significance of, impacts during the construction, operation and decommissioning of the Projects.

1.7.2.1 Determining receptor sensitivity and value

97. The ability of a receptor to adapt to change, tolerate and / or recover from potential impacts will be key in assessing its sensitivity to the impact under consideration. For ecological receptors, tolerance could relate to short-term changes in the physical environment, for human receptors tolerance could relate to displacement effects and therefore impacts upon economics or safety. It also follows that the times required for recovery will be a key consideration in determining receptor sensitivity.

98. Receptor value considers whether, for example, the receptor is rare, has protected or threatened status, importance at local, regional, national or international scale, and in the case of biological receptors whether the receptor performs a key role in the ecosystem function.

99. Therefore, the overall receptor sensitivity is determined by considering a combination of value, adaptability, tolerance and recoverability as well as applying professional judgement and / or past experience. Expert judgement is particularly important when determining the sensitivity of receptors. For instance, an Annex II species (under the Habitats Directive) could have high value, but if it was highly tolerant of an effect or had high recoverability it would follow that its sensitivity should reflect the ecology of the species rather than default to the protected status alone.

1.7.2.2 Predicting the Magnitude of Impacts

100. In order to predict the significance of an impact it is fundamental to establish the magnitude and probability of the impact occurring through a consideration of:

- scale or spatial extent (small scale to large scale or most of the population or a few individuals);
- duration (short-term to long-term);
- frequency; and
- nature of change relative to the baseline.

1.7.2.3 Evaluation of Significance

101. Subsequent to establishing the receptor sensitivity and magnitude of effect, the impact significance will be predicted by using quantitative or qualitative criteria, as appropriate to ensure a robust assessment. Where possible a matrix such as the one presented in **Table 1-4** will be used to aid assessment of impact significance based on expert judgement, latest guidance and any specific input from consultations. A description of the approach to impact assessment and the interpretation of significance levels will be provided within each section of the ES. This approach will ensure that the definition of impacts is transparent and relevant to each topic under consideration.

102. For the purpose of the EIA, major and moderate adverse impacts are deemed to be significant and, as such, may require mitigation. Whilst minor impacts are not significant in their own right, these may contribute to significant impacts cumulatively or through interaction.

Table 1-4 Example of the Significance of an Impact Resulting From Each Combination of Receptor Sensitivity and the Magnitude of the Effect Upon It

		Negative Magnitude				Beneficial Magnitude			
		High	Medium	Low	Negligible	Negligible	Low	Medium	High
Sensitivity	High	Major	Major	Moderate	Minor	Minor	Moderate	Major	Major
	Medium	Major	Moderate	Minor	Minor	Minor	Minor	Moderate	Major
	Low	Moderate	Minor	Minor	Negligible	Negligible	Minor	Minor	Moderate
	Negligible	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Minor

1.7.2.4 Embedded and Additional Mitigation, Impact Significant and Residual Impact

103. The EIA Regulations require a description of the measures envisaged to avoid, prevent, reduce or (where possible) offset any significant adverse effects on the environment. Where possible, embedded mitigation, i.e. mitigation identified at an early stage (often using experience from operational projects) can include:

- the design elements aimed at reducing impacts;
- commitment to specific best practice;
- commitment to pre-construction surveys; and
- commitment to consultation.

104. Embedded mitigation will be incorporated into the Projects' design and listed where relevant for each topic. Impacts will then be assessed with this mitigation in place. Where impacts are significant and additional mitigation is required, impacts may be reassessed and the post-mitigation or 'residual impact' identified. If the impact does not require mitigation (or none is possible) the residual impact will remain the same.

105. In some circumstances it may be necessary to detail monitoring requirements as part of mitigation measures identified. Monitoring may be required to confirm an assumption that an assessment is reliant upon (i.e. continue to monitor baseline conditions) and / or to confirm efficacy of mitigation measures implemented. Monitoring should be proportionate and directly relevant to the findings of the impact assessment and/or relate to uncertainties within the assessment, i.e. it should not be monitoring for the sake of monitoring.

1.7.2.5 Confidence

106. Where relevant, once an assessment of a potential impact has been made, a confidence value is assigned to the assessment to assist in the understanding of the judgement. This is undertaken on a simple scale of high-medium-low, where high confidence assessments are made on the basis of robust evidence, with lower confidence assessment being based, for example on extrapolation and use of proxies.

1.7.2.6 Inter-relationships

107. The impact assessment will consider the inter-relationship of impacts on individual receptors. The objective will be to identify where the accumulation of residual impacts on a single receptor and the relationship between those impacts, gives rise to a need for additional mitigation. When considering the potential for impacts to inter-relate it is assumed that any residual effect determined as having no impact will not result in a significant inter-relationship when combined with other effects on receptors. However, where a series of negligible or greater residual impacts are identified, they will be considered further.

1.7.2.7 Cumulative and Transboundary Impacts

108. Cumulative Impact Assessment (CIA) forms part of the EIA process. The Planning Inspectorate Advice Note nine (The Planning Inspectorate, 2018) and seventeen (The Planning Inspectorate, 2019) provide guidance on plans and projects that should be considered in the CIA including:

- projects that are under construction;
- permitted applications not yet implemented;
- submitted applications not yet determined;
- projects on the Planning Inspectorate's Programme of Projects;
- development identified in relevant Development Plans, (and emerging Development Plans – with weight being given as they move close to adoption) recognising that information on any relevant proposals is likely to be limited; and
- sites identified in other policy documents as their development is reasonably likely to come forward.

109. Only projects which are reasonably well defined and sufficiently advanced to provide information on which to base a meaningful and robust assessment will be included in the CIA. Projects which are sufficiently implemented during the site characterisation for the Projects will be considered as part of the baseline for the EIA. Where possible RWE Renewables will use as-built project parameter information (if available) as opposed to consented parameters to reduce over-precaution (inaccuracies) in the cumulative assessment.

110. For some topics (where for example the receptors include highly mobile or migratory species, fishing or shipping) the CIA will have a large geographic scale and involve many plans and projects. For others where receptors (or impact ranges) are more spatially fixed the CIA will be narrower. The scope of the CIA will therefore be established on a topic-by-topic basis with the relevant consultees as the EIA progresses.

111. Offshore cumulative impacts may come from interactions with the following activities and industries:

- other wind farms;
- aggregate extraction and dredging;
- licensed disposal sites;
- navigation and shipping;
- commercial fisheries;
- sub-sea cables and pipelines;
- potential port and harbour development;
- oil and gas activities, carbon capture and storage and hydrogen projects; and
- Unexploded Ordnance (UXO) clearance.

112. Onshore plans or projects that may be considered include (but are not limited to):

- other offshore wind farm infrastructure;
- other energy generation infrastructure;
- building and / or housing developments;
- installation or upgrade of roads;
- installation or upgrade of cables and pipelines; and
- coastal protection works.

113. Regulation 32 of the EIA Regulations sets procedures to address issues associated with a development that might have a significant impact on the environment in another European Economic Area (EEA) member state.

114. The procedures involve providing information on the member state and for the Planning Inspectorate to enter into consultation with that state regarding the significant impacts of the development and the associated mitigation measures. Further advice on transboundary issues, in particular with regard to consultation is given in the Planning Inspectorate Advice Note twelve (Planning Inspectorate, 2020).

115. Transboundary impacts, like cumulative impacts, are considered on a topic-by-topic basis for offshore subjects and are not expected to be relevant to onshore topics.

116. It is intended that screening of plans and projects to include in the CIA and Transboundary assessment will be undertaken for the Projects in 2022 and will be consulted upon with the relevant stakeholders through the EPP (section 1.6).

1.8 Policy and Legislative Context

1.8.1 Need for the Projects

117. The Government and the offshore wind sector adopted the Offshore Wind Sector Deal in 2019 to build on the United Kingdom's global leadership in offshore wind, maximising the advantages for UK industry from the global shift to clean growth. The Sector Deal provided a target of delivering 30GW of energy from offshore wind by 2030. Subsequently, the Energy White Paper (HM Government, 2020b) commits to increase this target to 40GW.

118. Building up to 40GW of offshore wind by 2030 could account for over £50 billion of infrastructure spending in the next decade.

119. There are four drivers for the development of offshore wind energy:

- reduce GHG emissions;
- energy security;
- maximise economic opportunities from energy infrastructure investment for the UK; and
- produce affordable energy.

120. The Projects will help contribute to these targets.

1.8.2 Summary of Climate Change and Renewable Energy Policy and Legislation

121. Climate change policy has been established at an international and national level. Key aspects are presented in **Table 1-5**.

Table 1-5 Summary of Relevant Climate Change Policies

Policy	Summary
United Nations Framework Convention on Climate Change (Paris climate agreement)	Limit global temperature increase to below 2°C, while pursuing efforts to limit the increase to 1.5°C; Commitments by all parties to prepare, communicate and maintain a Nationally Determined Contribution; and In 2023 and every five years thereafter, a global stocktake will assess collective progress toward meeting the purpose of the Agreement.
The UK Climate Change Act 2008	A reduction of 34% in GHGs by 2020 (below 1990 levels); and A reduction of 80% in GHGs by 2050 (below 1990 levels).
Climate Change Act 2008 (2050 Target Amendment) Order 2019	Introduces a target for at least a 100% reduction of GHG emissions (compared to 1990 levels) in the UK by 2050. Supersedes the Climate Change Act 80% target.
Net Zero Strategy: Build Back Greener 2021 (Presented to Parliament pursuant to Section 14 of the Climate Change Act 2008)	Net zero emissions by 2050. 40GW of offshore wind by 2030.
The UK Energy Act 2013	Introduction of provisions to enable a statutory 2030 decarbonisation target range for Great Britain's electricity sector; and Electricity Market Reform including introduction of the CfDs support mechanism.

1.8.3 Planning Policy and Legislation

122. The Planning Act (2008) (as amended) is the primary legislation that established the legal framework for applying for, examining and determining applications for NSIPs.

1.8.3.1 National Policy Statements (NPS)

123. NPSs are produced by the UK Government and set out national policy against which proposals for NSIPs are determined. NPSs include the Government's objectives for the development of nationally significant infrastructure. The three NPSs of relevance to the Projects are:

- EN-1 Overarching Energy (DECC, 2011a);
- EN-3 Renewable Energy Infrastructure (DECC, 2011b), which covers nationally significant renewable energy infrastructure (including offshore generating stations in excess of 100MW); and
- EN-5 Electricity Networks infrastructure (DECC, 2011c), which covers the electrical infrastructure associated with an NSIP.

124. At the time of writing revisions to the current energy NPSs are under consultation. It appears that the review process will conclude in 2022 and RWE Renewables are assuming the revised NPSs will be formally designated in Q2 2022, when the 2011 NPSs will be formally superseded. The revised NPSs will apply to the application for the Projects and the PEIR, ES and other application documents will take them fully into account.

125. Although not currently a mandatory requirement for NSIPs, it is likely that the updated version will encourage projects to consider delivering biodiversity net gain. RWE Renewables are keen to explore opportunities for biodiversity net gain as the Projects develop and where possible this will be included in the design of the Projects.

126. The Marine Policy Statement (MPS) adopted by all UK administrations in March 2011 provides the policy framework for the preparation of marine plans and establishes how decisions affecting the marine area should be made in order to enable sustainable development.

1.8.3.2 The EIA Directive

127. EIA was introduced under the European Union (EU) EIA Directive 85/337/EEC (as amended by Directives 97/11/EC, 2003/35/EC and 2009/31/EC). The EIA Directive was transposed into English law for the NSIPs by the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009. In 2011, the original EIA Directive and amendment were codified by EIA Directive 2011/92/EU (as amended by Directive 2014/52/EU).

128. Amendments were made by EIA Directive 2014/52/EU and have been transposed into English law for NSIPs by the EIA Regulations. These are the relevant EIA regulations for the Projects.

1.8.4 Environmental Legislation

129. **Table 1-6** provides an overview of the key environmental legislation that will be of relevance to the Projects.

Table 1-6 Key Relevant Environmental Legislation

Level	Legislation	Summary
International	The OSPAR Convention	Establishes a network of Marine Protected Areas.
	The Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention)	Establishes Ramsar sites to protect important areas for waterfowl.
UK Legislation	The Wildlife and Countryside Act 1981	Enables the designation of SSSIs to provide protection for flora, fauna, geological and physio-geological features. Enables designation of sites which are considered to be of national importance as NNRs. Makes it an offence to intentionally kill, injure or take wild birds and to take, damage or destroy the nest of any wild bird while that nest is in use or being built. Makes it an offence to intentionally kill, injure or take any animal listed in Schedule 5 of the Act and protects occupied and unoccupied places used for shelter or protection. Makes it an offence to intentionally pick, uproot or destroy any wild plant listed in Schedule 8 and to plant or otherwise cause to grow any non-native, invasive species listed under Schedule 9 of the Act.
	Countryside and Rights of Way Act 2000	Gives Natural England the power to designate AONBs.
	Water Environment (Water Framework Directive) (England and Wales) Regulations 2003	Ensures a 'good ecological status' of inland, estuarine and groundwater bodies including coastal surface waters up to one nautical mile offshore.

Level	Legislation	Summary
	Natural Environment and Rural Communities (NERC) Act 2006	Requires the relevant Secretary of State to compile a list of habitats and species of principal importance for the conservation of biodiversity.
	The Commons Act 2006	Protects areas of common land, in a sustainable manner delivering benefits for farming, public access and biodiversity.
	Marine Coastal and Access Act 2009	Enables the designation of Marine Protected Areas (MPAs) in England, Wales and UK offshore waters, including Marine Conservation Zones (MCZs) and Highly Protected Marine Areas (HPMAs). Introduces measures including a streamlined marine licensing system and the introduction of a marine planning system and decision-making to enable sustainable development in accordance with the MPS.
	Marine Strategy Regulations 2010	Establishes measures to maintain or achieve ‘good environmental status’ in the marine environment.
	Conservation of Habitats and Species Regulations 2017 and Conservation of Offshore Marine Habitats and Species Regulations 2017 (together the ‘Habitats Regulations’	Provides a framework for the conservation and management of wild fauna and flora, including protection for specific habitats listed in Annex I and species listed in Annex II of the Directive. Provides for the establishment of a Europe wide network of protected sites, known as Natura 2000 (the definition of which includes SAC and SPA). Makes it an offence to kill, injure, capture or disturb European Protected Species (EPS). Note that these two sets of regulations are currently being consolidated by the Government; however, there will be no policy changes as a result of this exercise.

1.8.4.1 Habitats Regulations Assessment

130. Under the Habitats Regulations the Secretary of State must consider whether a plan or project has the potential to have an adverse effect on the integrity and features of a National Site Network site (i.e. a SAC, SPA, candidate SAC or Site of Community Importance (SCI)). This process is known as a habitats regulations assessment (HRA). Under the Habitats Regulations, Appropriate Assessment is required for a plan or project, which either alone or in combination with other plans or projects, is likely to have a significant effect on a National site and is not directly connected with or necessary for the management of the site.

131. It is intended that the HRA Screening will be undertaken for the Projects in 2022 and will be consulted upon with the relevant stakeholders through the EPP (section 1.6).

132. Further assessment will be undertaken as required and presented with the DCO application in the Report to Inform Appropriate Assessment (RIAA). A draft RIAA will be provided for consultation with the PEIR.

133. The requirement for Stage 3 and 4 (i.e. the derogation case and identification of possible compensation) will be subject to the findings of the RIAA and consultation through the EPP. Any outputs from these stages will be reported in the DCO application as required.

2 OFFSHORE

134. This section presents the main baseline characteristics of the offshore environment within the offshore study area (**Figure 1-1**). This includes all receptors below MHWS, including those within the intertidal zone. Unless otherwise stated, the potential impacts of the Projects during construction, operation and decommissioning are considered in line with the methodology presented in section 1.7. Each section outlines which impacts are proposed to be scoped in to the EIA and which will be scoped out.

2.1 Marine Physical Processes

135. This section considers the potential effects of construction, operation and maintenance, and decommissioning of the Projects on Marine Physical Processes.

The following questions are posed to consultees to help them frame and focus their response to the marine physical processes scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Do you agree with the approach to data collection?
- Have all the potential impacts on the marine physical processes resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

2.1.1 Existing Environment

2.1.1.1 Bathymetry

136. The minimum and maximum depths across the Projects array areas are approximately 10m below LAT and 40m below LAT, respectively (**Figure 2-1**). Across the offshore study area, water depths are variable from 90m below LAT in the deepest areas to less than 5m below LAT in the nearshore landfall areas of search (EMODnet, 2020).

2.1.1.2 Tidal currents

137. Dogger Bank is influenced by cool Atlantic water masses arriving from the north and warmer inflow from the English Channel to the south, resulting in the creation of a front (Flamborough Front) where these two masses meet. Therefore, Dogger Bank is subject to a relatively complex regime of low velocity tidal currents and eddies. Department for Business, Enterprise and Regulatory Reform (BERR) (2008) modelled peak flows for mean spring tides of between approximately 0.3m/s and 0.5m/s (**Figure 2-2**). Peak flows increase gradually across the offshore study area, from 0.6m/s furthest offshore at the array areas, to up to 1.4m/s closer to the coast.

2.1.1.3 Waves

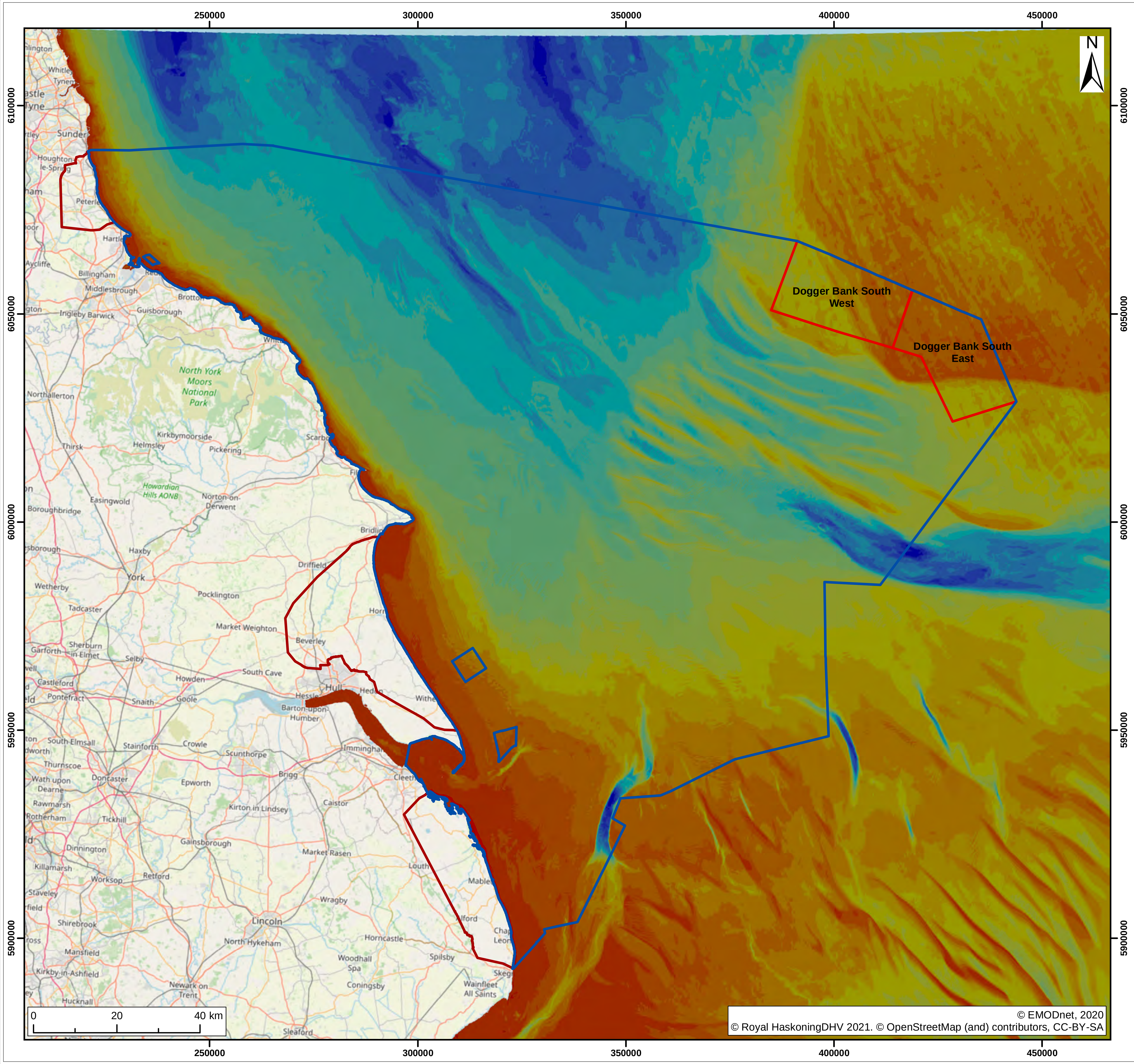
138. Given its open sea location Dogger Bank is exposed to relatively high levels of wave energy. The most frequent waves across the Projects are from the north to north-northwest. BERR (2008) described annual mean significant wave heights of 1.7m to 1.8m (**Figure 2-3**). Wave heights decrease gradually across the offshore study area, to less than 1.0m closer to the coast.

2.1.1.4 Bedload sediment and transport

139. Mapping of sediment types completed by British Geological Survey (BGS) (1987) is shown in **Figure 2-4**. The data shows that the Projects array areas are dominated by slightly gravelly sand, sand, and gravelly sand with a small patch of sandy gravel in the west. Across the offshore study area, a large part of the southern North Sea is sand, before coarser sediments (gravelly sand and sandy gravel) return nearer to the coast.

2.1.1.5 Suspended sediment concentrations

Cefas (2016) mapped the spatial distribution of average annual suspended sediment concentrations across the UK continental shelf between 1998 and 2015 and found that Dogger Bank is characterised by values lower than 5mg/l. Large areas of the southern North Sea are characterised by similar suspended sediment concentrations, with values becoming greater in shallower water towards the coast.



Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Onshore Study Area

Bathymetry (LAT)

- > 0
- 0 - -9.9
- -10 - -14.9
- -15 - -19.9
- -20 - -24.9
- -25 - -29.9
- -30 - -34.9
- -35 - -39.9
- -40 - -44.9
- -45 - -49.9
- -50 - -54.9
- -55 - -59.9
- -60 - -64.9
- -65 - -69.9
- -70 - -74.9
- -75 - -79.9
- -80 - -84.9
- -85 - -89.9
- < -90

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A1	C01	03/11/2021	Authorized	LB	DB	HC

Title:

Offshore Bathymetry

Figure: 2-1 | Drawing No: PB2340-RHD-OF-ZZ-DR-Z-0041

Co-ordinate system: WGS 1984 UTM Zone 31N | Page Size: A3 | Scale: 1:900,000

Project: Dogger Bank South Offshore Wind Farms

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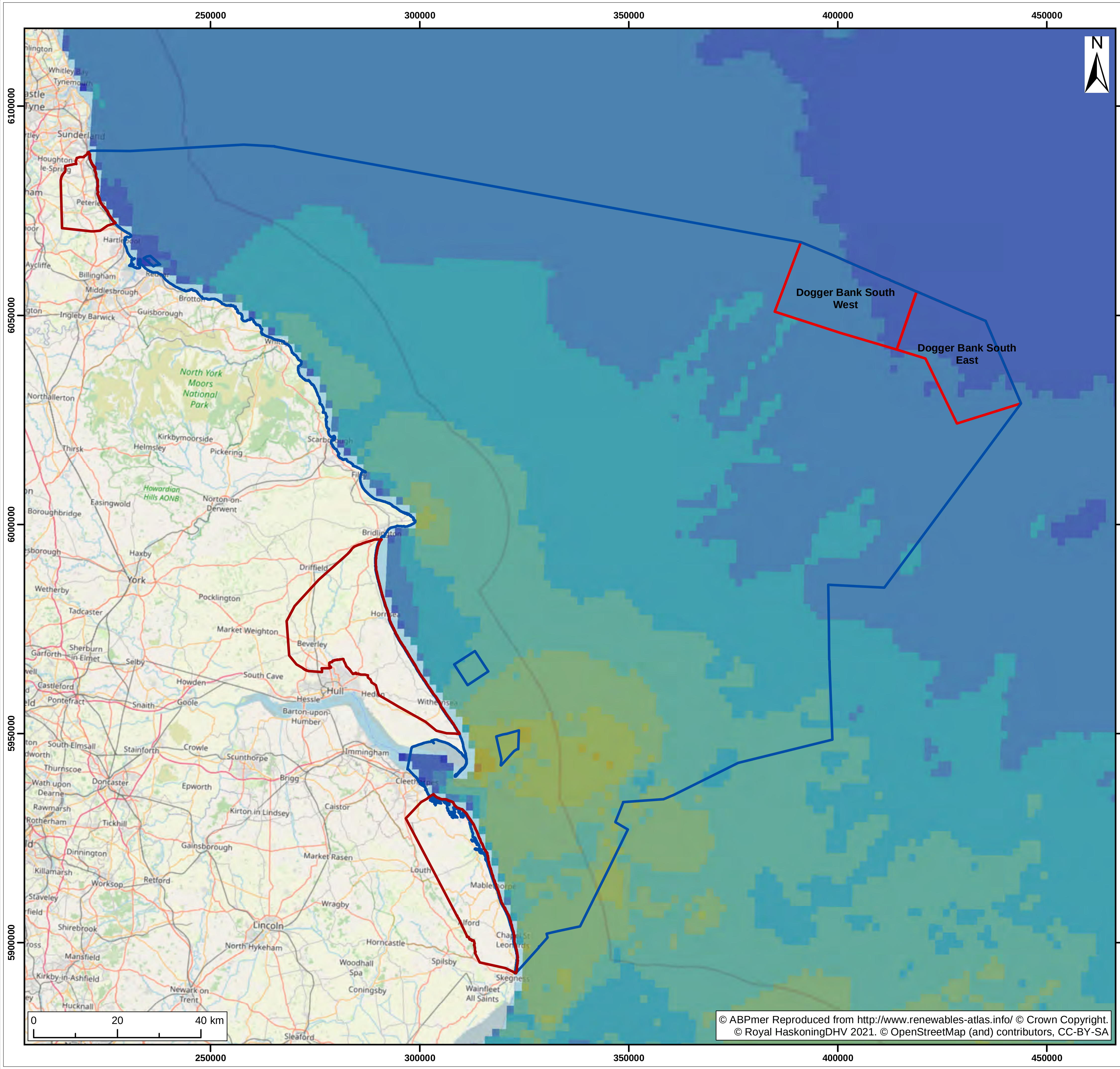


Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Onshore Study Area

Peak Flow of Mean Spring Tide (m/s)

- < 0.20
- 0.21 - 0.40
- 0.41 - 0.60
- 0.61 - 0.80
- 0.81 - 1.00
- 1.01 - 1.20
- 1.21 - 1.40
- 1.41 - 1.60
- 1.61 - 1.80
- 1.81 - 2.00
- > 2.00

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A1	C01	03/11/2021	Authorized	LB	DB	HC

Title:

Peak Flow for a Mean Spring Tide across the Offshore Study Area

Figure: 2-2 Drawing No: PB2340-RHD-OF-ZZ-DR-Z-0044

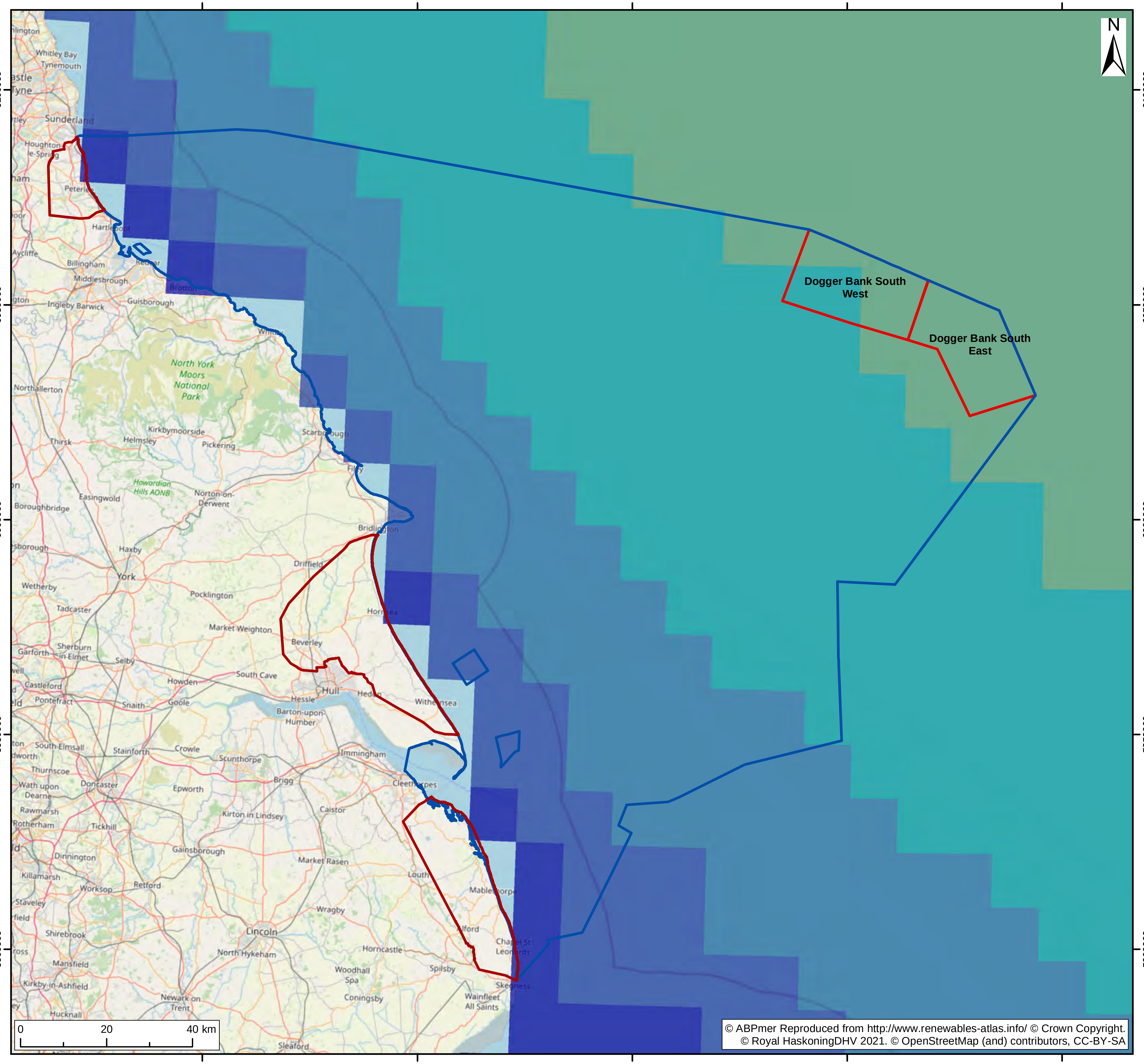
Co-ordinate system: WGS 1984 UTM Zone 31N | Page Size: A3 | Scale: 1:900,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

Royal HaskoningDHV Enhancing Society Together

RWE



Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Onshore Study Area

Annual Mean Significant Wave Height (m)

- < 1.00
- 1.01 - 1.25
- 1.26 - 1.50
- 1.51 - 1.75
- 1.76 - 2.00
- 2.01 - 2.25
- 2.26 - 2.50
- 2.51 - 2.75
- 2.76 - 3.00
- > 3.00

A1	C01	03/11/2021	Authorized	LB	DB	HC
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Annual Mean Significant Wave Height across the Offshore Study Area

Figure: 2-3 Drawing No: PB2340-RHD-OF-ZZ-DR-Z-0045

Co-ordinate system: WGS 1984 UTM Zone 31N
Page Size: A3
Scale: 1:900,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

Royal HaskoningDHV
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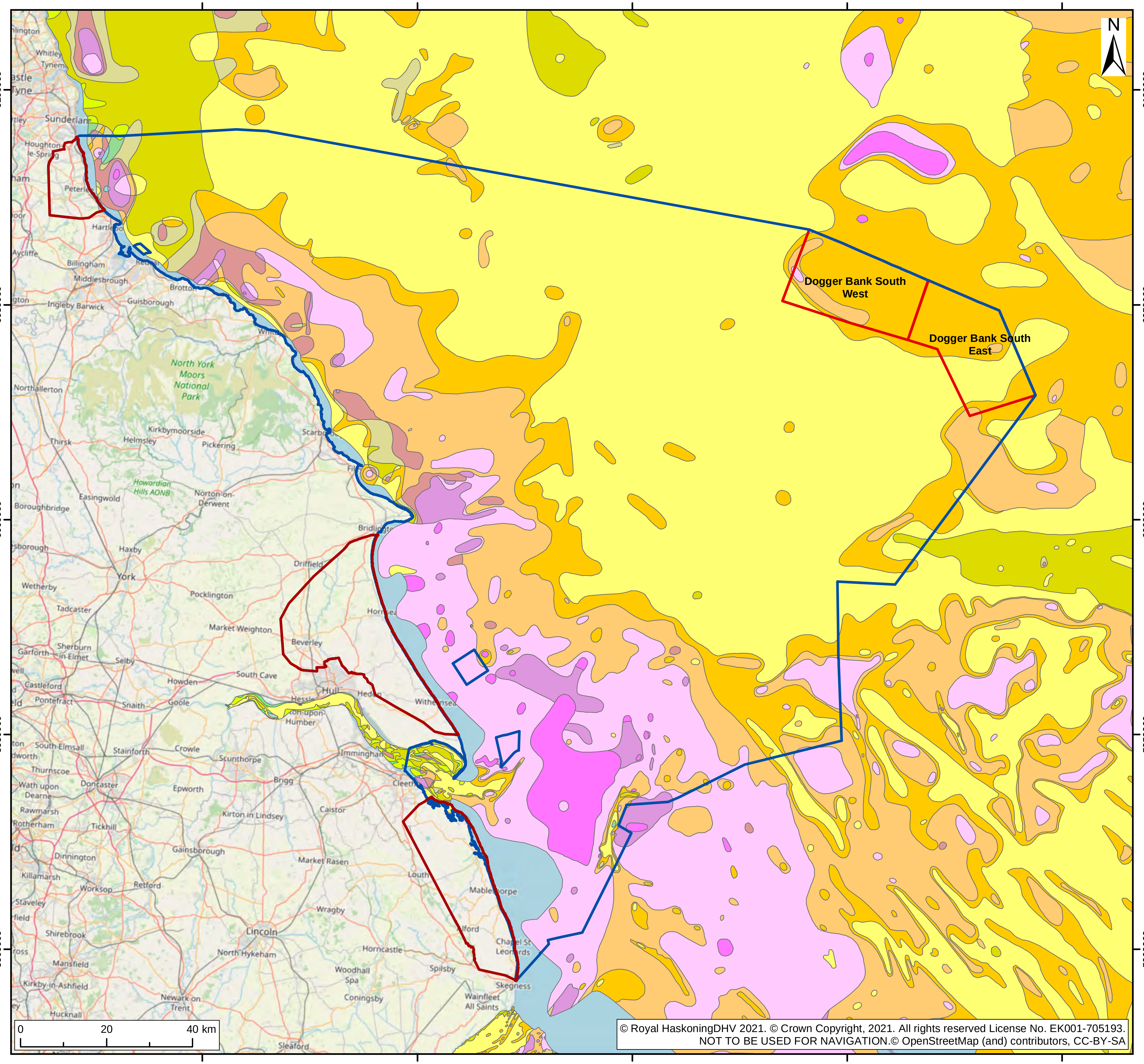
RWE



Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Onshore Study Area

Seabed Sediment

- GRAVEL
- GRAVEL, MUDDY, SANDY
- GRAVELLY MUD
- GRAVELLY MUDDY SAND
- GRAVELLY SAND
- MUD
- MUDDY GRAVEL
- MUDDY SAND
- SAND
- SANDY GRAVEL
- SANDY MUD
- SLIGHTLY GRAVELLY MUD
- SLIGHTLY GRAVELLY MUDDY SAND
- SLIGHTLY GRAVELLY SAND
- SLIGHTLY GRAVELLY SANDY MUD
- UNDIFFERENTIATED BEDROCK

A1	C01	03/11/2021	Authorized	LB	DB	HC
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Seabed Sediment

Figure: 2-4 Drawing No: PB2340-RHD-OF-ZZ-DR-Z-0042

Co-ordinate system: WGS 1984 UTM Zone 31N | Page Size: A3 | Scale: 1:900,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

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RWE

2.1.1.6 Coastal processes

140. Three potential landfall locations have been identified along the east coast of England (from north to south):

- between Sunderland and Hartlepool;
- between Bridlington and Spurn Point; and
- between Grimsby and Skegness.

141. The east coast of England between Sunderland and Skegness is shaped by waves approaching from the northeast with regional net sediment transport predominantly to the south. Local reversals in transport direction may occur in the lee of significant changes in coastal orientation. The coast contains a variety of environments, particularly cliffs of differing geologies, but also beaches, coastal sand dunes, and intertidal mudflat and saltmarsh in the southern search area, all with a variety of erosion/accretion patterns and coastal defence/management strategies.

2.1.1.7 Coastal erosion

142. The coastal geomorphology and coastal erosion (and accretion) regimes at each of the landfall locations differ.

2.1.1.7.1 Between Sunderland and Hartlepool

143. The AoS between Sunderland and Hartlepool varies between limestone cliffs capped by glacial sand and gravel and fronted by a limestone shore platform and wide sandy beaches backed by coastal sand dunes. Further offshore is an essentially featureless seabed. In the north of the AoS cliff retreat rates are estimated to be between 0.4m/year and 0.6m/year. If these rates are linearly extrapolated forward it would mean that the cliffs would retreat landward by approximately 24-36m over the next 60 years. However, the future rates may be higher due to climate-change induced sea-level rise. The areas characterised by sandy beaches are likely to be stable with no progressive trend of erosion or accretion.

2.1.1.7.2 Between Bridlington and Spurn Point

144. The Holderness coast is comprised of low cliffs and a cohesive shore platform composed predominantly of glacial tills of differing ages and character. The coast of Holderness has been eroding since Roman times, predominantly by cliff slumping. The thickness of the tills varies both alongshore and cross-shore, with the result that erosion exposes a slightly different sequence at any one time. Average long-term rates of erosion vary from about 1m/year to 2m/year. If these rates are linearly extrapolated into the future it would mean that the Holderness cliffs would retreat landward by approximately 60-120m over the next 60 years. However, the future rates may be higher due to climate-change induced sea-level rise. Also, the average longer-term rates have great short-term spatial and temporal variability. Periods of rapid erosion (10s of metres per year) may be followed by years when little or no erosion of the cliff occurs. Related to cliff erosion is downcutting of the shore platform which extends from the foot of the cliff into deeper water.

2.1.1.7.3 Between Grimsby and Skegness

145. The landfall AoS between Grimsby and Skegness can be broadly characterised as having three different types of coast. In the northern section of the AoS the coast is dominated by saltmarsh fronted by a gradually sloping foreshore. Here, the coast is protected from strong wave attack by Spurn Point and is therefore relatively stable. The middle section of the AoS comprises a wide and sandy foreshore backed by coastal sand dunes. For the most part the dunes are stable and well vegetated. They provide a reservoir of sand, which may be returned to the beach under offshore wind conditions or during periods of foreshore erosion. This area is experiencing net accretion with a maximum rate of around 1m/year in the vicinity of Donna Nook. However, as the dunes are composed of fine sand, they are sensitive to erosive processes.

146. In the southern section of the AoS, the coast comprises a low-lying coastal floodplain fronted by a relatively shallow sand beach that overlies a muddy cohesive shore platform. This coast is exposed to strong wave action and the beaches are eroding. However, since 1994, this stretch of coast has been subject to annual beach nourishment (Lincshore) which has partially mitigated this erosion, although repeat nourishments are required to top-up the beach sediment.

2.1.2 Approach to Data Collection

147. The following information has been considered during the production of this Scoping Report and will be considered further within the PEIR/ES where relevant matters are scoped in to the EIA process.

148. **Table 2-1** outlines existing primary data that has been used to inform this section and will also be used to inform the EIA.

Table 2-1 Existing Datasets

Dataset	Spatial Coverage	Survey Year / Timings
EMODnet bathymetry	DBS array areas and offshore export cable corridor(s)	2020
BERR Atlas tidal currents	DBS array areas and offshore export cable corridor(s)	2007
BERR Atlas waves	DBS array areas and offshore export cable corridor(s)	2001-2008
BGS seabed sediments	DBS array areas and offshore export cable corridor(s)	Pre-1987
Cefas suspended sediment concentrations	DBS array areas and offshore export cable corridor(s)	1998-2015
Physical and sedimentary processes data including numerical modelling	Dogger Bank Zone, Dogger Bank A, B and C, and Sofia offshore wind farms.	2011-2014

149. In addition to the data in **Table 2-1**, **Table 2-2** describes the surveys that will be undertaken to support the assessment.

Table 2-2 Site-Specific Data

Dataset	Spatial Coverage	Survey Year / Timings
Geophysical survey e.g. Side-scan sonar, Multi-Beam Echosounder, Sub-Bottom Profiler	DBS array areas and offshore export cable corridor(s)	To be completed in 2022
Grab sampling and particle size analysis	DBS array areas and offshore export cable corridor(s)	To be completed in 2022
Metocean survey (wave and currents)	DBS array areas	To be completed in 2022

150. Other data and information available to inform the EIA include:

- UK Atlas of Marine Renewable Energy;
- Wavenet wave buoys;
- United Kingdom Hydrographic Office (UKHO) tidal diamonds and historical charts;
- Class A tide gauges;
- United Kingdom Climate Projections 2018 (UKCP18);
- British Geological Survey 1:250,000 seabed sediment, Quaternary geology and bedrock geology mapping;
- Admiralty Charts and UKHO bathymetry data; and
- projects including Futurecoast, Shoreline Management Plans, the Humber Regional Environmental Characterisation and Marine Aggregate Regional Environmental Assessments.

2.1.3 Potential Impacts

2.1.3.1 Potential impacts during construction

2.1.3.1.1 Effects on waves and tidal currents

151. Whilst there is potential for the physical presence of construction plant and offshore infrastructure to impact upon the wave and tidal current regimes, these impacts would increase incrementally as the wind farms are constructed with the greatest potential impacts resulting from the completed wind farms. These impacts are therefore covered under 'Potential impacts during operation', below, and are scoped out of further consideration in relation to the construction phase.

2.1.3.1.2 Effects on bedload sediment transport and seabed morphological change

152. Construction of the wind farms will not change the geology of the site other than in the case of localised effects associated with foundation and cable installation. Due to the localised nature of these effects, it is not anticipated that such changes would give rise to significant impacts on seabed features, and neither would there be any changes in coastal morphology. Hence, these impacts are scoped out of further consideration in relation to the construction phase.

2.1.3.1.3 Effects on suspended sediment concentrations and transport

153. Potential effects during construction include temporary disturbance of the seabed due to the installation activities for cables and foundations (including seabed preparation, ploughing/trenching, cable burial and HDD) which release sediment into the water column resulting in increased suspended sediments and changes to seabed levels. Nearshore cable installation could result in changes to shoreline levels due to deposition or erosion. These effects will be assessed as part of the EIA and are therefore scoped in. The effects will be considered separately for the array areas and for the offshore export cable corridor(s), and potential interactions between the two will also be taken into account.

2.1.3.1.4 Indentations on the seabed due to installation vessels

154. There is potential for certain vessels used during installation of the foundations and cable infrastructure to directly impact the seabed. This applies for those vessels that utilise jack-up legs or several anchors to hold station and to provide stability for a working platform. Where legs or anchors (and associated chains) have been inserted into the seabed and then removed, there is potential for an indentation to remain, proportional to the dimensions of the object. These effects will be assessed as part of the EIA and are therefore scoped in.

2.1.3.2 Potential impacts during operation

2.1.3.2.1 Effects on waves and tidal currents

155. Potential effects during operation could occur due to the physical presence of infrastructure (i.e. foundations and any cable protection above the seabed), which may result in localised changes to waves and tidal currents due to physical blockage effects. These changes could potentially affect the sediment transport regime and/or seabed morphology. In addition, there is potential for the temporary presence of engineering equipment (e.g. jack-up barges or anchored vessels) to have local effects on the hydrodynamic and sediment regimes during maintenance activities. These effects will be assessed as part of the EIA and are therefore scoped in.

2.1.3.2.2 Effects on bedload sediment transport and seabed morphological change

156. Previous studies have concluded that minimal impacts can be expected on the prevailing bedload sediment transport conditions, both within wind farm sites as well as further afield, provided that the foundations are adequately spaced (which will vary depending on the details of the foundations and wind farm layout). Impacts on sediment transport are likely to be localised to the areas immediately surrounding the individual foundations in the form of seabed scour where the sediment is soft enough to be mobilised. Scour at each foundation will be assessed as part of the EIA using well-established empirical methods applied to offshore wind farms elsewhere.

157. Where the export cables are buried there would be no effect on bedload sediments and sediment transport. However, it is possible that cable protection would be required at locations where the seabed is characterised by hard geology, at cable and pipeline crossing locations and at landfall(s). The effects that cable protection may have on the marine physical processes primarily relate to the potential for interruption of sediment transport, both offshore and at the coast, and the footprint presented on the seabed. These effects will be assessed as part of the EIA and are therefore scoped in.

2.1.3.2.3 Effects on suspended sediment concentrations and transport

158. There is potential for sediments to be re-suspended by scouring effects. Consideration will be given to likely changes in suspended sediment concentrations due to scour during the operational phase within the EIA and are therefore scoped in.

2.1.3.2.4 Effects on water circulation (Flamborough Front)

159. The array areas may interact with the Flamborough Front, the boundary between two distinct water masses in the southern North Sea, which extends off the East Riding of Yorkshire coast. The potential effects on the Flamborough Front of the Projects array areas is scoped in and will be assessed as part of the EIA.

2.1.3.3 Potential impacts during decommissioning

160. The scope of the decommissioning works would most likely involve removal of the accessible installed components. Offshore, this is likely to include removal of all the wind turbine components, part of the foundations (those above seabed level), removal of some or all of the infield cables and export cables.

161. The removal of the foundations and cables has the potential to affect the wave and tidal current regimes, bedload sediment transport, and suspended sediment concentrations and transport. Any impacts arising from decommissioning would be comparable to those identified for the construction phase and will be assessed as part of the EIA. Therefore, for decommissioning effects on suspended sediment concentrations and transport; effects on seabed morphology due to deposition of suspended sediment; and indentations on the seabed due to decommissioning vessels are scoped in and will be assessed as part of the EIA.

2.1.3.4 Potential cumulative impacts

162. The CIA will be based on a zone of influence identified during the Projects alone impact assessment, which will define the geographical extent to which effects of the wind farms are expected. Recognising that the DBS arrays are close to Dogger Bank A, B and C, and Sofia offshore wind farms, the CIA will consider cumulative impacts with the existing wind farms and any other projects and marine users within the zone of influence (aggregate extraction and dredging, subsea cables and oil and gas activity).

2.1.3.5 Potential transboundary impacts

163. Based on the findings of the Dogger Bank Creyke Beck A & B and Dogger Bank Teesside A & B transboundary assessments, which found no potential for significant transboundary effects, it is proposed to scope out transboundary effects on the marine physical processes, recognising that the Projects are further from the Economic Exclusion Zone (EEZ) boundary than the existing projects. Also, given that the likely marine physical processes impacts of the Projects will be restricted to near-field change, coupled with its location 40.82km from the EEZ boundary, there would be no pathway for transboundary impacts.

2.1.3.6 Summary of potential impacts

164. **Table 2-3** outlines the effects which are proposed to be scoped in to, or out of the EIA. This may be refined through the EPP as additional information and data become available.

Table 2-3 Summary of Impacts Relating to the Marine Physical Processes. Topics to be Scoped In (✓) and Out (x)

Potential Impact	Construction	Operation	Decommissioning
Effects on waves and tidal currents	× The effect arises as a result of the presence of large foundations on the seabed and so is assessed in the operational phase	✓	× The effect arises as a result of the presence of large foundations on the seabed and so is assessed in the operational phase
Effects on bedload sediment transport and changes to seabed morphology	× The effect arises as a result of the presence of large foundations on the seabed and so is assessed in the operational phase	✓	× The effect arises as a result of the presence of large foundations on the seabed and so is assessed in the operational phase
Effects on suspended sediment concentrations and transport	✓	✓	✓
Effects on seabed morphology due to deposition of suspended sediment	✓	✓	✓
Effects on water circulation (Flamborough Front)	×	✓	×

Potential Impact	Construction	Operation	Decommissioning
	The effect arises as a result of the presence of large foundations on the seabed and so is assessed in the operational phase		The effect arises as a result of the presence of large foundations on the seabed and so is assessed in the operational phase
Indentations on the seabed due to installation and decommissioning vessels	✓	✗ The effect is related to construction / decommissioning activities	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	The Projects are located 40.82km from the EEZ boundary and therefore there is no pathway for transboundary impacts		

2.1.4 Approach to Impact Assessment

165. As part of the EIA process, the existing environment with respect to the marine physical processes will be described, including, but not limited to the following:

- bathymetry;
- geology;
- water levels;
- tidal currents;
- waves;
- climate change;
- seabed sediment distribution;
- bedload sediment transport;
- suspended sediment transport;
- morphological change;
- coastal processes at the landfall(s); and
- anticipated trends in baseline conditions.

166. The assessment of effects on the marine physical processes will be based on a Source-Pathway-Receptor (S-P-R) conceptual model, whereby the source is the initiator event, the pathway is the link between the source and the receptor impacted by the effect, and the receptor is the receiving entity. An example of this type of conceptual model is provided by cable installation which disturbs sediment on the seabed (source). This sediment is then transported by tidal currents until it settles back to the seabed (pathway). The deposited sediment could change the composition and elevation of the seabed (receptor).

167. Previous numerical modelling work has been undertaken specifically for the Dogger Bank Zone, Dogger Bank A, B and C, and Sofia offshore wind farms. The Projects are located in close proximity to these previous wind farms and the results of the modelling will be used as part of the conceptual evidence-based assessment of potential construction and operational effects or impacts of the Projects. The physical basis for using the previous modelling results is that the marine physical processes at the previous Dogger Bank sites are like those in the array areas and therefore provide suitable evidence (and are suitable analogues) to support the assessment of effects or impacts in the offshore search area. There is an extensive and robust evidence base from the previous Dogger Bank wind farms work to negate the need for numerical modelling to support the assessment of the Projects.

168. For the effects on the marine physical processes, the assessment will follow two approaches. The first type of assessment will cover impacts directly affecting receptors which possess their own intrinsic morphological value. The impact assessment will incorporate a combination of the sensitivity of the receptor, its value (if applicable) and the magnitude of the change to determine a significance of impact (**Table 2-4**).

Table 2-4 Marine Physical Processes Receptors

Receptor Group	Receptor	Closest Distance from the Projects
Designated sites and features	Dogger Bank SAC	The array areas are located in the SAC and the offshore export cable corridor(s) would pass through it
	Southern North Sea SAC	The array areas are located in the SAC and the offshore export cable corridor(s) would pass through it
East coast of England	Greater Wash SPA	Offshore export cable corridor(s) may pass through the SPA
	Teesmouth and Cleveland Coast SPA	Offshore export cable corridor(s) may pass through the SPA
	Various SSSIs, SACs, SPAs and NNRs	Offshore export cable corridor(s) making landfall on the east coast

169. In addition to identifiable receptors, the second type of assessment will cover changes to the marine physical processes which in themselves are not necessarily impacts to which significance can be ascribed (such as an increase in suspended sediment concentrations). However, such changes may indirectly impact other receptors such as benthic habitat (for example). In this case, the magnitude of effect is determined in a similar manner to the first assessment method but the significance of impacts on other receptors is made within the relevant chapters of the ES pertaining to those receptors.

170. The assessment will be undertaken in accordance with following standards and guidance:

- Guidelines for Data Acquisition to Support Marine Environmental Assessments of Offshore Renewable Energy Projects (Cefas 2012);
- Guidance on Environmental Impact Assessment in Relation to Dredging Applications (Office of the Deputy Prime Minister 2001);
- Offshore Wind Farms: Guidance Note for Environmental Impact Assessment in respect of Food and Environmental Protection Act (FEPA) and Coast Protection Act (CPA) requirements: Version 2 (Cefas 2004);

- Review of Cabling Techniques and Environmental Effects applicable to the Offshore Windfarm Industry (BERR 2008); and
- Coastal Process Modelling for Offshore Windfarm Environmental Impact Assessment (COWRIE 2009).

2.2 Marine Sediment and Water Quality

171. This section of the Scoping Report considers the potential effects of construction, operation and maintenance, and decommissioning of the Projects on marine sediment and water quality.

The following questions are posed to consultees to help them frame and focus their response to the marine sediment and water quality scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Do you agree with the approach to data collection?
- Have all the potential impacts on marine sediment and water quality resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

2.2.1 Existing Environment

2.2.1.1 Sediment quality

172. Studies undertaken as part of the Dogger Bank A and B (formerly Creyke Beck A & B) and Dogger Bank C and Sofia (formerly Teesside A and B) wind farms revealed generally low levels of contamination in the sediments. Concentrations within the offshore array areas were lower than those recorded in the nearshore environment (Forewind 2013, 2014). While some localised elevated concentrations were recorded in the nearshore areas off the coast of east Yorkshire such instances did not exceed Cefas Action Level 2 (the level where contaminants are generally considered to present a risk to water quality).

173. Whilst it is acknowledged that this data is relatively old, and not within the direct footprint of the Projects, it provides good background information on the offshore study area. As low levels of contamination were found at the existing Dogger Bank Wind farms sites, it is not proposed to do specific contaminate analysis at the array sites. The requirement for site specific data along the offshore export cable corridor(s) and landfall(s) will be determined following the site selection refinements as part of the project design process.

2.2.1.2 Water quality

174. Cefas (2016) mapped the spatial distribution of average annual suspended sediment concentrations across the UK continental shelf between 1998 and 2015 and found that Dogger Bank is characterised by values lower than 5mg/l. This value is in line with other estimates recorded for the area in investigation works conducted for the Dogger Bank A, B and C and Sofia offshore wind farms, which found that suspended sediment concentrations across the Dogger Bank Zone are typically around 1-2mg/l (Forewind 2013, 2014).

2.2.1.3 Designations

175. The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017, as amended by The Floods and Water (Amendment etc.) (EU Exit) Regulations 2019 continue to enforce the Directive of the European Parliament and of the Council 2000/60/EC establishing a framework for community action in the field of water policy (generally known as the WFD) following implementation of the European Union (Withdrawal) Act 2018. Water quality is an important component for compliance with the requirements of this Directive and therefore the information collected is relevant to this section. The current study area encompasses several WFD water bodies as shown in **Table 2-5**. **Table 2-5** also presents the details of current water quality status classification for all relevant waterbodies.

Table 2-5 WFD Water Bodies to be Considered (Environment Agency 2021)

WFD Water Body	Designation	Physico-Chemical Information (latest data from 2019)	Chemical Status (latest data from 2019)
Tyne and Wear - GB650301500002	Coastal Water Body	**High**	**Fail** (Polybrominated diphenyl ethers (PBDE) and Mercury and Its Compounds)
Yorkshire South - GB640402491000	Coastal Water Body	**High**	**Fail** (PBDE, Benzo(g-h-i) perylene, Mercury and Its Compounds and Tributyltin Compounds)
Lincolnshire - GB640402492000	Coastal Water Body	**Moderate** (Dissolved Inorganic Nitrogen)	**Fail** (PBDE, Benzo(g-h-i) perylene, Mercury and Its Compounds)

176. The following bathing waters are located on the coast in proximity to the onshore study areas (these are also protected areas designated under the WFD). They are classified over a four-year rolling period based on bacteriological parameters as either excellent, good, sufficient or poor:

- Seaham Hall Beach – Good
- Seaham Beach – Excellent
- Crimdon – Excellent
- Wilsthorpe – Good
- Fraisthorpe – Good
- Skipsea – Good
- Hornsea – Excellent
- Tunstall – Closed
- Withernsea – Good
- Mablethorpe Town – Excellent
- Sutton-on-Sea – Excellent
- Moggs Eye – Excellent
- Anderby – Excellent
- Chapel St Leonards - Excellent
- Ingoldmells South – Excellent

2.2.2 Approach to Data Collection

177. The following information has been considered during the production of this Scoping Report and will be considered further within the PEIR/ES where relevant matters are scoped in to the EIA process.

178. The assessment is closely linked to the Marine Physical Processes chapter, therefore relevant information in section 2.1 will be used to inform impacts on Marine Sediment and Water Quality. **Table 2-6** outlines existing primary data that have been used to inform this section and will also be used to inform the EIA.

Table 2-6 Existing Datasets

Dataset	Spatial Coverage	Survey Year/Timings
Sediment samples obtained from across the existing Dogger Bank wind farms development area that were analysed for contaminants (Forewind).	Within the Dogger Bank Zone, travelling westwards to the Yorkshire coastline.	2011/2012

179. In addition to the above data, site-specific data as detailed in **Table 2-7** will be collected for the assessment.

Table 2-7 Site-Specific Survey Data

Dataset	Spatial Coverage	Survey Year/Timings
Grab sampling and contaminant analysis	To be agreed through the ETG but likely to be focused on offshore export cable corridor(s), if required.	2022

180. Other data and information available to inform the EIA include:

- The Clean Seas Environment Monitoring Programme (CSEMP 2018);
- Bathing water profiles (updated by the Environment Agency on an annual basis);
- Catchment Data Explorer – water quality information for WFD water bodies (updated by the Environment Agency);

- OSPAR Commission Quality Status Report 2010 (OSPAR 2010);
- OSPAR Intermediate Assessment 2017 (OSPAR 2017);
- The Humber Regional Environmental Characterisation (Tappin et al. 2011); and
- The Humber Marine Aggregate Regional Environmental Assessment (Humber Aggregate Dredging Association 2012).

2.2.3 Potential Impacts

2.2.3.1 Potential impacts during construction

181. Potential impacts during construction will result from disturbance of the seabed due to the installation activities for cables and foundations (including seabed preparation). These have potential to cause:

- localised temporary increases in suspended sediments; and
- remobilisation of existing contaminated sediments.

182. Potential impacts related to the resuspension of contaminants are currently scoped in for assessment; however, studies carried out by Forewind (2013, 2014) have demonstrated low levels of contamination in the vicinity of the Projects. Therefore, we would seek to scope these out of further assessment through the EPP following data collection for the Projects due to the be undertaken in 2022.

183. Effects could also occur if there is accidental release of pollutants into the water from construction vessels. However, all vessels involved will be required to comply with the International Convention for the Prevention of pollution from Ships (MARPOL) 73/78. A Project Environmental Management and Monitoring Plan (or similar) will also be put in place for the Projects to ensure all works are undertaken in line with best practice for working in the marine environment. As a result, it is proposed that effects relating to accidental release of pollutants are scoped out of the EIA.

184. As such, during construction the following potential impacts are scoped in for further assessment:

- localised temporary increases in suspended sediments; and
- remobilisation of existing contaminated sediments.

2.2.3.2 Potential impacts during operation and maintenance

185. There is the potential for impacts to arise during routine maintenance activities from the use of vessels and other equipment. Potential impacts during operation will be similar to those of construction and may include localised increases in sediment concentration and the remobilization of existing contaminated sediments, although these will be much lower in magnitude than during construction. There is the potential for scour to give rise to sediment plumes which would temporarily increase levels of suspended sediments which could impact water quality.

186. As such, during operation and maintenance the following potential impacts are scoped in for further assessment:

- localised temporary increases in suspended sediments; and
- remobilisation of existing contaminated sediments.

187. As per the approach for potential impacts during construction, effects from accidental releases of pollutants from operation and maintenance work or vessels have been scoped out of the assessment. This is due to the mitigation that would be put in place through the Project Environmental Management and Monitoring Plan.

2.2.3.3 Potential impacts during decommissioning

188. Decommissioning impacts on marine water and sediment quality are likely to be similar to that of construction, with the potential to be of lower magnitude. For example, where construction may require drilling of foundations which would result in drill arisings, decommissioning would likely require the cutting of foundations just below seabed level and therefore result in less seabed disturbance than construction. As such, the following potential impacts during decommissioning are scoped in for further assessment:

- localised temporary increases in suspended sediments; and
- remobilisation of existing contaminated sediments.

2.2.3.4 Potential cumulative impacts

189. As detailed in section 2.1.3.4 above, the CIA will be based on a zone of influence identified during the Projects' alone impact assessment, which will define the geographical extent to which effects of the wind farms are expected. Recognising that the array areas are close to Dogger Bank A, B and C, and Sofia, the CIA will consider cumulative impacts with the existing wind farms and any other projects and marine users within the zone of influence (aggregate extraction and dredging, subsea cables and oil and gas activity).

2.2.3.5 Potential transboundary impacts

190. Based on the findings of the Dogger Bank Creyke Beck A & B assessments, which found no potential for significant transboundary effects, it is proposed to scope out transboundary effects on the marine sediment and water quality, recognising that the Projects are located 40.82km from the EEZ boundary, a distance which is further than that of these projects from the EEZ boundary. Therefore, there is no pathway for transboundary impacts.

2.2.3.6 Summary of potential impacts

191. **Table 2-8** outlines the impacts which are proposed to be scoped in to the EIA. This may be refined through the EPP as additional information and data become available.

Table 2-8 Summary of Impacts Relating to Marine Water and Sediment Quality. Topics to be Scoped In (✓) and Out (x)

Potential Impact	Construction	Operation	Decommissioning
Localised temporary increases in suspended sediments	✓	✓	✓
Remobilisation of existing contaminated sediments	✓	✓	✓
Pollution events resulting from the accidental release of pollutants.	×	×	×
Cumulative impacts	✓	✓	✓
Transboundary impacts	The Projects are located 40.82km from the EEZ boundary and therefore there is no pathway for transboundary impacts		

2.2.4 Approach to Impact Assessment

192. The impact assessment will be informed by the data described above and the findings of the Marine Physical Processes assessment.

193. Assessment of sediment quality and the potential risk to water quality is based on the use of recognised sediment quality guidelines; the Cefas Action Levels. Where concentrations are at or below action level 1, no additional assessment is considered necessary as the risk to water quality is considered to be low. Where concentrations fall close to or above action level 2, then more quantitative assessment might be required.

194. The impact significance on Marine Sediment and Water Quality is assessed based on the magnitude of effect and the receptor sensitivity (as discussed in section 1.7).

195. The findings of the impact assessment for Marine Sediment and Water Quality will be utilised to inform the WFD Compliance Assessment.

2.3 Offshore Air Quality

196. This section of the Scoping Report considers the potential effects of construction, operation and maintenance, and decommissioning of the Projects on offshore air quality.

The following questions are posed to consultees to help them frame and focus their response to the offshore air quality scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the potential impacts on offshore air quality resulting from the Projects been identified in the Scoping Report?
- Do you agree that offshore air quality impacts can be scoped out of the EIA?

2.3.1 Existing Environment

197. The primary source of offshore atmospheric emissions is likely to be from vessels emitting nitrogen oxides (NOx), particulate matter (PM) and sulphur dioxide (SO_2).

198. The International Maritime Organisation (IMO) has enacted regulations to reduce vessel emissions under Annex VI of the International Convention for the Prevention of Pollution from Ships (MARPOL). The North Sea is a designated Emission Control Area under MARPOL, with sulphur content of fuel oil being limited to 0.5%. Furthermore, as of 1 January 2021, vessels operating within the North Sea must comply with the most stringent NOx emission limits to comply with the Emission Control Area requirements.

199. Pollutant concentrations should only be compared to the relevant air quality objectives where there is representative exposure. There are no offshore human receptors which are sensitive to air quality, and marine-based ecological designations are unlikely to be sensitive to air pollution impacts (Centre for Ecology and Hydrology, 2021). Receptors may only be affected where there are isolated locations of relevant human exposure (e.g. residences) close to the shoreline, and land-based designated ecological sites.

2.3.2 Potential Impacts

2.3.2.1 Potential impacts during construction, operation and decommissioning

200. Vessels utilised by the Projects during construction, operation and decommissioning may contribute to emissions offshore; however, in the context of the existing vessel traffic within the North Sea the Projects' contributions would be small. Most construction and operation and maintenance works would be carried out at a distance from the shore and therefore would be unlikely to impact upon landside human or ecological receptors.

201. As there would be a relatively low number of vessels utilised as part of the Projects, the considerable distances to sensitive receptors and the MARPOL emissions regulations that will be applied, it is considered that impacts would not be significant. As such, it is proposed to scope offshore air quality impacts out of the EIA. This is in line with other recent EIA scoping opinions such as for North Falls Offshore Wind Farm (Planning Inspectorate, 2021).

2.3.2.2 Potential cumulative impacts

202. As described above, most offshore works will be undertaken at a significant distance from any sensitive receptors. As such, it is considered unlikely that any significant cumulative effects would occur with other offshore emission sources (i.e. vessels) used for any other plans or projects within the area.

2.3.2.3 Summary of potential impacts

203. A summary of the potential impacts of offshore air quality are summarised in **Table 2-9** below.

Table 2-9 Summary of Impacts Relating to Offshore Air Quality. Topics to be Scoped In (✓) and Out (x)

Potential Impact	Construction	Operation	Decommissioning
Impacts of emissions from vessels on human receptors	×	×	×
Impacts of emissions from vessels on ecological receptors	×	×	×

2.4 Offshore Airborne Noise

204. This section of the Scoping Report considers the potential effects of construction, operation and maintenance, and decommissioning of the Projects on offshore airborne noise. The potential impacts on onshore noise and vibration are assessed in section 3.9.

The following questions are posed to consultees to help them frame and focus their response to the offshore airborne noise scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the potential impacts on offshore airborne noise resulting from the Projects been identified in the Scoping Report?
- Do you agree that offshore airborne noise can be scoped out of the EIA?

2.4.1 Existing Environment

205. Existing offshore airborne noise is likely to be generated by a mix of anthropogenic and natural sources. Noise emitted by vessel traffic is expected to be the main source of anthropogenic noise in the study area.

206. Wind, wave and precipitation activity offshore would be the primary sources of natural airborne noise.

2.4.2 Potential Impacts

2.4.2.1 Potential impacts during construction

207. Construction activities have the potential to increase airborne noise within the array areas and offshore export cable corridor(s). The main sources of noise would be from increased vessel activity and from pile driving (if utilised).

208. The Projects are approximately 100km from shore at their nearest point (Flamborough Head). It is therefore highly unlikely that onshore receptors (i.e. coastal recreation users, coastal ecological designated sites and coastal settlements) will be affected by increases in noise in the array areas, in the context of the existing noise sources outlined above.

209. Nearshore construction activities that will generate airborne noise will be limited to installation of the export cable, which may involve HDD works or require ploughing, trenching or jetting of the cable. The impact of nearshore works on onshore receptors will be assessed in the onshore noise and vibration assessment (see section 3.9). Therefore, it is considered that airborne noise from construction is scoped out of further assessment.

2.4.2.2 Potential impacts during operation

210. During operation, movement of the turbines would be expected to be limited to generator, cranage and transport noise which cause low levels of airborne noise; however, given the distance between array areas and the shore it is considered that turbine noise will not be audible to onshore receptors.

211. Potential impacts to offshore receptors (i.e. commercial or recreational vessels) are unlikely to be significantly greater than baseline offshore noise levels. Disturbance to biological receptors (including fish and marine mammals) from underwater noise will be considered within the relevant sections for these topics. Therefore, it is considered that operational airborne noise from offshore infrastructure is scoped out of further assessment.

2.4.2.3 Potential impacts during decommissioning

212. During decommissioning, there is the potential for offshore decommissioning activities to create airborne noise, although it is expected that this would be lower than during the construction phase and would not include piling.

213. Due to the limited pathway for offshore airborne noise to impact receptors it is proposed that offshore airborne noise is scoped out of further consideration within the EIA. This is in line with other recent EIA scoping opinions such as for North Falls and Norfolk Vanguard (Planning Inspectorate 2021 and 2016 respectively).

2.4.2.4 Summary of potential impacts

214. A summary of the potential impacts of offshore airborne noise are summarised in **Table 2-10.**

Table 2-10 Summary of Impacts Relating to Offshore Airborne Noise. Topics to be Scoped In (✓) and Out (x)

Potential Impact	Construction	Operation	Decommissioning
Impacts of offshore airborne noise emissions on human receptors	×	×	×
Impacts of offshore airborne noise emissions on ecological receptors	×	×	×

2.5 Benthic and Intertidal Ecology

215. This section of the Scoping Report identifies the benthic habitat and species receptors relevant to the Projects. The potential effects of construction, operation and maintenance, and decommissioning of the Projects on benthic habitats and species are considered throughout this section.

The following questions are posed to consultees to help them frame and focus their response to the benthic and intertidal ecology scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Do you agree with the approach to data collection?
- Have all the potential impacts on benthic and intertidal ecology resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

2.5.1 Existing Environment

2.5.1.1 Intertidal

216. The intertidal zones within the landfall AoS predominantly comprise mobile sediments (as shown on **Figure 2-5**) and man-made coastal defence structures.

217. Both abundance and diversity of flora and fauna in the intertidal zones are likely to be low in areas of high sediment movement and in areas where scour around hard structures occurs. Other areas may support higher abundances and greater levels of diversity due to more sheltered conditions, lower sediment mobility and no coastal defence structures being present. Intertidal surveys will be undertaken in 2022 to record the habitat types present at potential landfall locations and, in turn, to characterise the ecological interest within the intertidal area.

2.5.1.2 Offshore

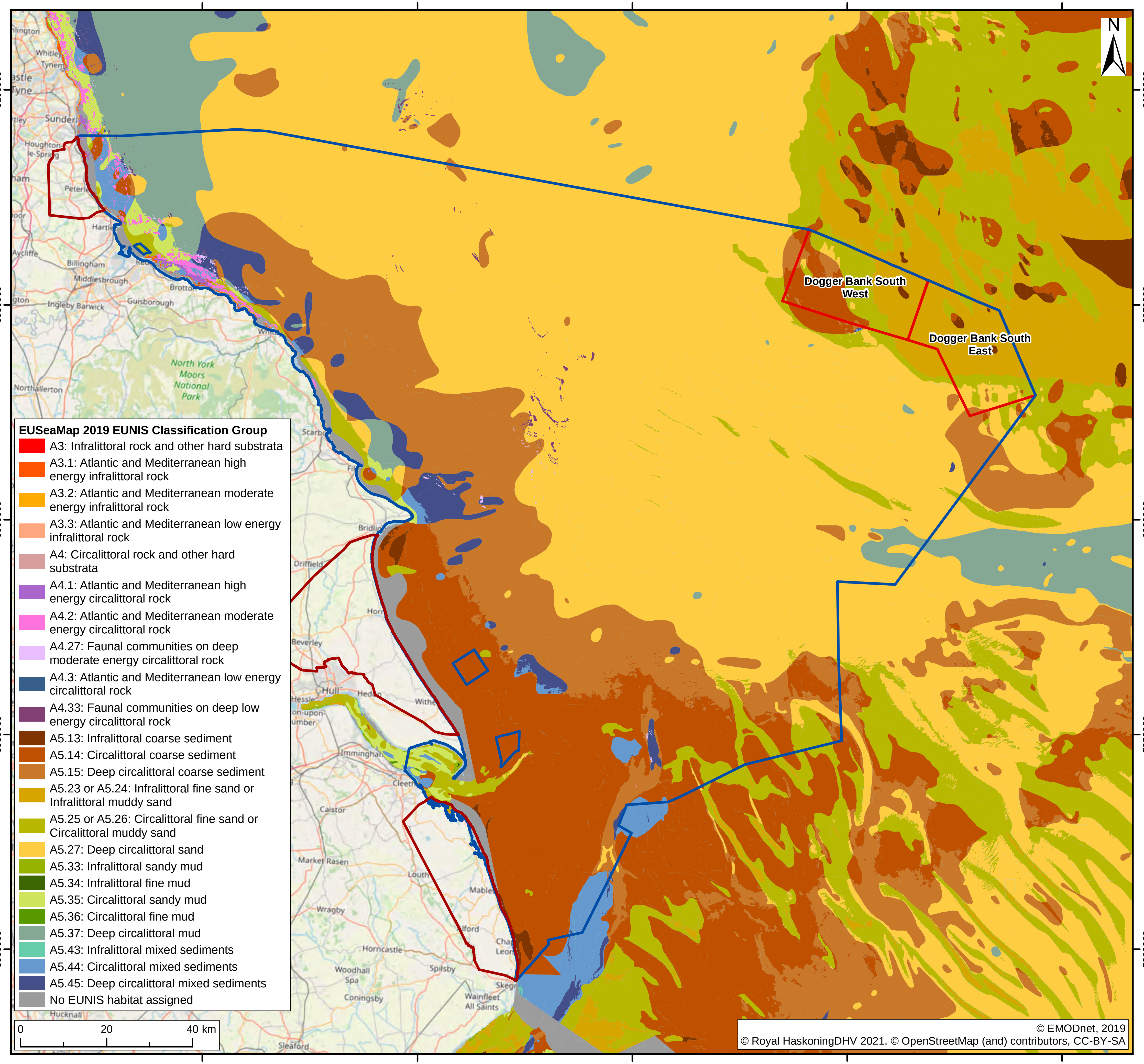
218. The EUSeaMap (2019) project predicts habitats within the North Sea based on known environmental characteristics which are cross-checked with extant survey data. The EUSeaMap predictions, shown in **Figure 2-5**, have been used to determine the anticipated habitat types within the offshore study area in the absence of site-specific information.

219. The majority of the offshore study area is predicted to comprise of deep circalittoral sand (A5.27), however as shown in **Figure 2-5**, the benthic habitats within the array areas are predicted to be predominately infralittoral fine sand (A5.23) or infralittoral muddy sand (A5.24) with areas of deep circalittoral sand (A5.27), circalittoral fine sand (A5.25), circalittoral muddy sand (A5.26) and circalittoral coarse sediment (A5.14).

220. The benthic habitats closer to the nearshore areas of the offshore study area are more heterogeneous than the wider offshore study area, with more coarse and mixed sediments predicted. The predicted European Nature Information System (EUNIS) habitat types are deep circalittoral coarse sediment (A5.15), circalittoral coarse sediments (A5.14), deep circalittoral mixed sediments (A5.45) and infralittoral coarse sediments (A5.13) (**Figure 2-5**).

221. Close to shore, the seabed habitats to the north of the inshore offshore study areas are predicted to be more heterogeneous with areas of circalittoral mixed sediments (A5.44), deep circalittoral mixed sediments (A.5.45), infralittoral mixed sediments (A5.43), deep circalittoral sand (A5.27), Atlantic and Mediterranean moderate energy circalittoral rock (A4.2), circalittoral fine sand (A5.25), circalittoral muddy sand (A5.26) and circalittoral sandy mud (A5.35). This is in comparison to the south of the inshore offshore study area where habitats (where assigned) are predicted to be predominately circalittoral coarse sediments with areas of circalittoral fine sand (A5.25), circalittoral muddy sand (A5.26) and circalittoral sandy mud (A5.35) within the mouth of the Humber Estuary (**Figure 2-5)**.

222. It is expected that the dominant benthic communities will be those associated with these predicted sediments, as described by EUNIS (2019). Benthic surveys will be undertaken in 2022 to characterise the benthic ecology within the array areas, offshore export corridor(s) and landfall(s).



Legend:
- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Onshore Study Area

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A1	C01	03/11/2021	Authorized	LB	LB	HC

Title:

Seabed Habitat

Figure: 2-5 | Drawing No: PB2340-RHD-OF-ZZ-DR-Z-0043

Co-ordinate system: WGS 1984 UTM Zone 31N | Page Size: A3 | Scale: 1:900,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

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2.5.1.3 Protected species and habitats (offshore)

223. Annex I sandbanks slightly covered by seawater all the time occur where areas of sand form distinct elevated bathymetric features which are predominantly surrounded by deeper water and where the top of the sandbank is in less than 20m water depth. As shown in **Figure 2-6**, instances of this feature occur throughout the offshore study area (including within the array areas), both within designated sites (section 1.1.1.1) and outside of them.

224. *Sabellaria spinulosa*, although not a protected species is on the list of species designated as being of 'principal importance for the purpose of conserving biodiversity' under the NERC Act 2006. *S. spinulosa* is a common species; however, some aggregations may form biogenic reefs in the right conditions. Annex I *S. spinulosa* reefs represent a priority habitat (biogenic reefs) under the EU Habitats Directive[1].

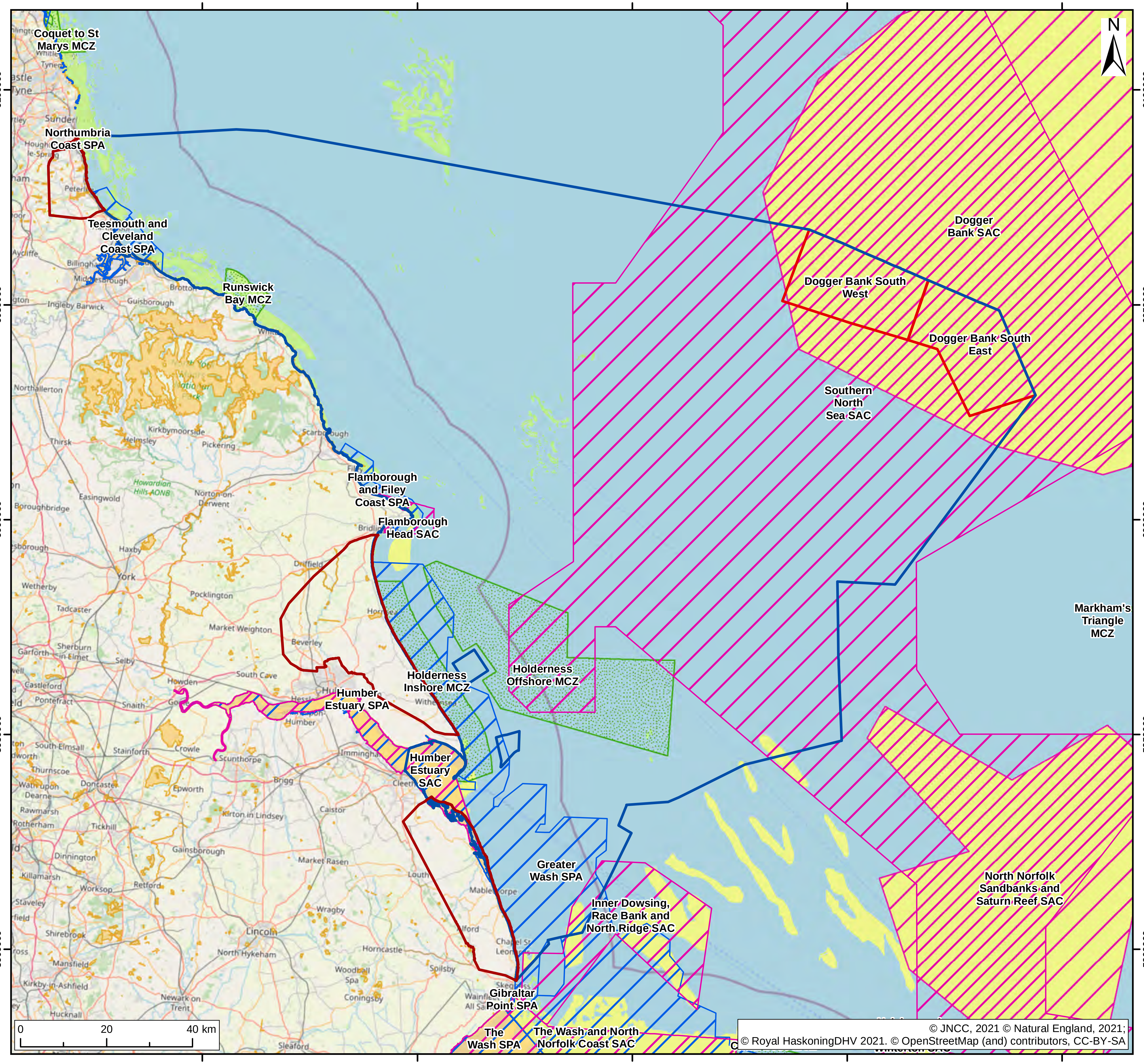
225. Reefs are protected under Annex I of the Habitats Directive, these can be either biogenic (made up of hard matter created by living organisms) or of geogenic (formed by non-biogenic substrata) origin. As shown in **Figure 2-6**, Annex I reef is found within the Flamborough Head SAC (geogenic chalk and boulder reefs). There are also patches of biogenic reef identified in the Holderness Offshore MCZ and in areas outside of designated sites along the coastline itself, particularly along the coastline towards the north of the offshore study area and just outside the Southern North Sea SAC, approximately 40km due east of Scarborough.

226. **Table 2-11** sets out the habitats protected as part of the MCZs present within the offshore study area.

227. The offshore study area also contains several UK Biodiversity Action Plan (BAP) habitats, which whilst not afforded a Protected status are valuable ecological receptors. These habitats are predicted to mainly be composed of coarse and mixed sediments with moderate to high infaunal diversity and scour tolerant epibenthic communities, sandy sediments with low infaunal diversity and sparse epibenthic communities and fine muddy sands with moderate species diversity, characterised by bivalves in areas of moderate to high wave exposure, with coarse littoral barren sand occurring within the intertidal area.

[1] The Habitats Directive - Environment - European Commission (europa.eu)

228. The benthic survey due to be undertaken in 2022 will be used to help identify and characterise rare, sensitive and valuable habitats and species that may be present for the purpose of informing the assessment.



Legend:
- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Onshore Study Area
- Marine Conservation Zones
- Special Areas of Conservation
- Special Protection Areas
- Sites of Special Scientific Interest
- Annex I Sandbank
- Annex I Reef

A1	C01	03/11/2021	Authorized	LB	LB	HC
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Designated Sites and Protected Benthic Habitats

Figure: 2-6 Drawing No: PB2340-RHD-OF-ZZ-DR-Z-0027

Co-ordinate system: WGS 1984 UTM Zone 31N
Page Size: A3
Scale: 1:900,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

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2.5.1.4 Designations

229. The offshore study area contains a number of protected areas designated as a result of the habitats they contain. These sites, and their designated features, are detailed in **Table 2-11** below. **Figure 2-6** above shows these sites in relation to the offshore study area. As site selection progresses, the offshore study area will be refined and the designated sites within this area will be considered further through the EIA and the HRA and MCZ Screening.

Table 2-11 Designated Sites for Benthic Features Within the Offshore Study Area

Site	Designating features
The Lagoons SSSI	Comprised of a variety of coastal habitats including saltmarsh, shingle, sand dune, swamp and most significantly, saline lagoons and pools which represent the only extant example in North Humberside of this nationally rare habitat. Supports populations of the nationally scarce spiral tasselweed *Ruppia cirrhosa*
Dogger Bank SAC	Annex I Sandbanks which are slightly covered by sea water all the time
Flamborough Head SAC	Annex I Reef
Humber Estuary SAC	Annex I Estuaries Annex I Sandbanks which are slightly covered by sea water all the time
Humber Estuary SSSI	Component estuarine habitats of intertidal mudflats, sandflats and coastal saltmarsh and associated saline lagoons, sand dunes and standing waters
Inner Dowsing, Race Bank and North Ridge SAC	Annex I Sandbanks which are slightly covered by sea water all the time Annex I Reef
Holderness Offshore MCZ	Broad scale habitat: • Subtidal coarse sediment • Subtidal sand • Subtidal mixed sediments

Site	Designating features
	Species feature of conservation importance: Ocean quahog (*Arctica islandica*)
Holderness Inshore MCZ	EUNIS Habitat Features • Intertidal sand and muddy sand (A2.2) • High energy circalittoral rock (A4.1) • Moderate energy circalittoral rock (A4.2) • Subtidal coarse sediment (A5.1) • Subtidal sand (A5.2) • Subtidal mud (A5.3) • Subtidal mixed sediments (A5.4)
Runswick Bay MCZ	EUNIS Habitat Features • High energy intertidal rock (A1.1) • Moderate energy intertidal rock (A1.2) • Low energy intertidal rock (A1.3) • Intertidal sand and muddy sand (A2.2) • Moderate energy infralittoral rock (A3.2) • Moderate energy circalittoral rock (A4.2) • Subtidal coarse sediment (A5.1) • Subtidal sand (A5.2) • Subtidal mud (A5.3) • Subtidal mixed sediments (A5.4) Species features • Ocean quahog

2.5.2 Approach to Data Collection

230. The following information has been considered during the production of this Scoping Report and will be considered further within the PEIR/ES where relevant matters are scoped in to the EIA process.

231. A number of benthic ecology datasets have been reviewed and collated to inform this Scoping Report. The datasets considered to be relevant to the offshore study area are listed in **Table 2-12.**

Table 2-12 Key Sources of Benthic Ecology Data for the Projects

Source	Summary	Coverage of Offshore Study Area
EMODnet broad-scale seabed habitat map for Europe (EUSeaMap) (EMODnet 2016[2])	EUSeaMap 2016 is a predictive habitat map which covers the seabed of a large area of European waters including the North Sea. Habitats are described in the EUNIS and Marine Strategy Framework Directive predominant habitat classifications and predicted based on a number of physical parameters. Associated confidence maps are also available which give a breakdown of confidence in predicted habitats into high, medium, and low categories.	Predictive maps are available for the full offshore study area.

[2] http://ww.emodnet-sea bedhabitats.eu/access-data/launch-map-viewer/

Source	Summary	Coverage of Offshore Study Area
Technical reports for Strategic Environmental Assessment (SEA) Areas 2 and 3 (Department of Trade and Industry (DTI) 2001a; DTI 2001b);	Description of survey data published in the SEA for Areas 2 (northern North Sea) and 3 (southern North Sea).	Broadscale data with regional coverage.
Joint Nature Conservation Committee (JNCC) resources	Annex I Sandbanks in the UK Version 3 shows the potential and high confidence mapped extents of Annex I habitat 'Sandbank' within the boundaries of the UK continental shelf. Annex 1 Reefs in UK waters Version 8.2 shows the potential and high confidence mapped extents of Annex I habitat 'Reef' in UK waters.	Available for the full offshore study area.
JNCC resources and Natural England Open Data	Details of SSSIs, SACs, SPAs and MCZs.	Available for the full offshore study area.
OneBenthic	Database of benthic datasets (e.g. seabed macrofauna, sediment particle size)	Available for the full offshore study area.
Dogger Bank A, B & C and Sofia wind farms	Benthic survey data	Available for parts of the offshore study area.

232. In addition to the data in **Table 2-12** and listed above, the following data (**Table 2-13**) will be collected for the assessment.

Table 2-13 Key Sources of Benthic Ecology Data for the Projects

Dataset	Spatial Coverage	Survey Year
Geophysical survey e.g. Side-scan sonar, Multi-Beam Echosounder, Sub-Bottom Profiler	Array areas and offshore export cable corridor(s)	2022
Grab sampling, epibenthic trawls and drop-down video	Array areas and offshore export cable corridor(s)	2022
Intertidal walkover surveys	Landfall location(s)	2022

2.5.3 Potential Impacts

2.5.3.1 Potential impacts during construction

233. Potential impacts during construction will arise from disturbance to the seabed during installation activities for cables and foundations in both the offshore and intertidal areas (export cable installation) (including seabed preparation), resulting in temporary habitat loss, increased suspended sediment concentrations, the remobilisation of contaminated sediments and disturbance from noise and vibration. It should be noted that impacts from noise and vibration during construction are scoped in only in relation to the effects of piling and UXO clearance, as other underwater noise sources during construction (e.g. vessel traffic) are unlikely to cause significant effects on benthic receptors (and have therefore been scoped out of the EIA). Construction vessel traffic may also result in the introduction of marine non-native species to the area. This aspect will be assessed under the operational phase of the assessment.

234. Impacts which span the life of the Projects (e.g. habitat loss) will be considered as part of the operational phase assessment and are therefore not considered in the construction phase assessment to avoid duplication.

235. Effects could also occur if there is an accidental release of pollutants into the water from construction vessels. The risk of pollutant release will be managed via the production of an Environmental Management and Monitoring Plan (or similar) for the Projects which will include details on marine pollution and associated contingency plans. Chemicals to be used during offshore operations will be approved under the Offshore Chemical Regulations 2002. In addition, all vessels involved will be required to comply with the International Convention for the Prevention of pollution from Ships (MARPOL) 73/78. Should a spill occur it is likely that pollutants would disperse rapidly, and quickly undergo degradation, leading to a subsequent reduction in potential impact. As a result of these mitigation measures, it is considered that there is no risk of likely significant impacts from pollutant release, and it is proposed that this impact be scoped out of the EIA.

2.5.3.2 Potential impacts during operation and maintenance

236. Potential impacts during operation will mostly result from the physical presence of infrastructure on the seabed (i.e., foundations and any cable protection above the seabed) which will result in long term habitat loss. Maintenance activities also have the potential to result in temporary impacts, similar to those occurring during construction, but smaller in extent and therefore of a lower magnitude. As piling will be completed during the construction phase, any effects of underwater noise and vibration are unlikely to cause significant effects on benthic receptors and therefore are proposed to be scoped out.

237. Potential impacts related to the resuspension of contaminants are currently scoped in for assessment; however, studies carried out by Forewind (2013, 2014) have demonstrated low levels of contamination in the vicinity of the Projects. Therefore, we would seek to scope these out of further assessment through the EPP following a more detailed review of data available and once the Projects offshore cable corridor(s) have been refined.

238. Potential impacts from Electromagnetic Fields (EMF) from operational cables are not considered to result in significant effects on benthic subtidal and intertidal receptors. A comparison of EMF field strength across 10 different cables and wind farms (Normandeau et al., 2011) suggests that EMF may be detectable above background levels up to 10m from the vicinity of the cable, however this decreases at lower voltages. This area of water in which EMF effects are present is also reduced via cable protection measures including burial. Any effects are likely to be highly localised, as EMFs are strongly attenuated and decrease as an inverse square of distance from the cable (Gill and Barlett, 2010). Bochert & Zettler (2006) report that brown shrimp *Crangon*, common starfish *Asterias rubens* and polychaete worm *Nereis diversicolor* (also known as *Hediste diversicolor*) do not react when exposed to EMF. Gibb et al. (2014) state there is no evidence of EMF impacting *S. spinulosa*. There is emerging evidence of the potential effects of EMF on shellfish species (crustaceans) as discussed further in section 2.6. Based on the evidence provided above, and outcomes of ESs for other offshore wind farms it is expected that EMF will be assessed as having negligible or minor impacts on benthic subtidal and intertidal receptors. However, it was discussed with stakeholders at the Seabed ETG who advised that this impact should be scoped in for further assessment, therefore, this impact has been scoped in at this stage for further consideration. As refinement of the project design envelope occurs, further discussions will take place with the ETG to consider scoping out EMF impacts.

2.5.3.3 Potential impacts during decommissioning

239. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator, with a decommissioning plan provided.

240. Any potential impacts arising during decommissioning are envisaged to be similar to those described for the construction phase, and as such the same potential impacts have been scoped in (and out) as a result. Disturbance to the seabed during decommissioning activities for cables and foundations could potentially result in temporary habitat loss, increased suspended sediment concentrations, the remobilisation of contaminated sediments and disturbance from noise and vibration (**Table 2-14**).

2.5.3.4 Potential cumulative impacts

241. The CIA will consider impacts that are likely to overlap temporally and spatially in conjunction with adjacent projects and will be informed by the results of the marine physical processes assessment (see section 2.1.3). It is anticipated that impacts will be localised and temporary.

2.5.3.5 Potential transboundary impacts

242. Given that the likely impacts of the Projects will be localised and small scale, and that the Projects are located 40.82km at their closest point to the EEZ boundary, transboundary impacts are unlikely to occur or to be significant. In relation to the spread of non-native species, appropriate mitigation and biosecurity precautions will be described in the ES to manage and prevent the spread of non-native species. It is therefore proposed that transboundary effects are scoped out.

2.5.3.6 Summary of potential impacts

243. **Table 2-14** outlines the impacts which are proposed to be scoped into the EIA. This may be refined by agreement through the EPP as additional information and data become available.

Table 2-14 Summary of Impacts Relating to Benthic Habitats. Topics to be Scoped In (✓) and Out (x)

Potential Impact	Construction	Operation	Decommissioning
Temporary physical disturbance	✓	✓	✓
Long term habitat loss	×	✓	×
Increased suspended sediment concentrations	✓	✓	✓
Remobilisation of contaminated sediments	✓	✓	✓
Pollution events resulting from the accidental release of pollutants.	×	×	×
Underwater noise and vibration (e.g. from piling and UXO clearance)	✓	×	✓
Interactions of EMF (including potential cumulative EMF effects)	×	✓	×
Colonisation of introduced substrate, including non-native species	×	✓	×
Cumulative impacts	✓	✓	✓
Transboundary impacts	The Projects are located 40.82km from the EEZ boundary and therefore there is no pathway for transboundary impacts		

2.5.4 Approach to Impact Assessment

244. The assessment of the potential impacts upon the benthos will be cross-referenced where relevant to the assessments for Marine Physical Processes and Marine Water and Sediment Quality. The impact assessment, in common with other receptors, will consider the following:

- magnitude/extent: the size or amount of impact – e.g. area of seabed directly or indirectly impacted;
- sensitivity of receptors;
- duration: time for recovery (may vary with receptor sensitivity) and duration of activity causing an impact;
- reversibility of the impact; and
- timing and frequency.

245. Sensitivity of features will be based upon the Marine Evidence-based Sensitivity Assessment framework where available (MarLIN 2021).

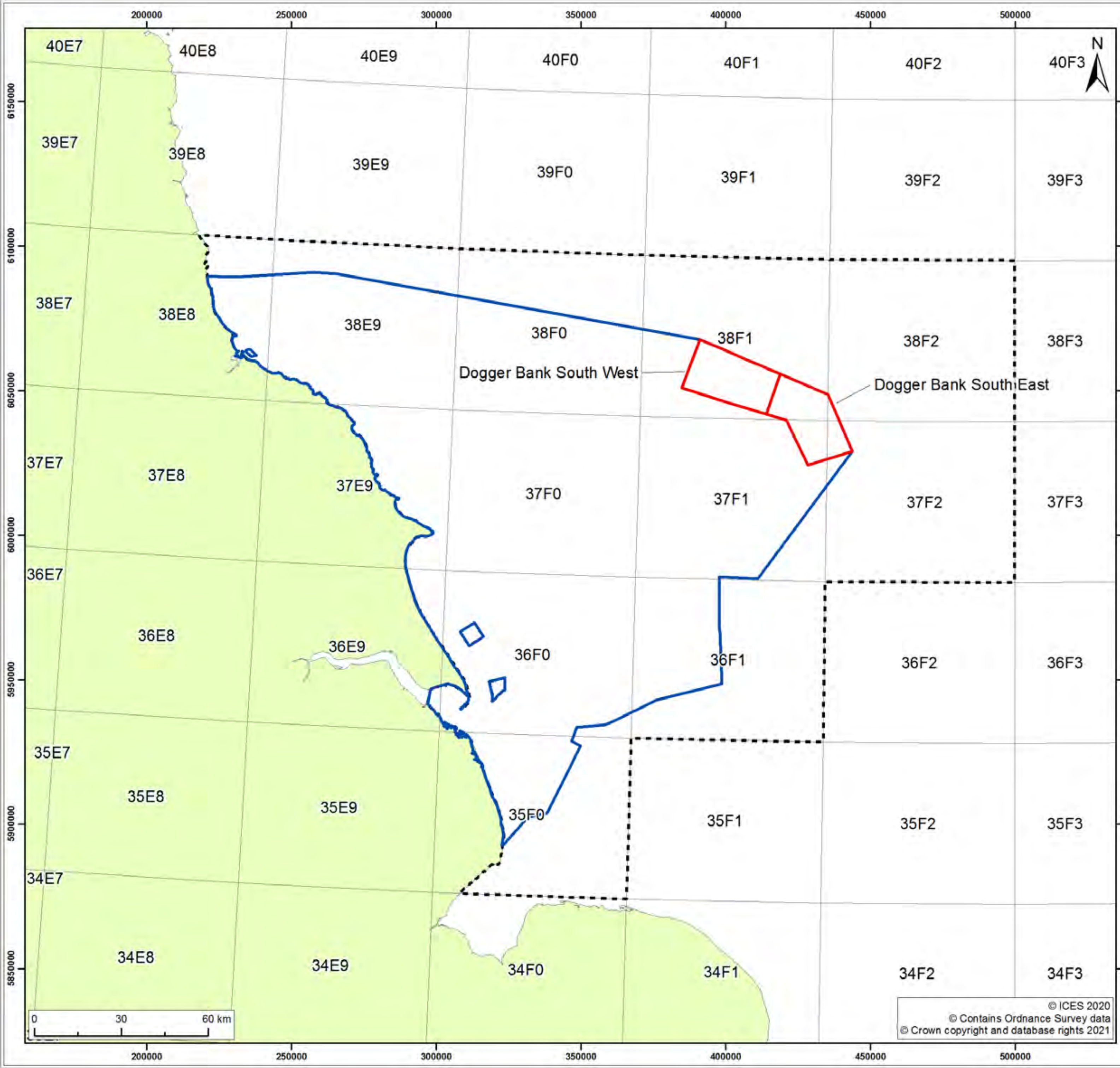
2.6 Fish and Shellfish Ecology

246. This chapter of the Scoping Report identifies fish and shellfish receptors relevant to the Projects. The potential effects of the construction, operation and maintenance, and decommissioning of the Projects on the ecology of fish and shellfish are considered.

The following questions are posed to consultees to help them frame and focus their response to the fish and shellfish ecology scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Do you agree with the approach to data collection?
- Have all the potential impacts on fish and shellfish ecology resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

247. The Fish and Shellfish study area for the Projects is defined as International Council for the Exploration of the Sea (ICES) Rectangles 35F0; 36E9; 36F0; 36F1; 37E9; 37F0; 37F1; 37F2; 38E8; 38E9; 38F0; 38F1; and 38F2. The Fish and Shellfish study area covers a total of 37,485km^2, and includes the offshore study area with a minimum buffer distance of 7km. This Fish and Shellfish study area provides wider regional context to the local fish and shellfish assemblage, whilst also providing coverage for any effects that may occur both within and outside of the offshore study area. The Fish and Shellfish study area is shown in **Figure 2-7**.



Legend:
- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Fish and Shellfish Ecology study area
- ICES rectangles

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
S2	P02	31/08/21	PB2340-MAR-OF-ZZ-DR-Z-0001	BO	IW	TM

Title:

Fish and Shellfish Ecology study area

Figure: 2-7 Drawing No: PB2340-MAR-OF-ZZ-DR-Z-0001

Co-ordinate system: WGS 1984 UTM Zone 31N | Page Size: A3 | Scale: 1:1,300,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

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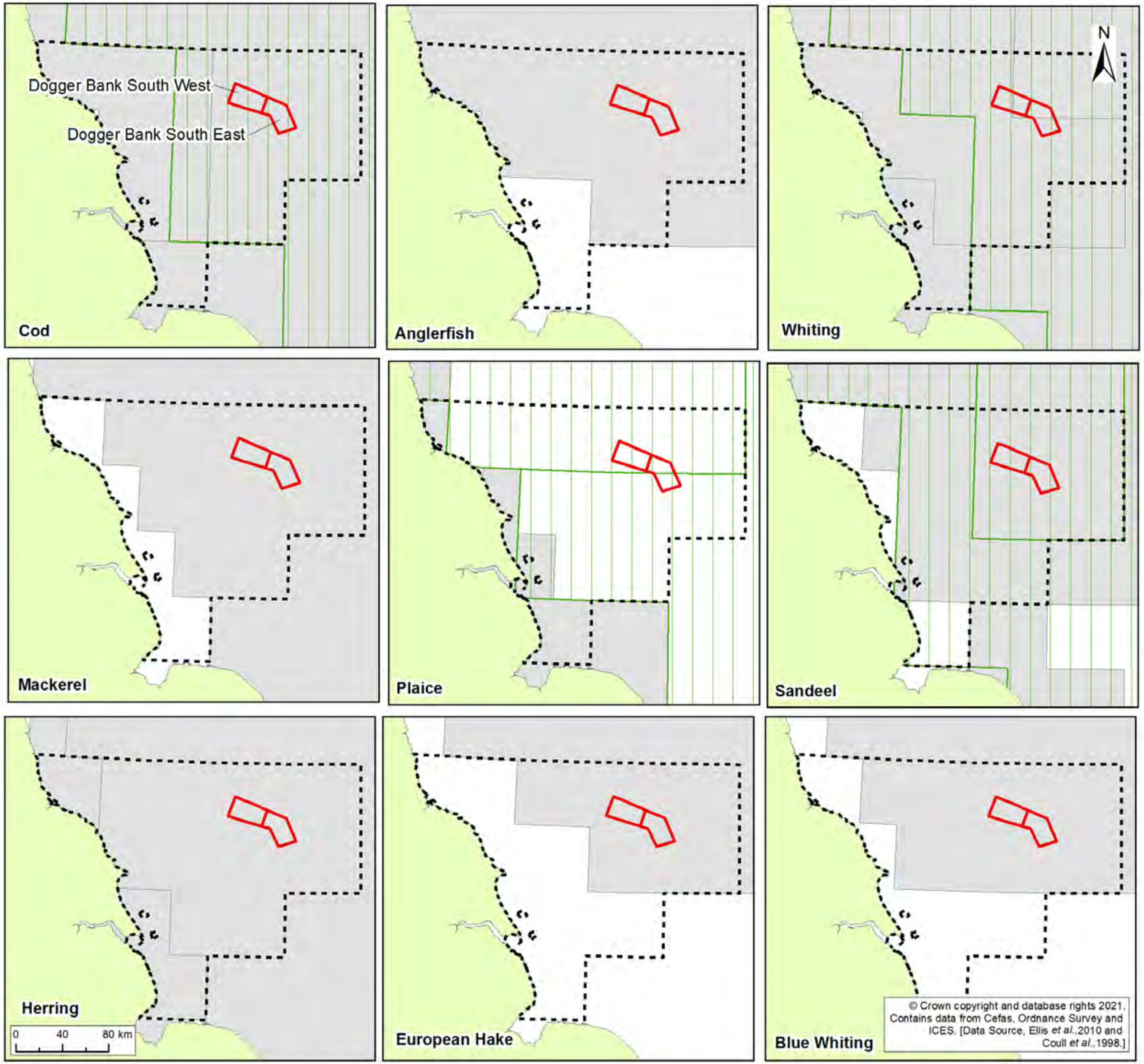
2.6.1 Existing Environment

248. Dogger Bank supports a wide range of fish and shellfish species, many of which have high commercial importance, with the region supporting significant fisheries for over 300 years (Plumeridge and Roberts 2017). A number of fish species have been identified as having spawning and nursery grounds both within the Fish and Shellfish study area, and within the offshore study area. Nursery grounds for cod, anglerfish, whiting, mackerel, plaice, sandeel, herring, European hake, blue whiting, ling, sole, spurdog, thornback ray, tope shark, haddock and nephrops are present within the Fish and Shellfish study area. Of these species cod, whiting, plaice, sandeel, sole and nephrops also have known spawning grounds within the Fish and Shellfish study area (**Figure 2-8; Figure 2-9**).



Legend:

- Dogger Bank South Offshore Wind Farms
- Fish and Shellfish Ecology study area
- Spawning grounds
- Nursery grounds

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
S2	P02	31/08/21	PB2340-MAR-OF-ZZ-DR-Z-0002	BO	IW	TM

Title:

Fish spawning and nursery areas

Figure: 2-8 | Drawing No: PB2340-MAR-OF-ZZ-DR-Z-0002

Co-ordinate system:	Page Size:	Scale:
WGS 1984 UTM Zone 31N	A3	1:3,300,000

Project:	Report:
Dogger Bank South Offshore Wind Farms	Dogger Bank South Offshore Wind Farms EIA Scoping Report

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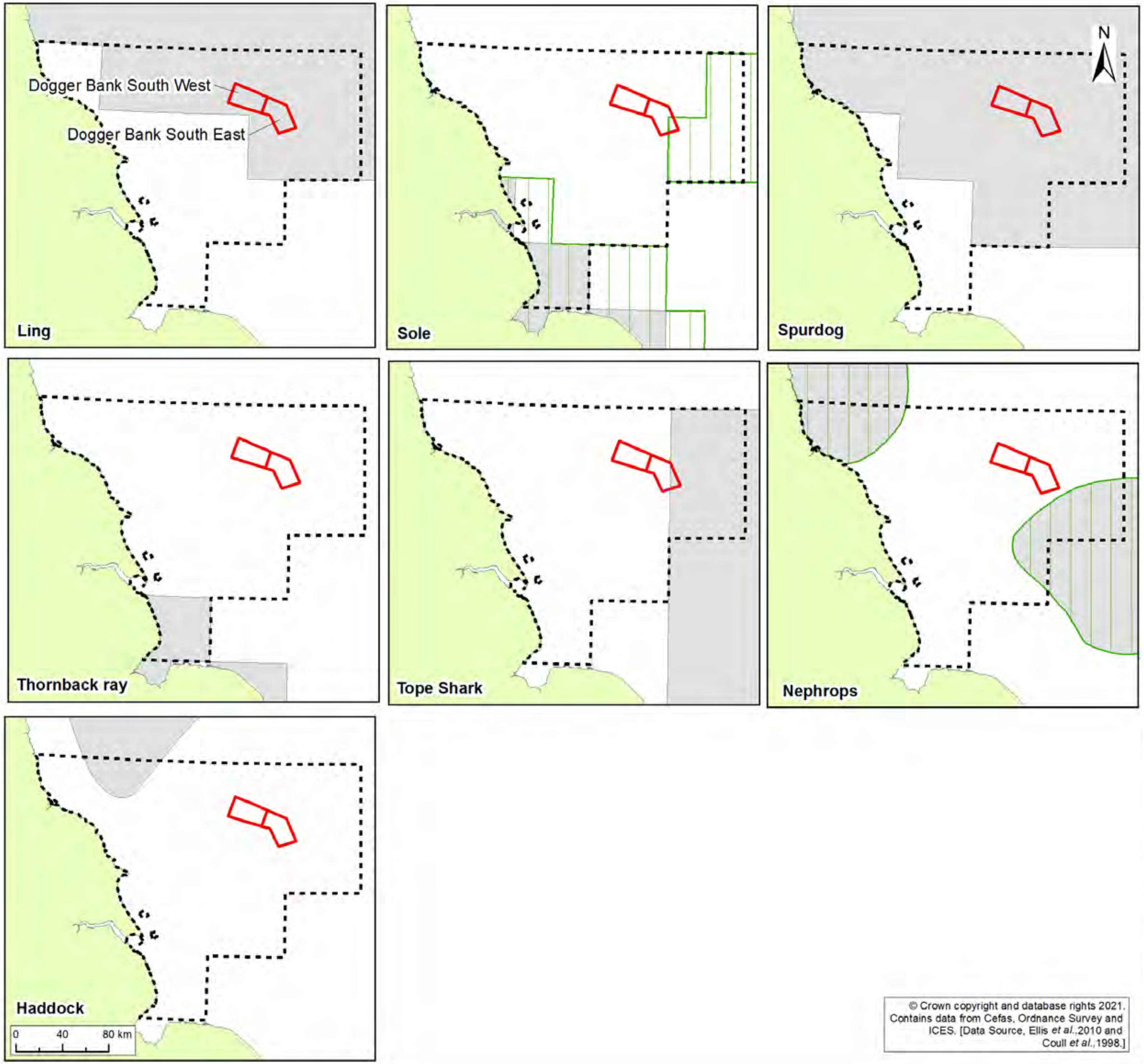

Legend:

- Dogger Bank South Offshore Wind Farms
- Fish and Shellfish Ecology study area
- Spawning grounds
- Nursery grounds

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
S2	P02	31/08/21	PB2340-MAR-OF-ZZ-DR-Z-0003	BO	IW	TM

Title:

Fish spawning and nursery areas

Figure: 2-9 | Drawing No: PB2340-MAR-OF-ZZ-DR-Z-0003

Co-ordinate system: WGS 1984 UTM Zone 31N | Page Size: A3 | Scale: 1:3,300,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

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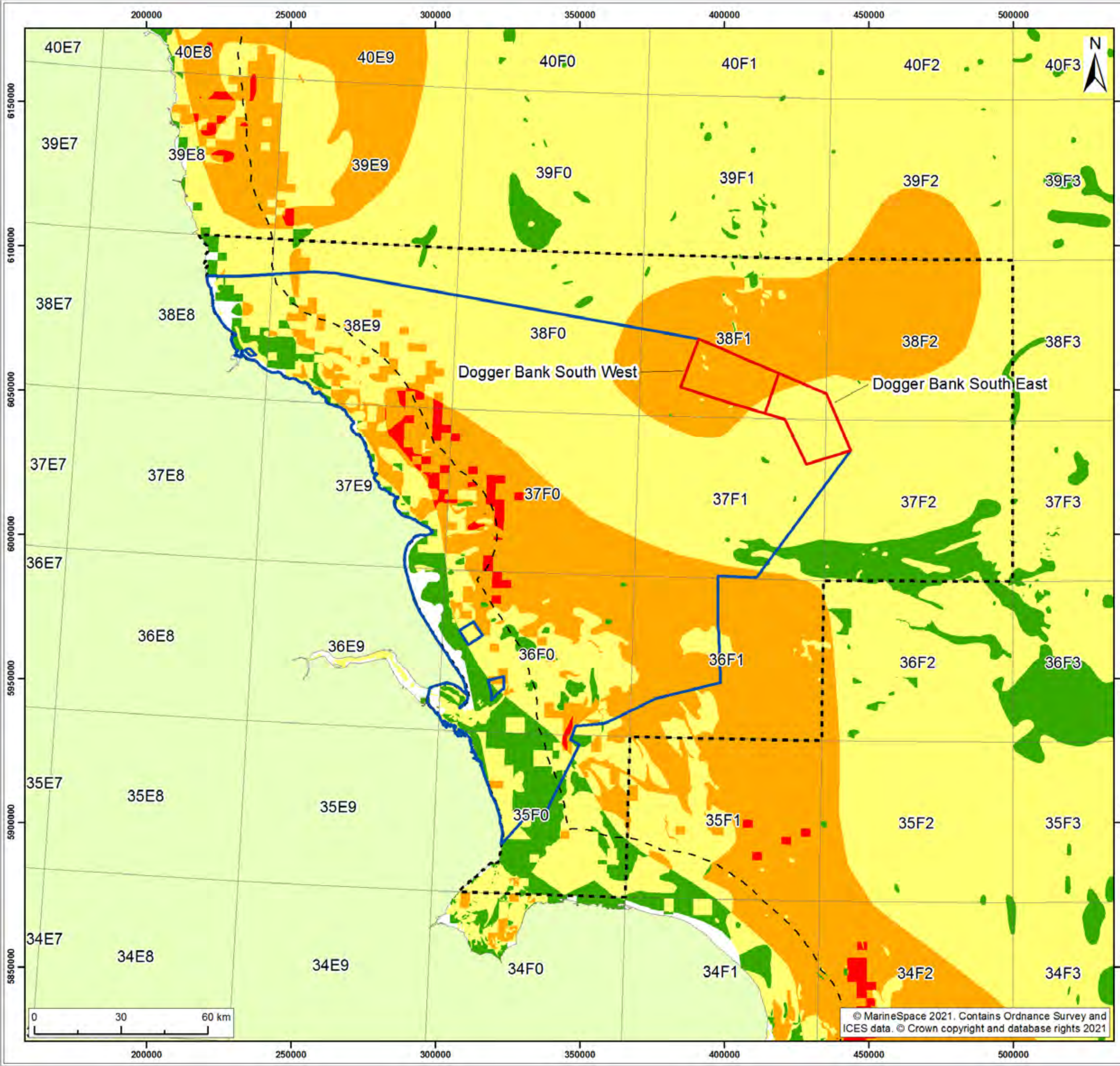
249. Both Atlantic mackerel *Scomber scombrus* and Atlantic cod *Gadus morhua* have known populations across the region. Cod are known to use regions within both the proposed array areas and the wider Fish and Shellfish study area as spawning grounds, with peak spawning activity occurring in February following a southerly winter migration. European plaice *Pleuronectes platessa* and common dab *Limanda limanda* are the most abundant Pleuronectiformes found within the region, with plaice playing an important role in local fisheries (JNCC 1995a; 1995b). Plaice spawning and nursery grounds are present both within the proposed array areas and the wider Fish and Shellfish study area.

250. Both Atlantic herring *Clupea harengus* and sandeel *Ammodytes* spp. have been identified as having spawning grounds within the Fish and Shellfish study area. Both of these species are highly sensitive to changes in substrate composition. Herring populations within the Fish and Shellfish study area increase during the summer and autumn, with spawning peaking between April and June (JNCC 1995a; 1995b). Dogger Bank is an extensive sandeel fishing ground within UK waters, with the species also acting as a key component of food webs across the area, serving as a prey species for a wide range of predators including fish, birds and marine mammals (Cefas, 2007). Specific habitats of importance to these species within the region are poorly understood, with the habitats of these species often present as small, distinct, areas within the wider benthic mosaic. A higher degree of resolution for the potential for Atlantic herring spawning and sandeel habitation within the Fish and Shellfish study area has been determined, using a methodology originally developed by MarineSpace for use in the EIA process for the marine aggregate industry (**Figure 2-10; Figure 2-11**). This assessment suggests that within the Fish and Shellfish study area there are discrete areas of very high and high potential spawning grounds for both sandeel and Atlantic herring. For both species the highest areas of potential spawning are approximately 12 nautical miles (NM) from the coastline.

251. The migratory species Atlantic salmon S*almo salar*, sea trout *Salmo trutta*, and European eel *Anguilla anguilla* are all known to have populations within the Fish and Shellfish study area. These species transition between freshwater and marine environments throughout their life histories and are likely susceptible to barrier effects that may impact their ability to migrate to and from spawning grounds (JNCC 1995a; 1995b).



Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Fish and Shellfish Ecology study area
- UK 12 nm limit
- ICES rectangles

Sandeel spawning potential

- Low spawning potential
- Medium spawning potential
- High spawning potential
- Very High spawning potential

S2	P02	31/08/21	PB2340-MAR-OF-ZZ-DR-Z-0004	BO	IW	TM
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Sandeel spawning potential across the Fish and Shellfish study area

Figure: 2-10 Drawing No: PB2340-MAR-OF-ZZ-DR-Z-0004

Co-ordinate system: WGS 1984 UTM Zone 31N | Page Size: A3 | Scale: 1:1,300,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

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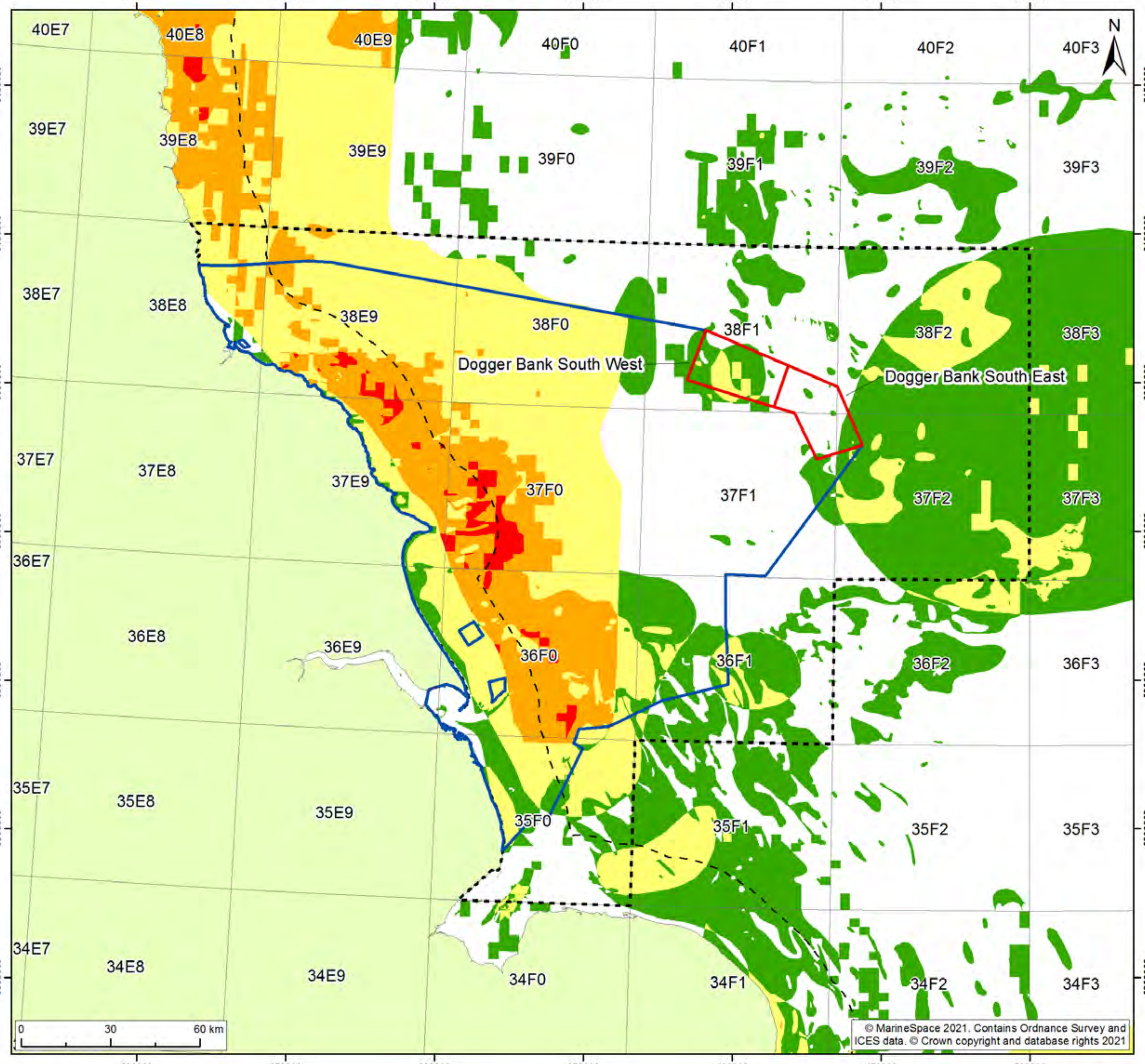

Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Fish and Shellfish Ecology study area
- UK 12 nm limit
- ICES rectangles

Herring spawning potential

- Low spawning potential
- Medium spawning potential
- High spawning potential
- Very High spawning potential

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
S2	P02	31/08/21	PB2340-MAR-OF-ZZ-DR-Z-0005	BO	IW	TM

Title:

Herring spawning potential across the Fish and Shellfish study area

Figure: 2-11 Drawing No: PB2340-MAR-OF-ZZ-DR-Z-0005

Co-ordinate system:	Page Size:	Scale:
WGS 1984 UTM Zone 31N	A3	1:1,300,000

Project:	Report:
Dogger Bank South Offshore Wind Farms	Dogger Bank South Offshore Wind Farms EIA Scoping Report

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252. A number of elasmobranch species are found within UK waters, with species including small-spotted catshark *Scyliorhynus canicula*, spurdog *Squalus acanthias* and thornback ray *Raja clavata* having a known presence within the Fish and Shellfish study area. Other elasmobranch species present within UK waters may also have a presence within the Fish and Shellfish study area including tope *Galeorhinus galeus*, cuckoo ray *Raja naevus*, and common skate *Leucoraja batis*, with the latter classed as endangered on the International Union for the Conservation of Nature Red List.

253. A number of shellfish species are found across the region, including arthropods such as European lobster *Homarus gammarus*, edible crab *Cancer pagurus*, Norway lobster *Nephrops norvigicus* and brown shrimp *Crangon crangon.* Brown shrimp are found in large quantities within The Wash, part of which is included within the Fish and Shellfish study area. European lobster and edible crab are recorded in areas of rocky reef and exposed coastline within the Fish and Shellfish study area; and Norway lobster are more abundant in regions of softer sediment into which they are able to burrow.

2.6.2 Approach to Data Collection

254. The following information has been considered during the production of this Scoping Report and will be considered further within the PEIR/ES where relevant matters are scoped in to the EIA process.

255. An initial desk-based review of literature and data sources was undertaken to support the information presented in section 2.6.1. Additional sources of information to be used during the EIA include:

- Marine Information Network (MarLIN);
- National Biodiversity Network (NBN) Gateway;
- Ocean Biodiversity Information System;
- EMODnet;
- ICES Landings Data;
- IFCA Landings Data;
- Dogger Bank Creyke Beck A & B and Teesside A & B Environmental Statement (Forewind, 2014);
- Hornsea 4 Scoping Report (Orsted, 2018); and
- Hornsea Project Four: Preliminary Environmental Information Report (Orsted, 2019).

2.6.3 Potential Impacts

2.6.3.1 Potential Impacts during Construction

256. Potential impacts during construction will result from physical disturbance of seabed habitats, and re-suspension of sediment during cable and foundation installation work (including seabed preparation).

257. The effects of direct damage (e.g. crushing) and disturbance to fish and shellfish species will be largely confined to the construction footprint. Effects will be short term and only occur within a small proportion of the proposed offshore study area. Predictions made by nearby offshore wind developments suggest direct damage and disturbance will impact fish and shellfish across 3.57% to 5.8% of the seabed within their offshore array area. The seabed types within the offshore study area are present across the Fish and Shellfish study area and are unlikely to contain habitat types either rare or unique to the Fish and Shellfish study area. Fish and shellfish populations within the region are generally deemed to have a medium to high level of recoverability following exposure to direct damage and disturbance. Mobile species have low vulnerability to impacts of this type, whereas more sessile species, primarily arthropods but also sandeel and herring, are more likely to have high vulnerability. For all species, due to the limited area likely to be affected, it is considered that there is no risk of likely significant impacts. Therefore, it is proposed that direct damage and disturbance to Fish and Shellfish ecology is scoped out of the EIA.

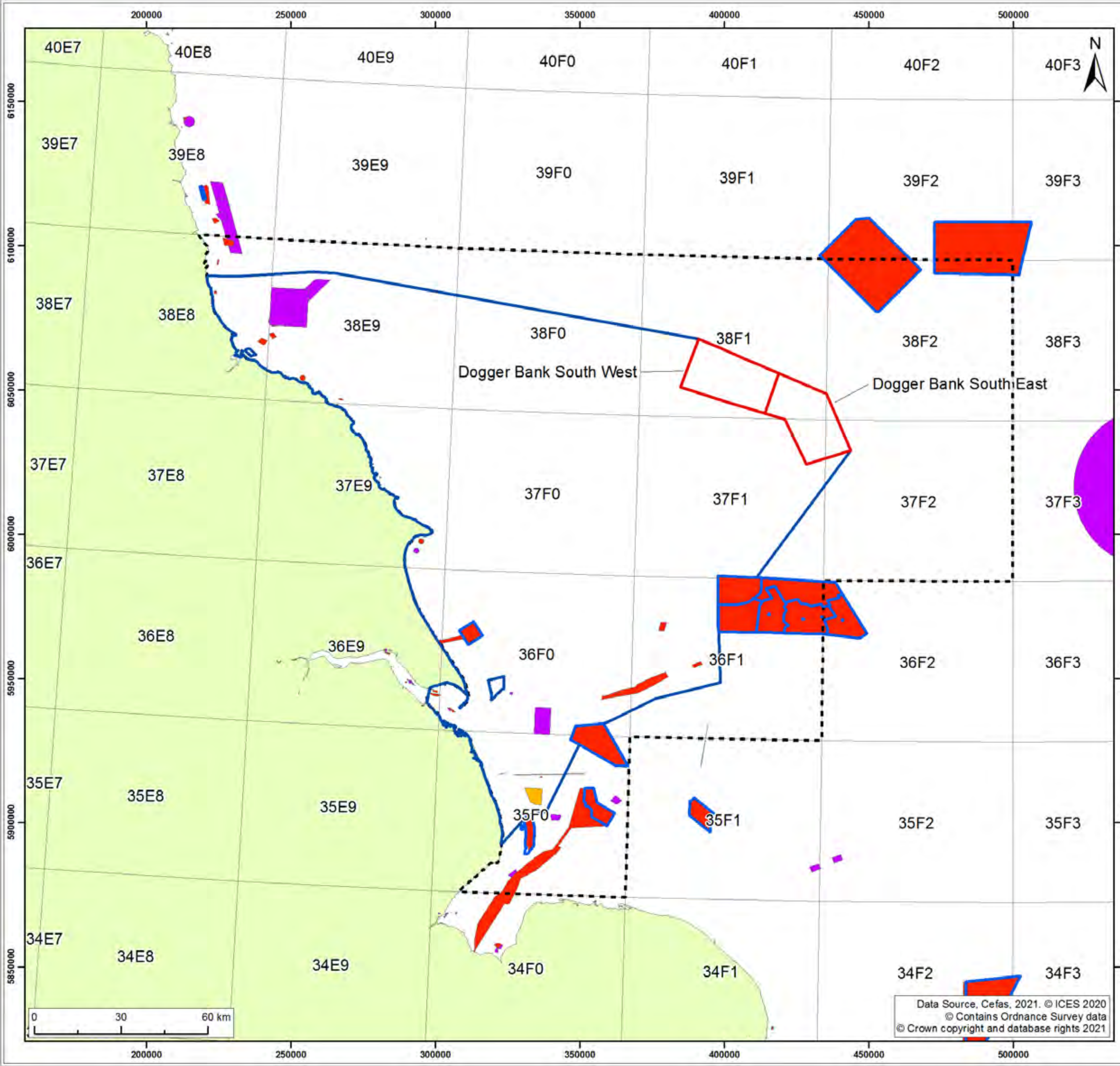
258. The effects of increased suspended sediment concentrations and associated sediment settlement have the potential to result in a change in predation success for species reliant on sight for this behaviour. Further, sediment plumes may result in the smothering of some Fish and Shellfish receptors, particularly those with limited mobility, and spawning and nursery grounds. This impact has been scoped into the EIA.

259. Potential impacts related to the release of sequestered contaminants following sediment disturbance works will be limited both spatially and temporally. Whilst direct analysis of sediment chemistry within the offshore search area has not been undertaken, measurements from across the wider central North Sea suggests that levels of elevated contamination are present surrounding estuary mouths, with fish species sampled further offshore showing a significant reduction in concentrations of certain pollutants. It is suggested that the wind industry is only likely to interact with areas of elevated levels of sediment contamination should infrastructure cross regions of historical dredge disposal (Cefas, 2017). Regions of historical dredge disposal are limited within the offshore study area and efforts will be made to ensure potential offshore export cable corridor(s) are positioned away from these sites (**Figure 2-12**) (Cefas 2013). In addition, studies carried out by Forewind (2013, 2014) have demonstrated low levels of contamination in the vicinity of the Projects. Therefore, we would seek to scope these out of further assessment through the EPP following data collection for the Projects due to the be undertaken in 2022.

260. The risk of pollutant release will be managed via the production of an Environmental Management and Monitoring Plan (or similar) for the Projects which will include details on marine pollution and associated contingency plans. Chemicals to be used during offshore operations will be approved under the Offshore Chemical Regulations 2002. In addition, all vessels involved will be required to comply with the International Convention for the Prevention of pollution from Ships (MARPOL) 73/78. Should a spill occur it is likely that pollutants would disperse rapidly, and quickly undergo degradation, leading to a subsequent reduction in potential impact. As a result of these mitigation measures, it is considered that there is no risk of likely significant impacts from pollutant release, and it is proposed that this impact be scoped out of the EIA.

261. Underwater noise generated by pile driving and other construction activities may result in disturbance and displacement of fish species and may affect spawning and nursery areas, as well as migration patterns. This impact has been scoped into EIA.

262. Habitat loss and disturbance to spawning and nursery areas has the potential to occur during the construction and decommissioning phase of the Projects. This is most likely to impact herring and sandeel receptors which will be assessed in detail during the EIA. This impact has been scoped into the EIA.



Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Fish and Shellfish Ecology study area
- ICES rectangles

Disposal site status

- Closed
- Not for waste disposal
- Open
- Open - Offshore Wind Farm Disposal Site

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
S2	P02	31/08/21	PB2340-MAR-OF-ZZ-DR-Z-0006	BO	IW	TM

Title:

Marine Disposal sites within and surrounding the Fish and Shellfish study area

Figure: 2-12 Drawing No: PB2340-MAR-OF-ZZ-DR-Z-0006

Co-ordinate system: WGS 1984 UTM Zone 31N
Page Size: A3
Scale: 1:1,300,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

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263. Habitat loss and disturbance to spawning and nursery areas has the potential to occur during the construction and decommissioning phase of the Projects. This impact is most likely to impact herring and sandeel receptors which will be assessed in detail during the EIA. This impact has been scoped into the EIA.

264. Impacts which span the life of the Projects (long term habitat loss; EMF effects arising from cables; and reduced fishing pressure within the array areas and increased fishing pressure outside of the array area) will be considered as part of the operation phase assessment (see below) and are therefore not considered in the construction phase assessment to avoid duplication.

2.6.3.2 Potential impacts during operation and maintenance

265. Potential impacts during operation will mostly result from loss of habitat and changes to seabed substrata caused by the physical presence of infrastructure (i.e. foundations and any cable protection above the seabed). Maintenance activities may result in disturbance to seabed habitats, however these would be similar to those during construction but at a lower magnitude.

266. The effects of direct damage (e.g. crushing) and disturbance to fish and shellfish species will be largely confined to the footprint of any maintenance operations that may be required across the life of the Projects. Effects will be short term and only occur within a small proportion of the proposed offshore study area when required. These effects are likely to have a negligible impact on the Fish and Shellfish population within the region as described within section 2.6.3.1, and so is scoped out of the EIA.

267. The effects of increased suspended sediment concentrations and associated sediment settlement associated with maintenance activities have the potential to result in a change in predation success for species reliant on sight for this behaviour. Further, sediment plumes may result in the smothering of some Fish and Shellfish receptors, particularly those with limited mobility, and spawning and nursery grounds. This impact has been scoped into the EIA.

268. As described in section 2.6.3.1, potential impacts related to the release of sequestered contaminants following sediment disturbance is scoped into the EIA at this stage, and pollutant release has been scoped out of the EIA.

269. As piling and UXO clearances will be completed during the construction phase, any effects of underwater noise and vibration resulting from operation and maintenance of the Projects are unlikely to cause significant effects on Fish and Shellfish receptors during operation. It is possible that some UXO clearance may be required during operation and maintenance stage, if this is the case, the Projects would seek additional marine licences. This impact has been scoped out of the EIA for this phase of the Projects.

270. Temporary habitat loss and disturbance to spawning and nursery areas has been scoped out of the operation and maintenance section of the assessment. However, long-term loss of habitat and / or change in habitat type as a result of changes in substrate composition will be considered in relation to operation and maintenance activities and are therefore scoped into the EIA.

271. EMF can be generated in the region surrounding electrical cables during the transmission of electricity and magnetic fields. Some marine organisms are sensitive to EMF, particularly those that make use of electroreceptors for orientation, navigation and prey/predator detection. Potential impacts from EMF from operational cables are not considered to result in significant effects on fish and shellfish receptors. A comparison of EMF field strength across 10 different cables and wind farms (Normandeau et al., 2011) suggests that EMF may be detectable above background levels by electroreceptive fish over 10m from the vicinity of the cable, however this decreases at lower voltages, with the study examining cables ranging from 450 KV to 33 KV. This area of water in which EMF effects are present is also reduced via cable protection measures including burial. Any effects are likely to be highly localised, as EMFs are strongly attenuated and decrease as an inverse square of distance from the cable (Gill and Barlett, 2010).

272. Elasmobranchs are known to use electroreceptive organs, the Ampullae of Lorenzini, for the detection of bioelectric fields produced by prey items, as well as for navigation and a range of social behaviours. It is acknowledged that elasmobranchs have higher levels of electroreceptive sensitivity when compared to teleosts, so are considered to be of medium sensitivity. Migratory species including Atlantic salmon and seatrout are unlikely to encounter areas of increased EMF effect as these species spend the majority of their time in the upper water column during migration, away from the majority of EMF effect (Kristensen et al. 2018; Normandeau et al. 2011; Strøm et al. 2018). Further, European eels have been shown to exhibit no change in migratory behaviour in the presence of subsea export cables of higher voltages (and therefore increased EMF effects) than are expected for the Projects (Westerberg and Lagenflet, 2008). Other fish species tend to have a high degree of mobility, as well as a level of habitat flexibility, that should allow for any species to avoid EMF effects. For the above reasons, the sensitivity of demersal, pelagic and migratory fish to EMF effects from cables is considered low. EMF effects have been shown to result in minimal changes in crab behaviour under lab conditions (PTEC, 2014), whilst field studies in the Baltic Sea observed no impacts on the migratory routes of a range of shellfish species (OSPAR, 2009). Bochert & Zettler (2006) report that brown shrimp *Crangon* do not react when exposed to EMF.

273. EMF effects from cables for shellfish receptors are considered negligible. Although elasmobranchs have been assessed as having a medium sensitivity to EMF effects, the total volume of water within which EMF is likely to be detectable above background levels is negligible when compared to the Fish and Shellfish study area. Further, many species within the Fish and Shellfish receptor group have a high degree of mobility, which will allow for avoidance behaviour to unaffected areas, should EMF act as a disturbance. Based on the above evidence, it was proposed to scope out this impact. However, based on feedback from the Seabed ETG that the body of knowledge on the impacts of EMF in the marine environment is limited and continues to expand, the effects of EMF during the operation and maintenance phase of the Projects has been scoped into the EIA.

274. The ecological impact on Fish and Shellfish within the study area as a result of decreased fishing pressure within the array area, and an increase in fishing pressure outside of the array areas will be considered, and therefore scoped into the EIA.

2.6.3.3 Potential Impacts during decommissioning

275. During decommissioning the potential impacts are anticipated to be similar to those for the construction phase, albeit on a smaller scale and as such the same potential impacts have been scoped in (and out) as a result. For example, noise impacts will be lower as no piling will be required.

2.6.3.4 Potential cumulative impacts

276. The CIA will consider habitat loss and disturbance and noise impacts in conjunction with adjacent projects and cumulative changes to seabed habitat caused by changes in physical processes based on the results of the Marine Physical Processes assessment.

2.6.3.5 Potential transboundary impacts

277. Given that the likely impacts of the Projects will be localised and small scale, and that the Projects are located 40.82km at their closest point to the EEZ boundary, transboundary impacts are unlikely to occur or to be significant. It is therefore proposed that transboundary effects are scoped out.

2.6.3.6 Summary of potential impacts

278. **Table 2-15** outlines the impacts which are proposed to be scoped into the EIA. This may be refined by agreement through the EPP as additional information and data become available.

Table 2-15 Summary of Impacts Relating to Fish and Shellfish Ecology. Topics to be Scoped In (✓) and Out (x)

Potential Impact	Construction	Operation	Decommissioning
Direct damage (e.g. crushing) and disturbance to fish and shellfish species during construction.	×	×	×
Increase in local suspended sediment concentrations and sediment settlement.	✓	✓	✓
Release of sequestered contaminants following sediment disturbance.	✓	✓	✓
Pollution events resulting from the accidental release of pollutants.	×	×	×
Impacts on fish and shellfish species as a result of noise and vibration.	✓	×	✓
Habitat loss / disturbance to spawning and nursery areas, including the installation of turbine foundations, scour protection and cables.	✓	×	✓
Long-term loss of habitat and / or change in habitat type as a result of changes in substrate composition.	×	✓	×
EMF effects arising from cables.	×	✓	×
Reduced fishing pressure within the array areas and increased fishing pressure outside of the array area.	×	✓	×
Cumulative impacts	✓	✓	✓
Transboundary impacts	The Projects are located 40.82km from the EEZ boundary and therefore there is no pathway for transboundary impacts		

2.6.4 Approach to Impact Assessment

279. The proposed approach to the assessment of potential impacts on Fish and Shellfish Ecology is detailed below:

- Natural fish populations within the Fish and Shellfish study area will be characterised via a review of existing literature, environmental data and fish landings data. Landings data will be sourced from ICES for the assessment of offshore populations, and from IFCA for inshore populations.
- No project-specific surveys on fish and shellfish populations are proposed.
- Key receptor groups will be defined and used as the basis for the assessment, with the sensitivity of each receptor group clearly explained within the ES. An assessment of Atlantic herring and sandeel, with regards to potential impacts resulting from seabed disturbance, will be conducted using currently available data.
- The footprint of potential habitat loss and disturbance will be calculated and used as the basis for the impact assessment where appropriate.
- The Marine Physical Processes assessment will be used to inform the assessment of impacts relating to Fish and Shellfish Ecology resulting from disturbance of the seabed and resulting in changes to suspended sediments.
- Underwater noise modelling will be undertaken to inform the Fish and Shellfish Ecology assessment.
- Potential impacts resulting from subsea noise will be assessed via a desk-based review of previous subsea noise assessments produced for existing offshore wind farm projects, alongside the underwater noise modelling results. A full methodology of noise assessments referenced will be included.
- Reference will be made within the assessment to models produced by the National Physical Laboratory and also published response thresholds (Popper et al. 2003; Hawkins and Popper. 2014).
- The subsea noise assessment on fish and shellfish will take full account of the conclusions made by other EIAs produced for other offshore wind farm projects within the region.

2.7 Marine Mammals

280. This section of the Scoping Report identifies the marine mammal receptors relevant to the Projects. The potential effects of construction, operation and maintenance, and decommissioning of the Projects on marine mammals are considered throughout this section.

The following questions are posed to consultees to help them frame and focus their response to the marine mammals scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Do you agree with the approach to data collection?
- Have all the potential impacts on marine mammals resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

2.7.1 Existing Environment

281. To cover the offshore study area, which includes the area encompassing the array areas and options for the offshore transmission works, the existing environment for marine mammals is based on the wider North Sea area to take into account the wide ranges and movements of marine mammals and relevant Management Units.

282. Assessments of the distribution of marine mammals throughout the North Sea have identified six marine mammal species that occur commonly throughout the region (e.g. Hammond et al. 2021; Paxton et al. 2016; Waggitt et al. 2019; DECC, 2016; Special Committee on Seals (SCOS) 2020). These include:

- Baleen whales:
  - Minke whale *Balaenoptera acutorostrata*.
- Toothed whales:
  - Harbour porpoise *Phocoena phocoena*;
  - Bottlenose dolphin *Tursiops truncatus*; and
  - White-beaked dolphin *Lagenorhynchus albirostris*.
- Pinnipeds:
  - Grey seal *Halichoerus grypus*; and
  - Harbour seal *Phoca vitulina*.

283. Other marine mammal species that have been recorded in the North Sea in lower numbers include short-beaked common dolphin *Delphinus delphis,* Atlantic white-sided dolphin *Lagenorhynchus actus*, Risso's dolphin *Grampus griseous*, and Killer whale *Orcinus orca*.

284. A large-scale survey of the presence and abundance of cetacean species around the north-east Atlantic, undertaken in the summer of 2016 (the Small Cetaceans in the European Atlantic and North Sea (SCANS) III survey; Hammond et al. 2021) places the Projects array areas and potential offshore export cable corridor(s) in Block O. The results of the surveys for Block O shows harbour porpoise to be the most common cetacean species. Other cetacean species recorded in Block O (although in much lower abundances) include white-beaked dolphin and minke whale.

285. The Joint Cetacean Protocol (JCP) Phase III report (Paxton et al. 2016) shows similar results, with only harbour porpoise present with relatively high density in the offshore study area, with lower densities of minke whale and white-beaked dolphin compared to the wider North Sea region. Distribution maps of cetacean species within the north-east Atlantic (Waggitt et al. 2019) also indicate that harbour porpoise would be the most likely species to be present within the offshore study area, with minke whale and white-beaked dolphin also having a relatively high density. Atlantic white-sided dolphin, bottlenose dolphin, Risso's dolphin, and short-beaked common dolphin may also be present with in the offshore study area, but in much lower numbers.

286. This is further supported by DECC (2016), which states that within the offshore study area, only harbour porpoise is considered to be common, with white-beaked dolphin and minke whale more commonly sighted seasonally further north, and both bottlenose dolphin and Atlantic white-sided dolphin are noted as uncommon for the area.

287. Other occasional visitors to the southern North Sea include sperm whale *Physeter macrocephalus*, and long-finned pilot whale *Globicephala melas* (Waggitt et al. 2019). However, sightings of these species are rare.

288. Both grey seal and harbour seal are present in the offshore study area, with a number of haul-out sites off the coasts of Yorkshire and Lincolnshire. Donna Nook, which is the largest grey seal breeding site in England, and one of the biggest in the UK, is located within one of the landfall areas of search (Grimsby to Skegness) (SCOS, 2020). Smaller harbour seal haul-out sites are also present within the offshore study area, with the main sites being within The Wash (approximately 15km south of the offshore study area) (SCOS, 2020).

289. For grey seal, densities within the offshore study area are relatively low in most areas offshore, with increased densities near to the southern and western edges of Dogger Bank, and higher closer to the coastline, particularly near to Donna Nook and the Humber Estuary (Carter et al. 2020; Russell et al. 2017). Harbour seal densities are low in the majority of the offshore study area, increasing towards the south of the area and near to The Wash (Carter et al. 2020; Russell et al. 2017).

290. Two years of monthly offshore digital aerial surveys of the DBS East and DBS West array areas, plus 4km buffer (agreed with Natural England) are underway (**Figure 2-13**). These surveys commenced in March 2021 (first survey was undertaken on the 25 March 2021) and are planned to be completed in February 2023. During the three survey visit undertaken so far, four categories of marine mammal sightings were recorded in the DBS East survey area and during the DBS West surveys eight categories of marine mammal were recorded (**Table 2-16**).

Table 2-16 Marine Mammal Digital Area Survey Results (March to May 2021)

Species	DBS East	DBS West
Harbour porpoise	23	56
White-beaked dolphin	-	4
Common dolphin	-	2
Grey seal	-	1
Unidentified dolphin / porpoise	18	18
Unidentified seal	5	10
Unidentified dolphin	1	2
Unidentified marine mammal	-	3

291. A number of surveys were also undertaken for the Dogger Bank A and B (formerly known as Dogger Bank Creyke Beck A and B), and for the Dogger Bank C and Sofia project (formerly known as Dogger Bank Teesside A and B). The surveys for all four projects (the Dogger Bank Zone) were undertaken by boat, from January 2010 to January 2012. Harbour porpoise was the most commonly sighted marine mammal within these surveys, followed by white-beaked dolphin and minke whale. Low numbers of bottlenose dolphin, Atlantic white-sided dolphin, fin whale *Balaenoptera physalus* and humpback whale *Megaptera novaeangliae* were also recorded, as well a number of unidentified dolphin species and unidentified baleen whale species (Forewind 2013; 2014). Dogger Bank Zone aerial surveys, undertaken from November 2009 to October 2011 revealed harbour porpoise to be the most common species, with relatively high numbers across the Dogger Bank Zone (Forewind 2013; 2014).

292. A full assessment of the baseline conditions will be undertaken through the EIA process, and will inform, alongside the results of the site-specific aerial surveys, the species to be taken forward for further assessment. However, it is expected that the six most commonly occurring species within the offshore study area, and therefore taken forward for assessment, will be:

- Harbour porpoise;
- White-beaked dolphin;
- Bottlenose dolphin;
- Minke whale;
- Grey seal; and
- Harbour seal.

293. As highly mobile marine predators, the status and activity of marine mammals known to occur within or adjacent to the offshore study area would be considered in the context of their Management Unit population. For cetacean species, this would be based on Inter-Agency Marine Mammal Working Group (IAMMWG, 2021), and for seal species this would be based on the latest population estimates from the SCOS reporting (at the time of writing, this would be SCOS 2020).

2.7.1.1 Designations

294. The DBS East and DBS West array areas, and part of the offshore study area, are within the summer area of the Southern North Sea SAC, which is designated for harbour porpoise. For other marine mammal species (including bottlenose dolphin, grey seal, and harbour seal), tagging studies and information on species' movements will be reviewed to determine the potential for connectivity of marine mammals from designated sites and the offshore study area as part of the HRA screening.

2.7.2 Approach to Data Collection

295. The following information has been considered during the production of this Scoping Report and will be considered further within the PEIR/ES where relevant matters are scoped in to the EIA process.

296. **Table 2-17** outlines existing primary data that has been used to inform this section and will also be used to inform the EIA.

Table 2-17 Existing Marine Mammal Datasets

Data Set	Spatial Coverage	Survey Year / Timing
Site specific surveys		
Aerial surveys	DBS East and DBS West array areas, plus 4km buffer	March 2021 to February 2023
Other nearby offshore wind farm surveys		
Dogger Bank Zone boat-based surveys (covering Dogger Bank A, B, C and Sofia wind farms) (Forewind 2013; 2014)	Dogger Bank Zone	January 2010 to January 2012
Dogger Bank Zone aerial surveys (covering Dogger Bank A, B, C and Sofia wind farms) (Forewind 2013; 2014)	Dogger Bank Zone	November 2009 to October 2011

297. Other data and information available to inform the EIA include:

- SCANS-III: Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys (Hammond et al. 2021);
- SCANS-II: Cetacean abundance and distribution in European Atlantic shelf waters to inform conservation and management (Hammond et al. 2013);
- The identification of discrete and persistent areas of relatively high harbour porpoise density in the wider UK marine area (Heinänen and Skov, 2015);
- Revised Phase III data analysis of JCP data resources (Paxton et al. 2016);
- Offshore Energy Strategic Environmental Assessment (including relevant appendices and technical reports) (DECC, 2016);
- Distributions of Cetaceans, Seals, Turtles, Sharks and Ocean Sunfish recorded from Aerial Surveys 2001-2008 (WWT, 2009);
- Distribution maps of cetacean and seabird populations in the North-East Atlantic (Waggitt et al. 2019);

- MARINElife surveys from ferry routes across the southern North Sea area (MARINElife, 2021);
- Sea Watch Foundation volunteer sightings off eastern England (Sea Watch Foundation, 2021);
- Management Units for cetaceans in UK waters (IAMMWG, 2021);
- Seal telemetry data (e.g. Sharples et al. 2008; Russel and McConnell 2014; Barker et al. 2014; Vincent et al. 2017);
- UK seal at sea density estimates and usage maps (Russell et al. 2017; Carter et al. 2020);
- Other North Sea wind farm survey data (Dogger Bank A, B, C and Sofia offshore wind farms);
- SCOS annual reporting of scientific advice on matters related to the management of seal populations (e.g. SCOS, 2020);
- Trilateral surveys of Harbour Seals in the Wadden Sea and Helgoland in 2020 (Galatius et al. 2020); and
- EG-Seals grey seal surveys in the Wadden Sea and Helgoland in 2019-2020 (Brasseur et al. 2020).

298. The latest and most up to date references will be applied to the assessment, data used will also be supplemented with appropriate results of ongoing research and studies as it becomes available.

2.7.3 Potential Impacts

2.7.3.1 Potential impacts during construction

299. The key potential impacts during construction for marine mammals are expected to be those from underwater noise, principally from piling activities and UXO clearance. Potential impacts of underwater noise are auditory injury and disturbance. Underwater noise during piling, as well as disturbance associated with underwater noise from other construction activities (such as UXO clearance and cable installation activities) and the presence of vessels offshore will be considered, with site specific underwater noise modelling undertaken. The potential for a barrier effect as a result of disturbance and displacement (due to underwater noise) will also be considered and scoped in for assessment.

300. Other impacts to be considered during the construction phase and scoped in for assessment would be the potential for interactions and / or an increase in collision risk with construction vessels. The assessment will consider potential for disturbance to seals at haul-out sites, and any disturbance of marine mammals foraging at sea, as well as the potential for indirect impacts as a result of changes in availability of prey species.

301. Potential impacts related to changes in water quality are currently scoped in for assessment. However, once further information is available on the potential for water quality changes and the release of contaminants, including the management measures that would be put in place, the scoping out of water quality impacts from further assessments would be discussed, through the EPP.

2.7.3.2 Potential impacts during operation and maintenance

302. Potential impacts during operation scoped in for assessment will mostly result from the presence of operation and maintenance vessels within the array areas (leading to an increase in vessel interactions / collision risk), underwater noise (including that generated by operational turbines) and the impacts on prey species during any maintenance activities. These will be similar to impacts assessed for construction, but lower in magnitude due to the absence of pile driving, with fewer vessels required for maintenance than construction.

303. As for construction, other impacts to be considered during the operations phase include the potential for disturbance to seals at haul-out sites, the disruption of marine mammals during foraging, as well as the potential for indirect impacts on prey species.

304. The potential for impacts due to barrier effects from the physical presence of the Projects once constructed has been scoped out of the assessment. The spacing between wind turbines would allow animals to move between devices and through the operational wind farm. Studies at Dutch and Danish wind farms have shown that harbour porpoise and seal presence within operational wind farms show no evidence of exclusion (for example, Diederichs et al. 2008; Lindeboom et al. 2011; Marine Scotland 2012; McConnell et al. 2012; Russell et al. 2014; Scheidat et al. 2011; Teilmann et al. 2006; Tougaard et al. 2005, 2009a, 2009b). Both harbour porpoise and seals have been shown to forage within operational wind farm sites (e.g. Lindeboom et al. 2011; Russell et al. 2014) indicating no restriction to movements.

305. The potential for impacts from EMF has been scoped out. This is consistent with other recent projects (including for Norfolk Vanguard and Norfolk Boreas (Planning Inspectorate 2016; 2017b), East Anglia ONE North and East Anglia TWO (Planning Inspectorate 2017c; 2017d), and both the Dudgeon Extension and Sheringham Shoal Extension Projects (Planning Inspectorate; 2019)) as there is no evidence of any impact.

2.7.3.3 Potential impacts during decommissioning

306. During decommissioning the potential impacts are anticipated to be similar or less than those described above for the construction phase, for example underwater noise impacts will be lower as there will be no piling. Potential impacts scoped in to the assessment during decommissioning include physical and auditory injury and behavioural impacts resulting from underwater noise; disturbance from vessels and barrier effects due to underwater noise; disturbance at seal haul-out sites and to foraging at sea; increase in risk of collision due vessel interaction; changes to prey resource and changes to water quality.

2.7.3.4 Potential cumulative impacts

307. The CIA will consider displacement due to cumulative underwater noise and impacts on prey species. The assessment will also consider displacement due to the presence of offshore vessels and maintenance activities during the operational phase.

2.7.3.5 Potential transboundary impacts

308. There is a significant level of marine development being undertaken or planned by EU Member States (i.e. Belgium, the Netherlands, Germany and Denmark) in the North Sea. Populations of marine mammals are highly mobile and there is potential for transboundary impacts especially when considering noise impacts. Transboundary impacts have been scoped in for assessment along with the other cumulative impacts.

2.7.3.6 Summary of potential impacts

309. **Table 2-18** outlines the impacts which are proposed to be scoped in or out of the EIA. This may be refined through the EPP as additional information and data become available.

Table 2-18 Summary of Impacts Relating to Marine Mammal Ecology. Topics to be Scoped In (✓) and Out (x)

Potential Impact	Construction	Operation	Decommissioning
Physical and Auditory Injury Resulting from Underwater Noise	✓	✓	✓
Behavioural Impacts Resulting from Underwater Noise	✓	✓	✓
Disturbance from Vessels due to Underwater Noise	✓	✓	✓
Barrier Effects from Underwater Noise	✓	✓	✓
Disturbance at Seal Haul-Out Sites	✓	✓	✓
Disturbance to Foraging at Sea	✓	✓	✓
Vessel Interaction (Increase in Risk of Collision)	✓	✓	✓
Changes to Prey Resource	✓	✓	✓
Changes to Water Quality	✓	✓	✓
Barrier Effects from the Physical Presence of the Wind Farm	✗	✗	✗
Effects from EMFs	✗	✗	✗
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓

2.7.4 Approach to Impact Assessment

310. Underwater noise modelling will be undertaken to inform the marine mammal assessment. Spatial noise impacts will be considered in the context of the site characterisation data in order to quantify the potential impact on the reference populations for marine mammals.

311. Where possible, the magnitude of effect will be quantified. The impact significance will be determined by a matrix approach supported by expert judgement, taking into account the value and sensitivity of the receptor (as outlined in section 1.7.2).

312. Consultation with key marine mammal stakeholders will be ongoing during the EIA process, through the Marine Mammal ETG, and will include discussion of the best available information to use, for example, to determine species density estimates and define reference populations for the assessment.

2.8 Offshore Ornithology

313. This section of the Scoping Report identifies the offshore ornithology receptors relevant to the Projects. The potential effects of construction, operation and maintenance, and decommissioning of the Projects on offshore ornithology are considered throughout this section.

The following questions are posed to consultees to help them frame and focus their response to the offshore ornithology scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Do you agree with the approach to data collection?
- Have all the potential impacts on offshore ornithology resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

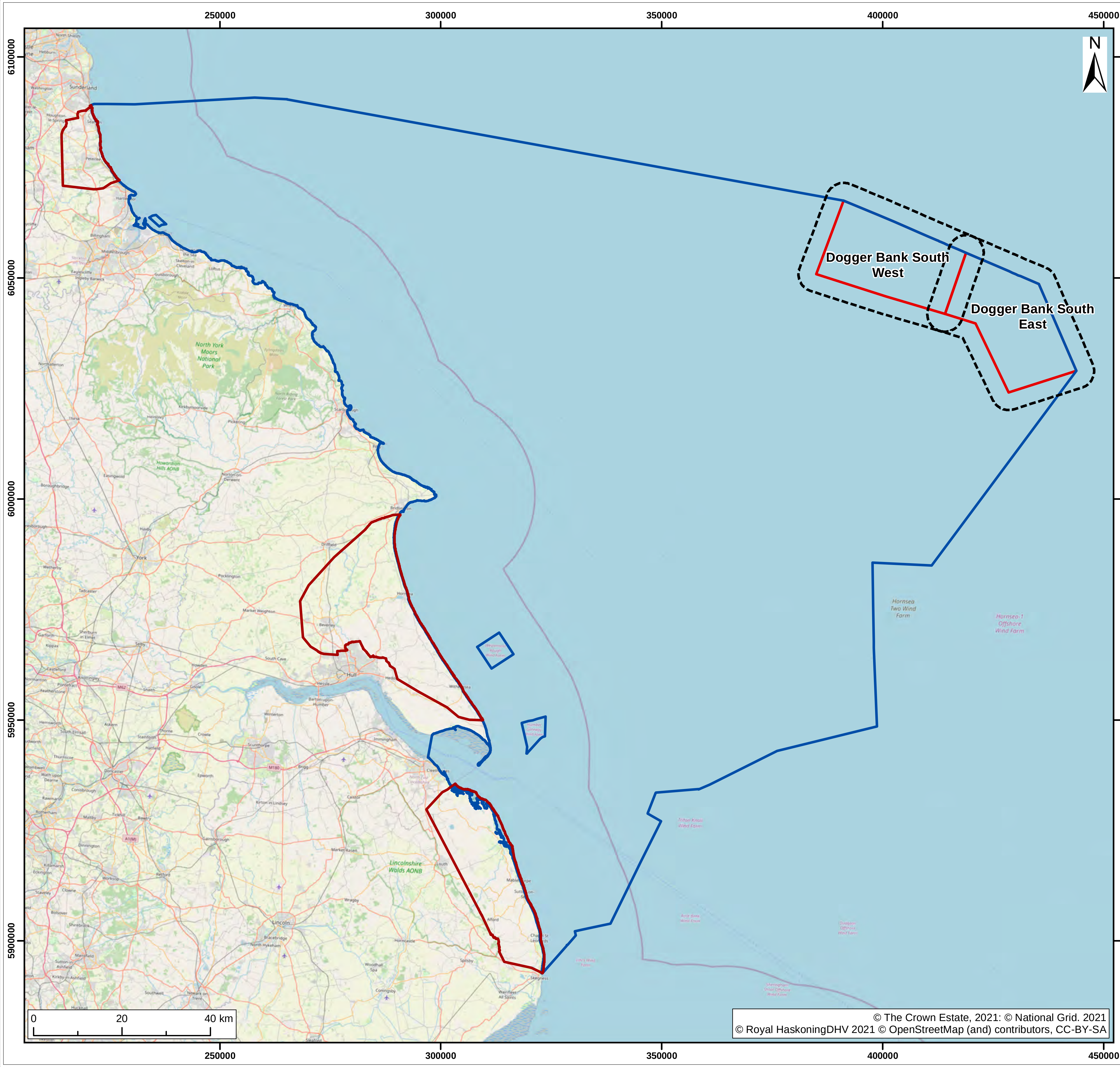
2.8.1 Existing Environment

314. The offshore ornithology impact assessment will consider potential effects on seabird species due to the Projects. This will be informed both by expert understanding of the seabird species present in the southern North Sea and analysis of site-specific survey data. As well as consideration of the regional seabird populations, the potential for connectivity of the Projects to sites with statutory designation for nature conservation, which have birds listed as qualifying features will be reviewed. Four classes of statutory designated sites will be considered: SPAs, Proposed Special Protection Areas (pSPAs), Ramsar sites and SSSIs.

315. The designated sites with the greatest potential for connectivity to the Projects will be those designated for breeding seabirds, with lower linkage expected for those designated for terrestrial, coastal or marine bird interests (typically overwintering aggregations).

316. The array areas do not overlap with any ornithological designations (**Figure 2-13**). However, since breeding seabirds can travel considerable distances whilst foraging it is necessary to consider designated sites located outside the wind farm areas. The extent of connectivity between seabird SPAs and offshore wind farms during the breeding season is largely a function of distance and will be informed through review of species-specific foraging ranges (see Woodward et al. 2019). Outside the breeding season, patterns of migration are used to infer the origins of species recorded and SPA connectivity will be based on the data provided in Furness (2015).

317. Monthly digital aerial surveys commenced across the array areas and 4km buffer in March 2021. The survey programme will run for two years and will conclude in February 2023. At present, since only preliminary site-specific data on the species present are available this scoping report has considered other data sources. Drawing on past studies and wind farm impact assessments the seabird species expected to be present are provided in **Table 2-19** along with their seasonal definitions which will be used for assigning impacts to appropriate populations.



Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Onshore Study Area
- Aerial Survey Area (4km Buffer)

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
SX	P02	08/10/21	Third Issue	LNF	MT	MT
SX	P01	06/09/21	Second Issue	LNF	MT	MT
SX	P00	21/07/21	First Issue	LNF	MT	MT

Title:

Dogger Bank South Offshore Wind Farms, study area and aerial survey area

Figure: 2-13 | Drawing No: PB2340-MAC-OF-ZZ-DR-Z-0001

Co-ordinate system: WGS 1984 UTM Zone 31N | Page Size: A3 | Scale: 1:850,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

MacArthur Green RWE

Table 2-19 Species Specific Definitions of Biological Seasons (Furness 2015) for Bird Species Expected to be Present on the Array Areas.

Species	Breeding	Migration-free breeding	Migration - autumn	Winter	Migration - spring	Non-breeding
Black-headed gull	-	Apr-Jul	-	-	-	Aug-Mar
Common gull	-	May-Jul	-	-	-	Aug-Apr
Great black-backed gull	Mar-Aug	May-Jul	Aug-Nov	Dec	Jan-Apr	Sep-Mar
Herring gull	Mar-Aug	May-Jul	Aug-Nov	Dec	Jan-Apr	Sep-Feb
Lesser black-backed gull	Apr-Aug	May-Jul	Aug-Oct	Nov-Feb	Mar-Apr	-
Kittiwake	Mar-Aug	May-Jul	Aug-Dec	-	Jan-Apr	-
Little gull	Apr-Jul	May-Jul	-	-	-	Aug-Apr
Guillemot	Mar-Jul	Mar-Jun	Jul-Oct	Nov	Dec-Feb	Aug-Feb
Puffin	Apr-Aug	May-Jun	Jul-Aug	Sep-Feb	Mar-Apr	Mid-Aug-Mar
Razorbill	Apr-Jul	Apr-Jul	Aug-Oct	Nov-Dec	Jan-Mar	-
'Commic' tern	May-Aug	Jun	Jul-Sep	-	Apr-May	-
Arctic Skua	May-Jul	Jun-Jul	Aug-Oct	-	Apr-May	-
Fulmar	Jan-Aug	Apr-Aug	Sep-Oct	Nov	Dec-Mar	-
Gannet	Mar-Sep	Apr-Aug	Sep-Nov	-	Dec-Mar	-
Great skua	May-Aug	May-Jul	Aug-Oct	Nov-Feb	Mar-Apr	-

2.8.2 Approach to Data Collection

318. The following information has been considered during the production of this Scoping Report and will be considered further within the PEIR/ES where relevant matters are scoped in to the EIA process.

319. The survey data obtained from the ongoing monthly surveys will be used in conjunction with the following datasets and guidance materials:

- Using a collision risk model to assess bird collision risks for offshore wind farms (Band, 2012);
- A Stochastic Collision Risk Model for Seabirds in Flight (McGregor et al. 2018);
- Mapping Seabird Sensitivity to offshore wind farms (Bradbury et al. 2014);
- The avoidance rates of collision between birds and offshore turbines (Cook et al. 2014);
- Non-breeding season populations of seabirds in UK waters: Population sizes for Biologically Defined Minimum Population Scales (BDMPS) (Furness 2015);
- Joint SNCB Interim Displacement Advice Note 2017 (JNCC/SNCBs 2017);
- Modelling flight heights of marine birds to more accurately assess collision risk with offshore wind turbines (Johnston et al. 2014a, 2014b);
- A Population Viability Analysis Modelling Tool for Seabird Species (Searle et al. 2019);
- Seabird Populations of Britain and Ireland (Mitchell et al. 2004);
- An atlas of seabird distribution in north-west European waters (Stone et al. 1995); and
- Desk-based revision of seabird foraging ranges used for HRA screening (Woodward et al. 2019).

320. The above list will also be supplemented as appropriate with new information and the results of ongoing research and studies as it becomes available.

2.8.3 Potential Impacts

2.8.3.1 Potential impacts during construction

321. Impacts on ornithological receptors during construction relate to disturbance due to the presence and movement of construction vessels and associated construction activities within the wind farm sites and offshore export cable route(s), which can cause displacement from areas used by the birds (e.g. for foraging). As well as construction vessels themselves, the sources of disturbance may include vessels moving to and from the sites, associated support vessels and helicopters used for crew transfers. Installation of export cables also has the potential to cause disturbance, both directly from vessels involved in the installation and also indirectly through disturbance effects on prey fish caused by activities such as cable burial and potentially accidental pollution events (although this is expected to be mitigated via adoption of an Environmental Management and Monitoring Plan (or similar) for the Projects). While there may be a very small amount of permanent habitat loss (e.g. of seabed around the turbine foundations), most of these potential effects will be expected to be short-lived and are unlikely to lead to long-term impacts.

322. Impacts expected to be scoped in will include disturbance due to the presence and movement of construction vessels in the array areas, the actual construction activities, and around the export cable installation vessels.

2.8.3.2 Potential impacts during operation

323. Impacts on ornithological receptors during operation relate to the presence of the turbines themselves. These include the risk of birds avoiding the turbines and therefore potentially being displaced from foraging areas, which may have knock-on demographic effects (e.g. increased mortality). Such avoidance may also lead to foraging or migration routes being extended as a result of the wind farm acting as a barrier to movement. Birds which do approach the turbines are at risk of collision with the turbines. There may also be indirect effects mediated through impacts on fish prey.

324. Impacts expected to be scoped in will include disturbance and displacement related to the presence of the turbines themselves (which may also manifest as barrier effects) and due to operation and maintenance vessels, mortality resulting from collisions with the rotating blades and indirect effects mediated through impacts on fish prey resources.

2.8.3.3 Potential impacts during decommissioning

325. Impacts during decommissioning are expected to be similar, but of smaller magnitude, to those anticipated during construction.

326. The same potential impacts noted for construction are therefore expected to be scoped in for decommissioning.

2.8.3.4 Potential cumulative impacts

327. Cumulative impacts will focus on the operational phase effects of displacement and collision risk. The list of projects to include in this assessment will follow industry best practice and statutory advice. The risk of cumulative effects during construction and decommissioning are scoped out on the basis that individual project alone impacts during these phases are typically small (and this is anticipated to be the case for the Projects), localised, temporary and unlikely to overlap with construction elsewhere to any appreciable extent.

328. Cumulative impacts expected to be scoped in will therefore include disturbance and displacement due to the presence of the turbines and collision risk.

2.8.3.5 Potential transboundary impacts

329. Given the level of development in the southern North Sea by EU Member States (i.e. Belgium, the Netherlands, Germany and Denmark) and that birds are highly mobile and migratory there is potential for transboundary impacts especially with regard to displacement/barrier effects and collision risk. Transboundary impacts will be assessed as with the other cumulative impacts.

2.8.3.6 Summary of potential impacts

330. **Table 2-20** outlines the offshore ornithological impacts which are proposed to be scoped into the EIA. This may be refined through the EPP as additional information and data become available.

Table 2-20 Summary of Impacts Relating to Offshore Ornithology. Topics to be Scoped In (✓) and Out (x)

Potential Impact	Construction	Operation	Decommissioning
Direct temporary habitat loss/ disturbance due to construction (arrays and export cable(s))	✓	✗	✓
Indirect impacts through effects on prey species and habitats: Accidental pollution (will be mitigated via Environmental Management and Monitoring Plan).	✗	✗	✗
Indirect impacts on important ornithological features (IOFs) due to impacts on prey species and habitats	✓	✓	✓
Operational disturbance and displacement	✗	✓	✗
Collision Risk	✗	✓	✗
Barrier effects	✗	✓	✗
Cumulative impacts	✗	✓	✗
Transboundary impacts	✗	✓	✗

2.8.4 Approach to Impact Assessment

331. The impact assessment methodology will be based on that described in section 1.7, adapted to make it applicable to assessment of important ornithological features (IOFs), and aligned with the key guidance document produced on impact assessment of ecological/ornithological receptors (Chartered Institute of Ecology and Environmental Management's (CIEEM) 2018; updated 2019).

332. The assessment approach will use a 'source-pathway-receptor' model, which identifies likely impacts on ornithological receptors as a result from the proposed construction, operation and decommissioning of the offshore infrastructure. The parameters of this model are defined as follows:

- **Source** – the origin of a potential impact (noting that one source may have several pathways and receptors) e.g. an activity such as cable installation and a resultant effect such as re-suspension of sediments.
- **Pathway** – the means by which the effect of the activity could impact an IOF e.g. for the example above, re-suspended sediment could settle and smother the seabed.
- **Receptor** – the element of the receiving environment that is impacted e.g. for the above example, bird prey species living on or in the seabed are unavailable to foraging birds.

333. The aerial surveys will provide information on species (or species-groups if species identification is not possible), abundance, distribution, behaviour, location, numbers, sex and age (where possible) and flight direction and flight height (although it should be noted that flight height estimation from aerial survey is subject to a large degree of uncertainty and these data are not currently supported for use in assessment of collision risk).

334. The EIA will identify the nature of the use of the site by birds recorded - i.e. seasonal differences and activities (i.e. foraging, overwintering, migrating or other) in order to determine the importance of the site relative to the wider area for seabirds throughout the year.

335. Detailed analysis will include density and abundance estimates (with associated confidence intervals and levels of precision).

336. Flight height data derived from the aerial survey imagery will be reported, however, owing to the technical difficulties in estimating flight height from aerial imagery, it is anticipated that generic flight data (Johnston et al. 2014a, 2014b) will be used in the collision risk model (subject to discussion with stakeholders).

337. Quantitative methods to be used in the assessment will include:

- displacement matrices, combining ranges of displacement and mortality to obtain estimates of displacement mortality;
- collision risk modelling using the deterministic Band model, and/or the stochastic version (McGregor 2018; the use of appropriate models will be discussed with relevant stakeholders though the EPP); and,
- population viability analysis to provide predictions of the population consequences of the impacts for the Projects alone and also cumulatively and in-combination with other wind farms.

338. Reference population sizes for each species will be based on the best available information at the time of undertaking the assessment and will be agreed with key stakeholders. These are likely to be derived from Furness (2015).

339. The sensitivity of each species will be determined based on the size of its population, its conservation status and its known sensitivity to offshore wind farms. Species identified as IOFs will be subject to full impact assessment against the impacts listed above, taking into account relevant ecological features (e.g. auk flight heights are almost exclusively below rotor height and therefore these species have negligible collision risk). The impact assessment will be undertaken in line with guidance by CIEEM (2018; updated 2019) and expert opinion.

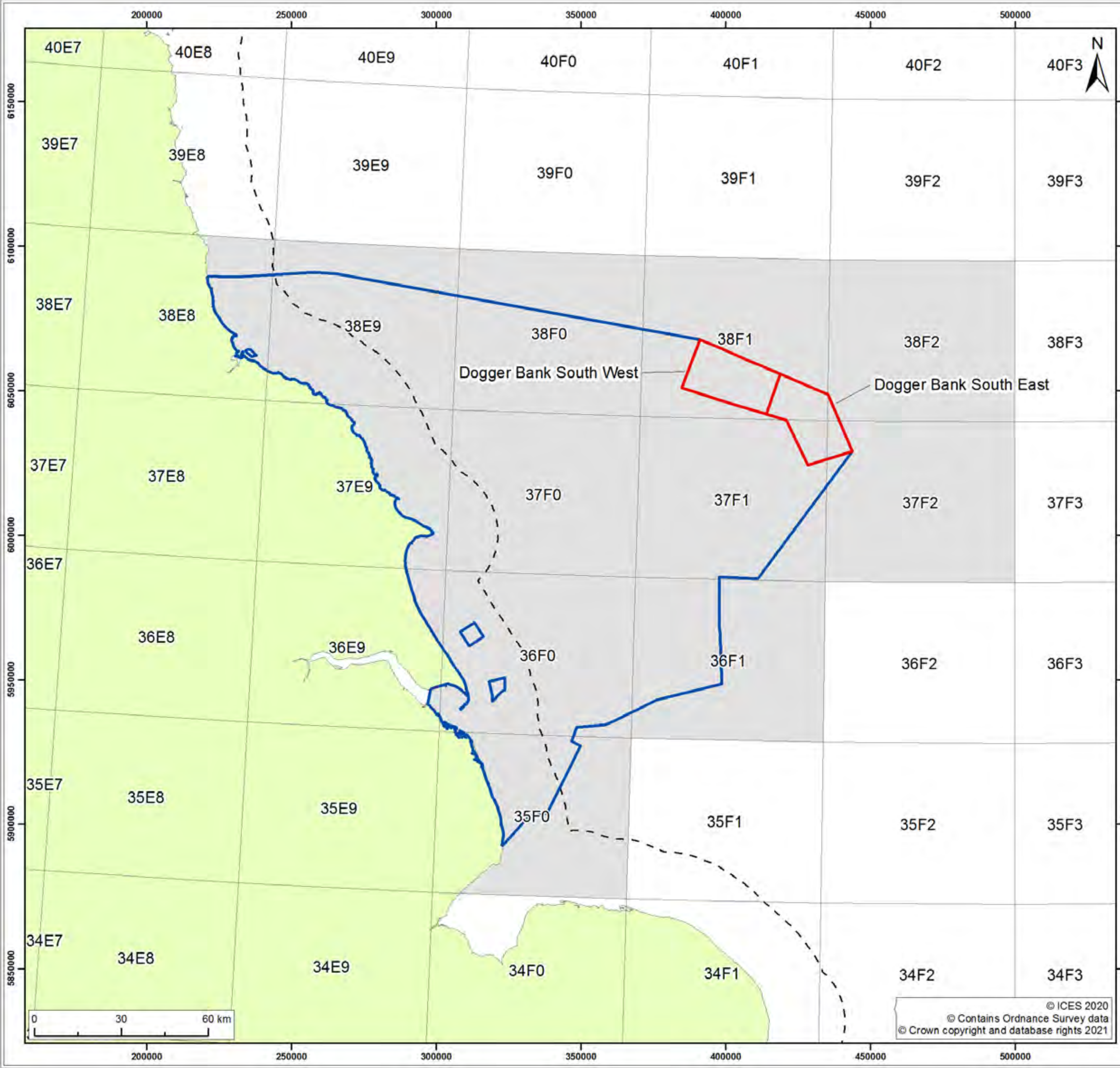
2.9 Commercial Fisheries

340. This section of the Scoping Report identifies the Commercial Fisheries receptors relevant to the Projects. The potential effects of construction, operation and maintenance, and decommissioning of the Projects on commercial fisheries are considered throughout this section.

The following questions are posed to consultees to help them frame and focus their response to the commercial fisheries scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Do you agree with the approach to data collection?
- Have all the potential impacts on commercial fisheries resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

341. The Commercial Fisheries study area for the Projects is defined as ICES rectangles 38E8, 38E9, 38F0, 38F1, 38F2, 37E9, 37F0, 37F1, 37F2, 36E9, 36F0, 36F1, 35F0 (**Figure 2-14**). This Commercial Fisheries study area will provide wider regional context to the various fisheries, whilst also providing coverage for any effects that may occur both within, and outside of, the offshore study area. It is important to note that the array areas and proposed offshore export cable corridor(s) will not occupy the whole of the offshore study area. The offshore export cable corridor(s) will be defined via the site selection process following confirmation of the onshore gird connection location(s) by National Grid ESO.



Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Commercial Fisheries study area
- UK 12nm limit
- ICES rectangles

S2	P02	31/08/21	PB2340-MAR-OF-ZZ-DR-Z-0007	BO	IW	TM
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Commercial Fisheries study area

Figure: 2-14 Drawing No: PB2340-MAR-OF-ZZ-DR-Z-0007

Co-ordinate system: WGS 1984 UTM Zone 31N | Page Size: A3 | Scale: 1:1,300,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

MarineSpace Making Sense of the Marine Environment™ RWE

2.9.1 Existing Environment

342. Dogger Bank supports a wide range of fish and shellfish species. Many of these species have high commercial importance, with the region supporting significant fisheries for over 300 years (Plumeridge and Roberts 2017). For UK vessels, between 2015 to 2019, the average annual value of commercial fisheries, within the offshore study area, was £37.3 million (MMO, 2020). This value does not take into account foreign vessel landings.

343. **Plate 2-1** displays the top 15 species, by weight, landed by all vessels (UK and non-UK fleet, all vessel sizes) from the Commercial Fisheries study area from 2012 to 2016. The key species in terms of weight are sandeel *Ammodytes* spp. and Atlantic herring *Clupea harengus* (STECF, 2017), although there are notable fluctuations in the annual landings. Whilst landings by weight of other species are lower, several have high market values, as presented in **Plate 2-2** and discussed below.

344. Danish seine vessels account for the majority of sandeel caught in the Commercial Fisheries study area (**Plate 2-1**), with the highest landings from ICES rectangle 38F1 (STECF, 2017) which overlaps the array areas. Atlantic herring is predominantly caught by Danish, Dutch, French and German vessels; with the highest landings of Atlantic herring from within ICES rectangle 37F0, which is landward of the array areas. Both Atlantic herring and sandeel have been identified as having spawning grounds within the Commercial Fisheries study area, as discussed further in section 2.6.

345. **Plate 2-1** indicates that European plaice *Pleuronectes platessa*, edible crab *Cancer pagurus* and European sprat *Sprattus sprattus* are also key species in terms of landed weight (STECF, 2017). European plaice is primarily targeted by UK and Dutch vessels from ICES rectangle 37F2 and 38F2, both of which have a small overlap with the most westerly part of the array areas. The majority of edible crab landings from the Commercial Fisheries study area is caught by English vessels within ICES rectangle 36F0. The majority of European sprat landings are by Danish vessels within ICES rectangle 37F2. Other notable species in terms of landed weight are great Atlantic scallop *Pecten maximus*[3], whiting *Merlangius merlangus*, Norway lobster *Nephrops norvegicus*, whelk *Buccinum undatum*, European lobster *Homarus gammarus*, Atlantic mackerel *Scomber scombrus*, common edible cockle *Cerastoderma edule*, Atlantic cod *Gadus morhua*, common shrimp *Crangon crangon* and haddock *Melanogrammus aeglefinus*.

346. **Plate 2-2** indicates that the top species caught by UK vessels in the Commercial Fisheries study area, in terms of both value and weight (as informed by data shown in Plate 2-1), are lobster, crab, scallop, Norway lobster, plaice and whelk (MMO 2020 and STECF 2017). Annual landings of these species appear to fluctuate between 2015 and 2019, apart from landings of crab which show a steady increase. Crab and lobster are caught across the majority of the offshore study area, but predominantly from ICES rectangle 36F0. Within ICES rectangle 38F1, where the largest proportion of the array areas is located, the dominant species caught by UK vessels are plaice, crab and sandeel.

347. Due to the distance offshore, the fishing fleet in the array areas consists entirely of vessels greater than 12m in length (MMO, 2021a). The main gear types used around the Dogger Bank are beam trawls, bottom otter trawls and seine nets. It is noted that there is an increase in UK pot landings from the Dogger Bank SAC in 2019, which had previously seen low potting activity. Within the Dogger Bank SAC, scallop dredging occurred at very low levels, until early 2020 when there was a large increase in scallop dredging after a lucrative scallop stock was found; there is currently a temporary closure for scallop fishing within the SAC[2] (MMO, 2021a).

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[3] A large proportion of the array areas overlaps with the Dogger Bank SAC. At the time of writing, Dogger Bank SAC is subject to a temporary closure for scallop dredges, to enable improved scientific understanding of the scallop stock to be developed. The scallop fishing closure in the Dogger Bank SAC will remain in place until the outcome of the MMO consultation on a proposed byelaw to prohibit all bottom towed gear in the area is decided, anticipated in late summer 2021. https://www.gov.uk/government/news/dogger-bank-scallops.

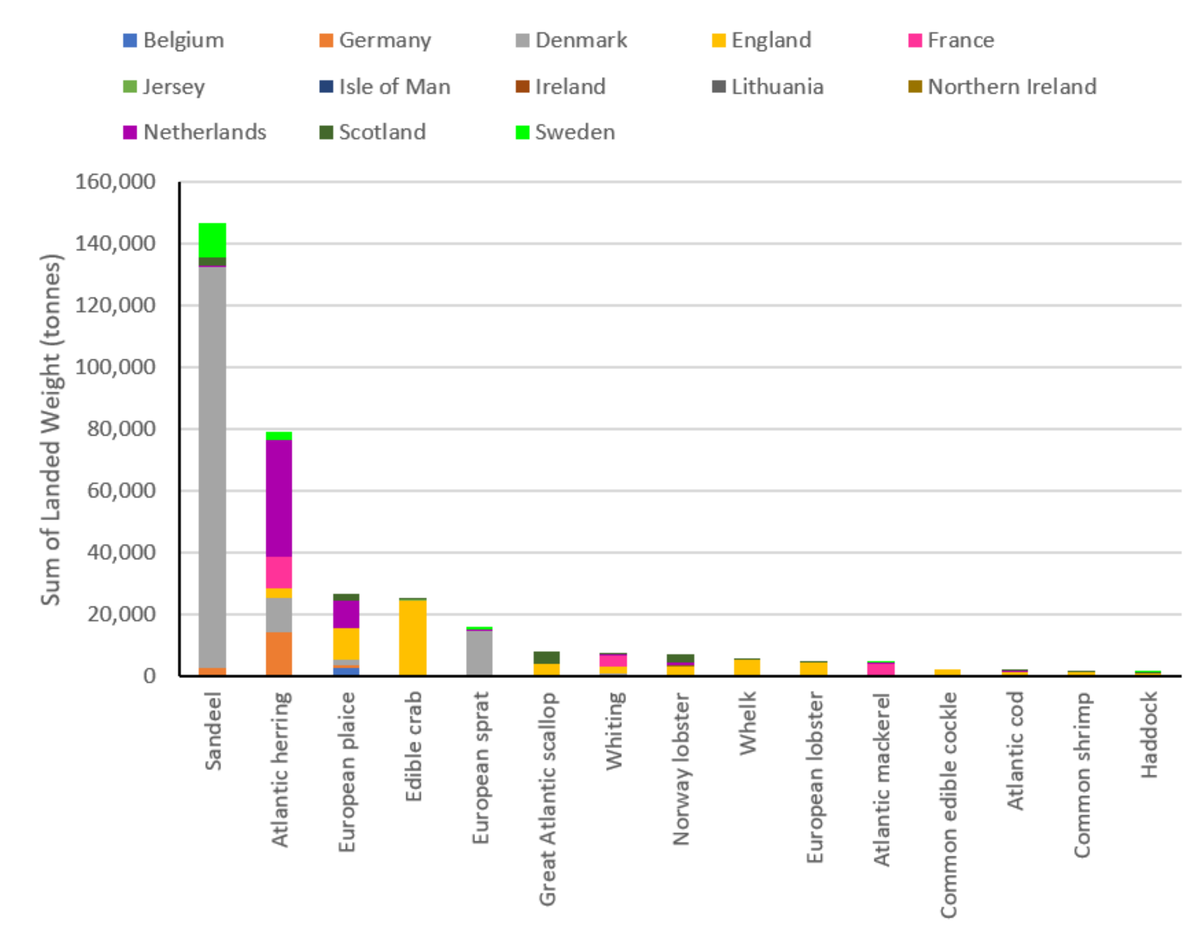


Plate 2-1 Top 15 species by weight (tonnes) from 2012 to 2016 landed from the Commercial Fisheries study area (STECF 2017)

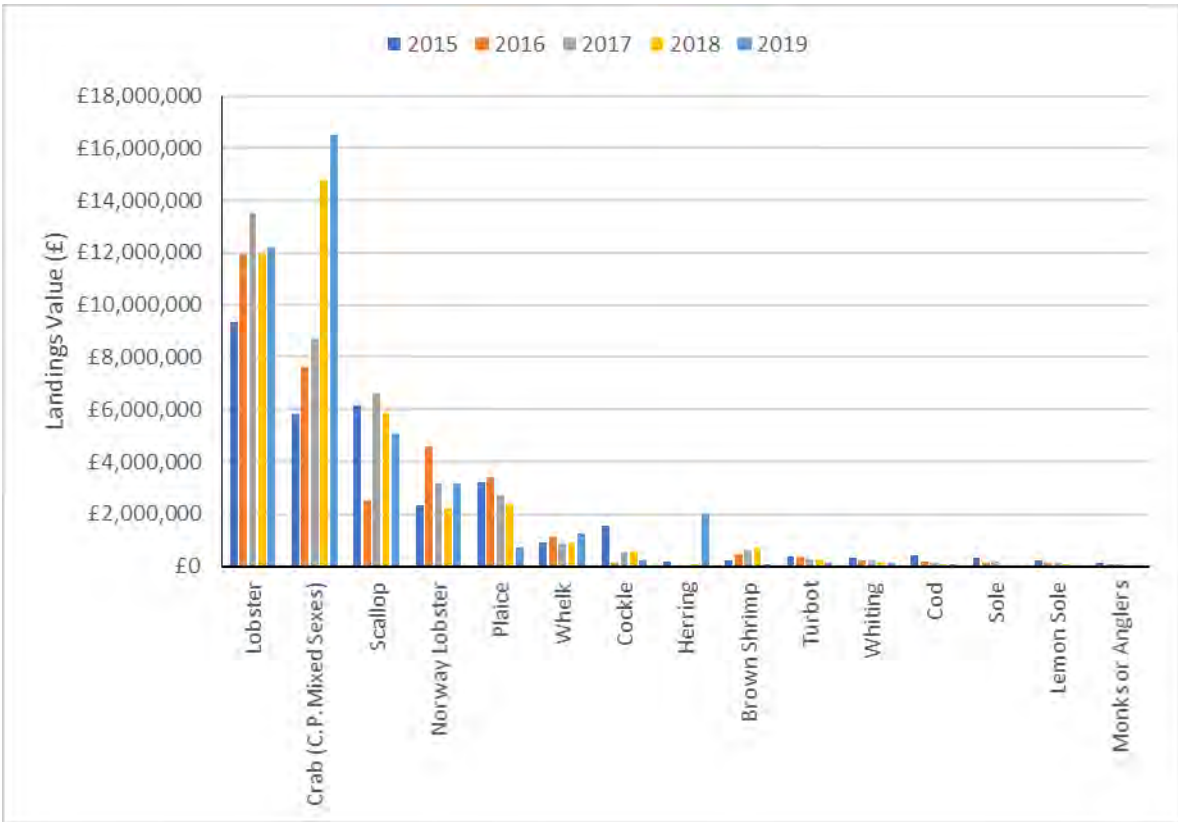
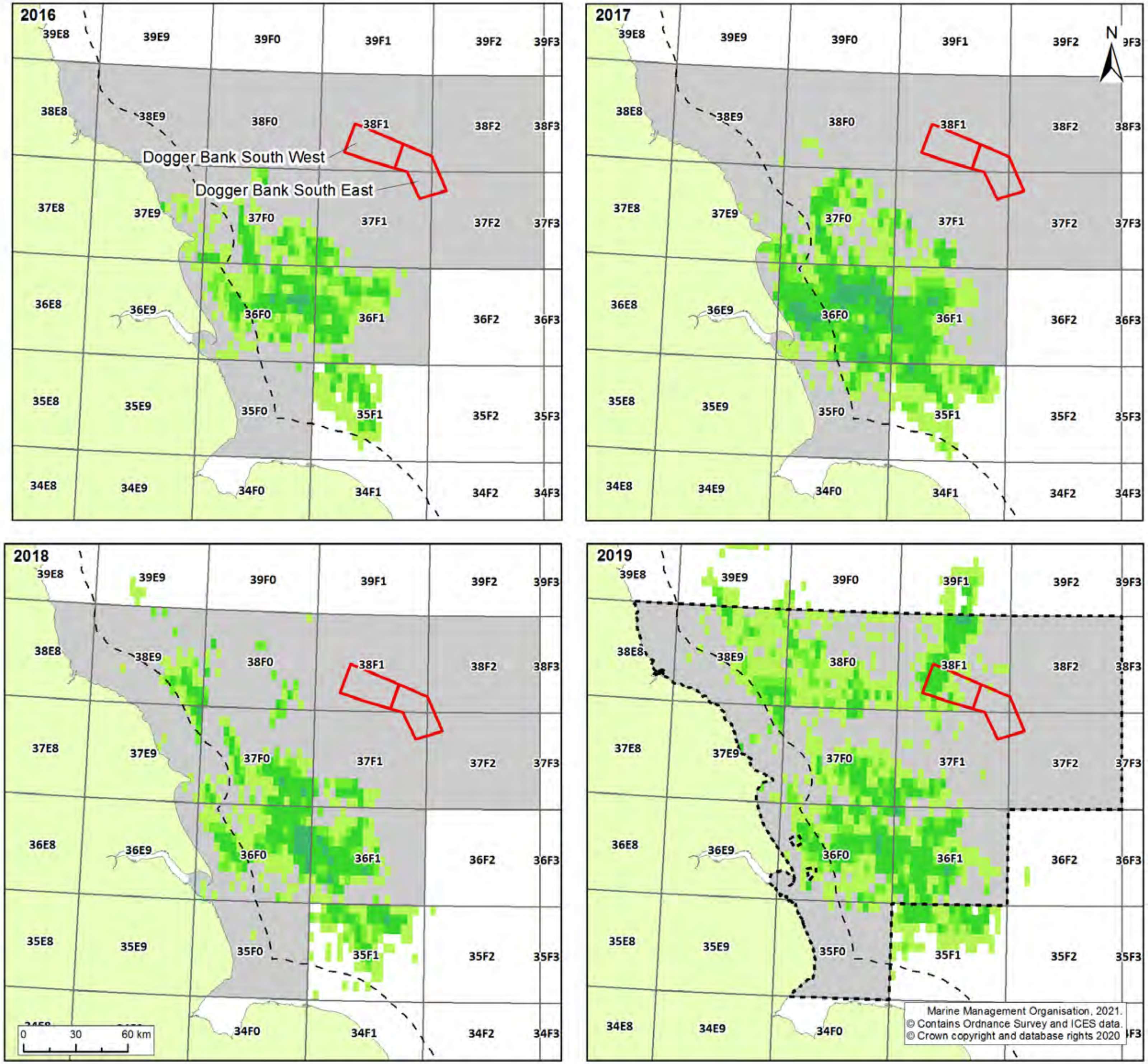
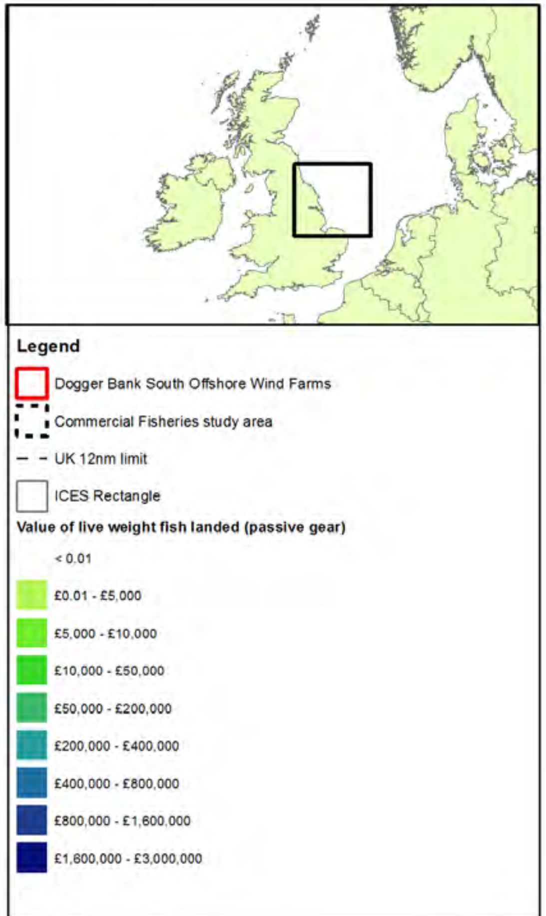


Plate 2-2 Top 15 species by value (£) from 2015 to 2019 landed from the Commercial Fisheries study area (UK vessels only) (MMO 2020)

348. In addition to analysis of landings data, Vessel Monitoring Systems (VMS) data have also been obtained for the Commercial Fisheries study area. VMS data from the MMO captures UK vessels ≥15m (MMO, 2021b), and has been categorised by both mobile and passive gear type to show the value of live weight of fish landed. ICES VMS data captures vessels from all nationalities >12m for mobile bottom contacting gears (ICES 2017), and has been categorised by gear type to show the annual fishing effort.

349. The data indicate that ≥15m UK static gear vessel activity covered a progressively greater geographical area from 2016 to 2019. During 2016 and 2017, static activity was focused within the southern and inshore area of the Commercial Fisheries study area (**Figure 2-15**), and did not overlap with the Projects array areas. In 2018, static gear vessels were active within the southern area as well as discrete areas across the north-western part of the Commercial Fisheries study area; in 2019 activity was observed across the southern area and northern area, including within the western part of DBS West. It is likely there is an under-representation of static gear activity, particularly in the inshore areas where many vessels <15m in length tend to fish.





SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
S2	P02	31/08/21	PB2340-MAR-OF-ZZ-DR-Z-0008	BO	IW	TM

Title:

Value of fish landings (UK vessels) by passive gears 2016 - 2019

Figure: 2-15 | Drawing No: PB2340-MAR-OF-ZZ-DR-Z-0008

Co-ordinate system: WGS 1984 UTM Zone 31N | Page Size: A3 | Scale: 1:2,200,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

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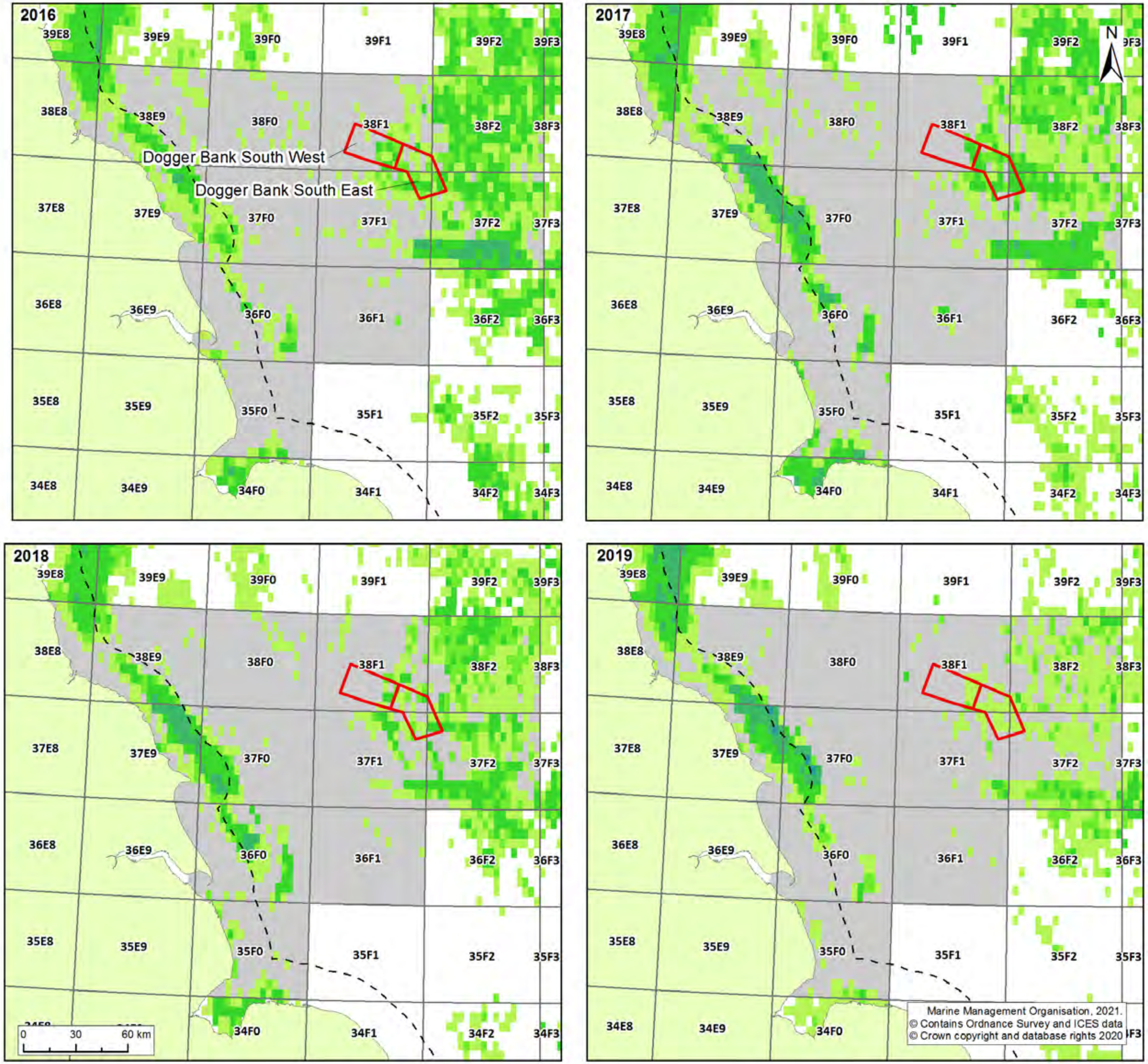
350. The VMS data indicate that ≥15m UK mobile gear vessels are active across the Commercial Fisheries study area, with more focused activity in the east and in the inshore (**Figure 2-16**). Mobile vessels were active across the offshore search area during the whole time period studied, with lower values of live weight of fish landed during 2019.

351. The ICES VMS data indicate that vessels utilising bottom otter trawls are active across the entirety of the array areas, whereas beam trawl activity is focused to the south-east of the Commercial Fisheries study area (**Figure 2-17**). Vessels using demersal seine nets are active in localised areas, predominantly to the east of the array areas. Dredges are active within the inshore area of the Commercial Fisheries study area.



Legend

- Dogger Bank South Offshore Wind Farms
- Commercial Fisheries study area
- UK 12nm limit
- ICES Rectangle

Value of live weight fish landed (mobile gear)

- < 0.01
- £0.01 - £5,000
- £5,000 - £10,000
- £10,000 - £50,000
- £50,000 - £200,000
- £200,000 - £400,000
- £400,000 - £800,000
- £800,000 - £1,600,000
- £1,600,000 - £3,000,000

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
S2	P02	31/08/21	PB2340-MAR-OF-ZZ-DR-Z-0009	BO	IW	TM

Title:

Value of fish landings (UK vessels) by mobile gears 2016 - 2019

Figure: 2-16 | Drawing No: PB2340-MAR-OF-ZZ-DR-Z-0009

Co-ordinate system: WGS 1984 UTM Zone 31N | Page Size: A3 | Scale: 1:2,200,000

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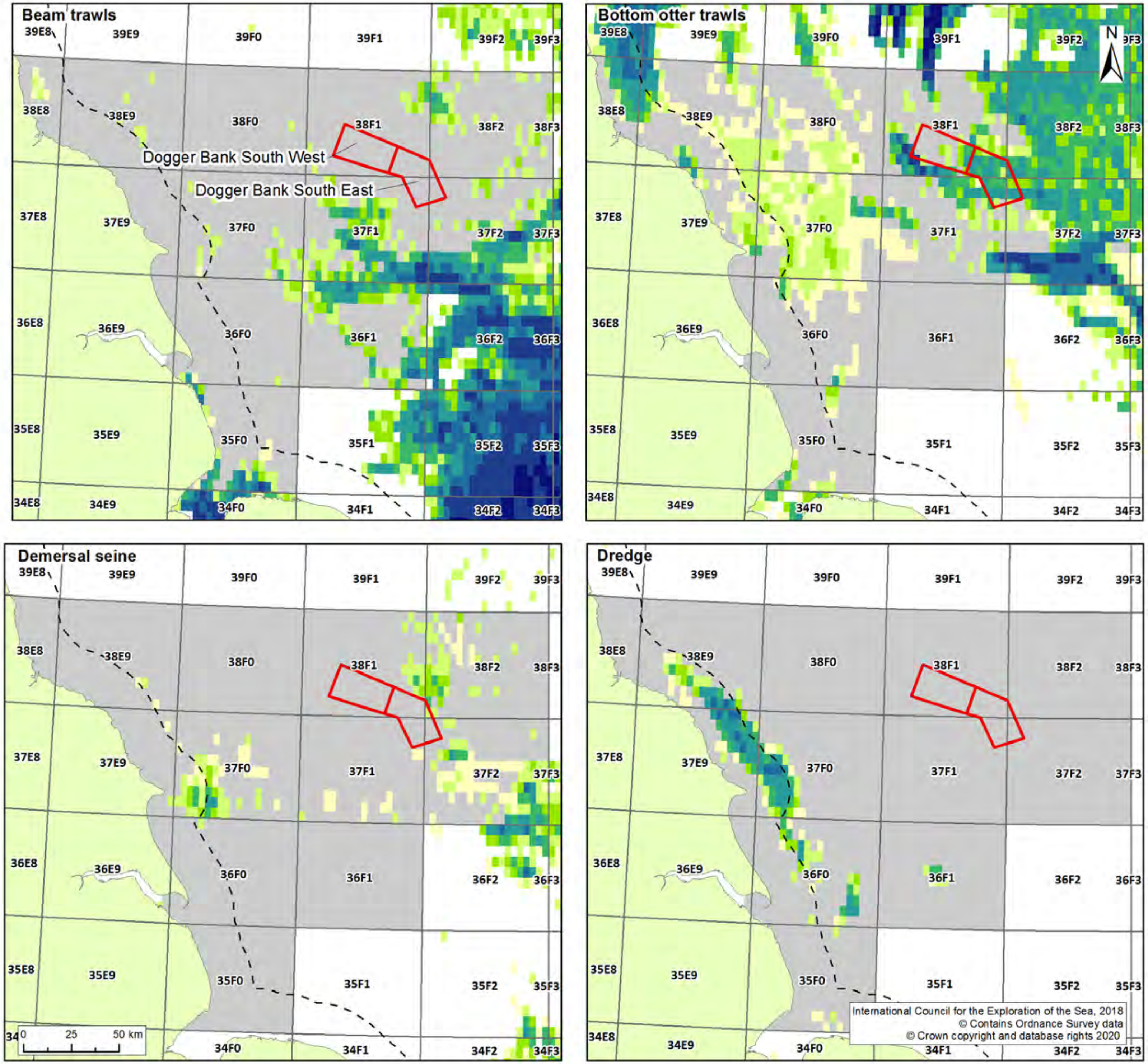

Legend

- Dogger Bank South Offshore Wind Farms
- Commercial Fisheries study area
- ICES Rectangle
- UK 12 nm limit

Annual fishing effort (kilowatt/hours)

- < 1,000
- 1,000 - 5,000
- 5,000 - 10,000
- 10,000 - 20,000
- 20,000 - 50,000
- 50,000 - 100,000
- 100,000 - 250,000
- > 250,000

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
S2	P02	31/08/21	PB2340-MAR-OF-ZZ-DR-Z-0010	BO	IW	TM

Title:

Fishing effort by gear type - 2017

Figure: 2-17 Drawing No: PB2340-MAR-OF-ZZ-DR-Z-0010

Co-ordinate system: WGS 1984 UTM Zone 31N | Page Size: A3 | Scale: 1:2,000,000

Project: Dogger Bank South Offshore Wind Farms

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2.9.2 Approach to Data Collection

352. The following information has been considered during the production of this Scoping Report and will be considered further within the PEIR/ES where relevant matters are scoped in to the EIA process.

353. An initial desk-based review of literature and data sources was undertaken to support this scoping exercise, as presented below. Additional sources of information are also listed which would be expected to inform the EIA:

- the MMO UK fleet landings by selected ICES Rectangles (latest available data);
- MMO UK and foreign fleet landings into the UK by Port (latest available data);
- European Commission – Scientific, Technical and Economic Committee for Fisheries (STECF) non-UK landings by ICES Rectangle (latest available data);
- MMO fishing activity data for UK vessels (≥15 m), using (VMS) data (latest available data);
- MMO fish landings to UK ports (GIS dataset) (latest available data);
- ICES fishing activity data for mobile bottom contacting gear vessels (>12 m) using VMS data (latest available data);
- landings data and VMS data from non-UK organisations; and
- project specific marine traffic survey.

354. It is acknowledged that there are various limitations and assumptions within the quantitative datasets listed above. For example, smaller vessels are excluded from the analysis of VMS data, as only vessels with a beam ≥12m (ICES) or ≥15m (MMO) are captured. In order to support these existing datasets, consultation would be held with fisheries stakeholders to provide further insight into specific fishing grounds and activity of any vessels in the area. Consultation will be important to fully understand how commercial fisheries will be affected in the area.

355. Datasets showing fishing activity and fish landings from 2020 and 2021 will be affected by the impacts of COVID-19, therefore data will be obtained for the years prior to 2020 to avoid potential influences within the data. Data across a time period of at least 4 years will collated if possible.

2.9.3 Potential Impacts

356. An assessment of potential effects to Commercial Fisheries as a result of the proposed Projects is detailed below**.** The presented assessment is based on the current definition of the Projects and current baseline conditions as informed by available data and expert opinion.

2.9.3.1 Potential impacts during construction

357. Potential impacts scoped in for the construction phase will be related to restricted access to fishing grounds due to construction activities, displacement of fishing activity due to presence of construction vessels, loss or damage to gear due to snagging, supply chain opportunities for local fishing vessels and disturbance to fish and shellfish species. This last point will be considered as part of the fish ecology assessment, with implications for Commercial Fisheries, covered in section 2.9. Navigational safety with regard to commercial fisheries will be considered in section 2.10.

358. Potential impacts caused by increased steaming times due to the presence of installation vessels is proposed to be scoped out of the assessment. The magnitude of this impact is deemed negligible as the effect will be localised. The sensitivity is considered low to medium for vessels working offshore due to the large operational ranges of the vessels working offshore, and therefore any increase in steaming times would be minimal. The main element that would affect inshore vessels would be the construction of the export cable which would be temporary and localised.

359. For all fleets, due to the limited area likely to be affected, it is considered that there is no risk of likely significant effect due to increased steaming times. It is proposed that the potential impact from increased steaming times to Commercial Fisheries is scoped out of the EIA.

2.9.3.2 Potential impacts during operation and maintenance

360. Potential impacts during operation will focus on impacts similar to those arising during construction. The following impacts have been scoped in: loss of access to fishing grounds due to infrastructure associated with the Projects and displacement of fishing activity, loss or damage to gear due to snagging, and supply chain opportunities for local fishing vessels.

361. Potential impacts from increased steaming times due to the presence of infrastructure associated with the Projects is proposed to be scoped out for the same reasons as it is for construction impacts.

2.9.3.3 Potential impacts during decommissioning

362. During decommissioning the potential impacts are anticipated to be similar to those described above for the construction phase although on a smaller scale, therefore the following impacts behave been scoped in: restricted access to fishing grounds due to construction activities, displacement of fishing activity due to presence of construction vessels, loss or damage to gear due to snagging, supply chain opportunities for local fishing vessels and disturbance to fish and shellfish species (considered as part of the fish ecology assessment).

363. Potential impacts from increased steaming times due to the presence of infrastructure associated with the Projects is proposed to be scoped out for the same reasons as it is for construction impacts.

2.9.3.4 Potential cumulative impacts

364. The cumulative assessment for commercial fishing will consider impacts to commercial fishing activity, stocks and loss of access to fishing grounds and displacement of fishing activity. Cumulative impacts from the development of the offshore wind farm, other wind farms and activities (including the proposed closure of the Dogger Bank SAC to bottom towed gear) will be considered as part of the EIA where consultation with the fishing industry confirms that such interactions are a concern.

2.9.3.5 Potential transboundary impacts

365. Given the prevalence of vessels from other countries, transboundary impacts will be assessed for each impact as part of the construction, operation, decommissioning and CIA. Transboundary consultation with stakeholders in EU Member States will be undertaken and the most up to date information on European projects and fisheries data will be used to inform the assessment.

2.9.3.6 Summary of potential impacts

366. **Table 2-21** outlines the Commercial Fisheries impacts which are proposed to be scoped into the EIA. This may be refined through consultation with stakeholders as additional information and data become available.

Table 2-21 Summary of Impacts Relating to Commercial Fisheries. Topics to be Scoped In (✓) and Out (x)

Potential Impact	Construction	Operation	Decommissioning
Loss of access to fishing grounds due to presence of installation vessels / the Projects' infrastructure / cable protection	✓	✓	✓
Displacement of fishing activity into other areas due to presence of installation vessels / the Projects' infrastructure / cable protection	✓	✓	✓
Impacts on fish and shellfish species as a result of construction, repair, operation and decommissioning	Considered in section 2.6 Fish and Shellfish Ecology, but implications from this on Commercial Fisheries will be considered.		
Increased steaming times due to the presence of installation vessels / the Projects' infrastructure	x	x	x
Loss or damage to gear due to snagging	✓	✓	✓
Supply chain opportunities for local fishing vessels	✓	✓	✓
Navigational safety	Considered in section 2.10 Shipping and Navigation.		
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓

2.9.4 Approach to Impact Assessment

367. The commercial fisheries impact assessment will follow the EIA methodology as described in section 1.7. The following guidance documents, specific to commercial fisheries, will also be considered:

- Changes to Fishing Practices around the UK as a Result of the Development of Offshore Windfarms – Phase One (Revised) (Gray et al. 2016);
- Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Disruption Settlements and Community Funds (FLOWW 2015);
- Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Liaison (FLOWW 2014);
- Best Practice Guidance for Fishing Industry Financial and Economic Impact Assessments – Guidelines Based on Outputs from a Technical Workshop organised by the UK Fisheries Economic Network (Poseidon 2012); and
- Options and Opportunities for Marine Fisheries Mitigation associated with Windfarms commissioned by Collaborative Offshore Wind Research into the Environment (COWRIE) (Blyth-Skyrme 2010).

368. In order to inform an extended baseline characterisation of the commercial fisheries within the Commercial Fisheries study area, further data collection and engagement will be required as follows:

- Detailed desk-based fisheries assessment to identify key fishing grounds, seasons, techniques and long-term patterns – using MMO and ICES data supplemented with other studies, data and reports from the region, including information associated with other offshore wind farm sites.
- Engagement with fisheries organisations and representatives, from an early stage in the EIA process, in order to ground truth available baseline data and provide further understanding of fishing activity in the area.

369. Receptor groups will be identified through a review of data and feedback from consultation. Impacts will be assessed separately for each receptor group. This approach will ensure all key potential impacts are assessed properly.

370. The impact of the construction, operation and maintenance, and decommissioning of the Projects on the fishing industry will be assessed.

371. Cumulative impacts on commercial fisheries receptors have the potential to arise from interaction of the development of the Projects and other activities in the region. Consideration of the cumulative impacts is a key part of the assessment process and will be assessed as part of the EIA.

372. Where appropriate, mitigation measures will be proposed and residual impacts presented.

2.10 Shipping and Navigation

373. This section describes the methodology to be used for assessing the impact on shipping and navigation arising from the presence of the Projects including with regard to the Navigation Risk Assessment (NRA), the technical document which will inform the EIA. This section includes the main study area to be used for characterising the existing environment, an overview of the baseline conditions, the datasets that will be used to inform the EIA (and NRA), the likely significant effects to be considered within the EIA and how these effects will be assessed including the application of embedded mitigation measures.

374. The shipping and navigation assessment focuses on vessels in transit with other marine activities (including commercial fishing) assessed in the Commercial Fisheries and Infrastructure and Other Users sections. Likewise, with respect to aviation, the shipping and navigation assessment focuses on emergency response and in particular the effect on emergency response resources and search and rescue capability. Other aviation activities are assessed as part of Aviation and Radar.

The following questions are posed to consultees to help them frame and focus their response to the shipping and navigation scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Do you agree with the approach to data collection?
- Have all the potential impacts on shipping and navigation resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

2.10.1 Existing Environment

2.10.1.1 Shipping and Navigation Study Area

375. The main study area for the shipping and navigation assessment of the Projects is defined as the array areas (DBS East and DBS West), plus a 10NM buffer. The 10NM buffer is standard for shipping and navigation assessments as it is large enough to encompass vessel routeing which may be impacted, while remaining site specific to the area being studied. **Figure 2-18** presents an overview of the shipping and navigation study area.

2.10.1.2 Navigational Features

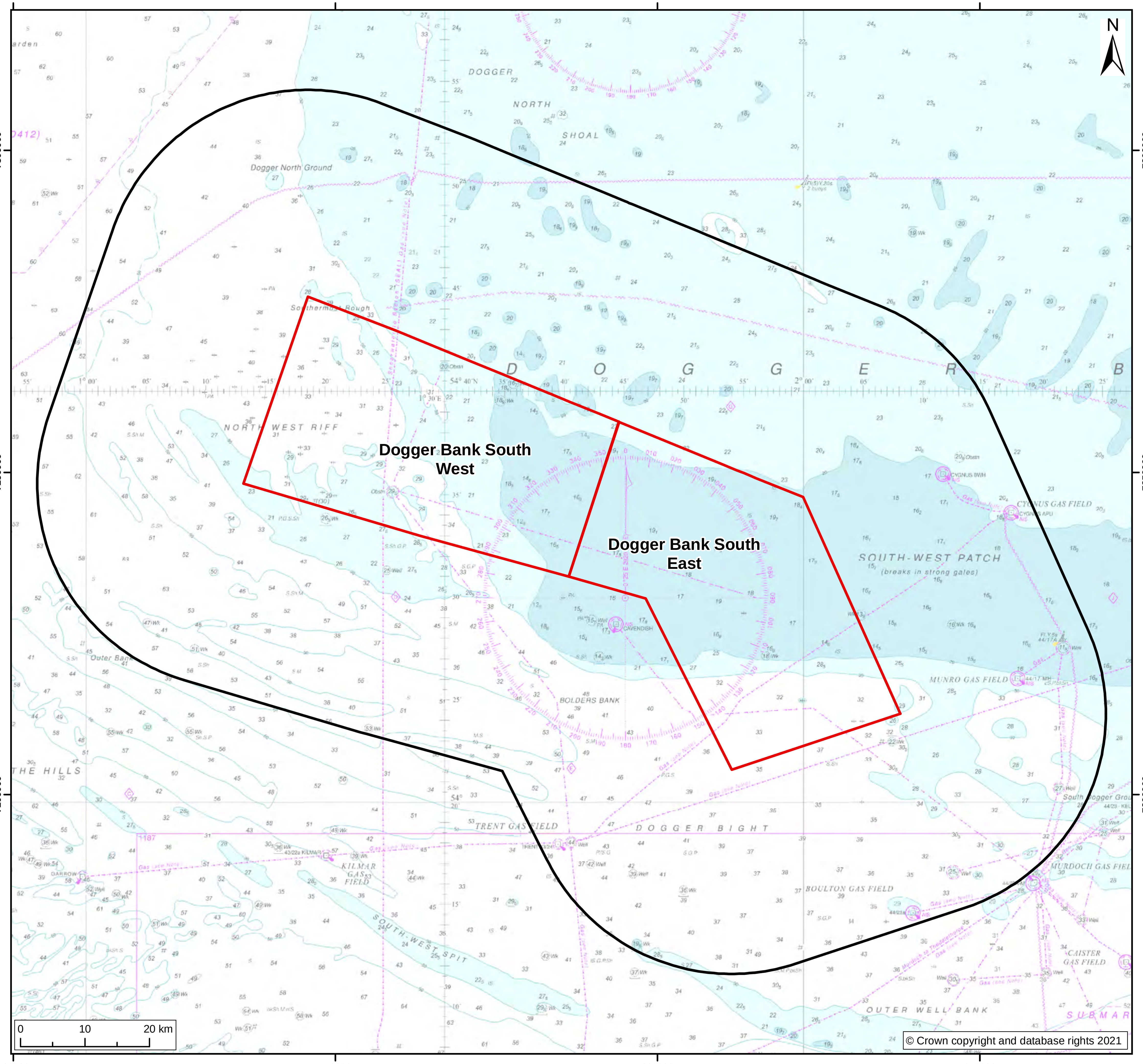
376. An overview of navigational features is presented in **Figure 2-19**, with key features listed below.

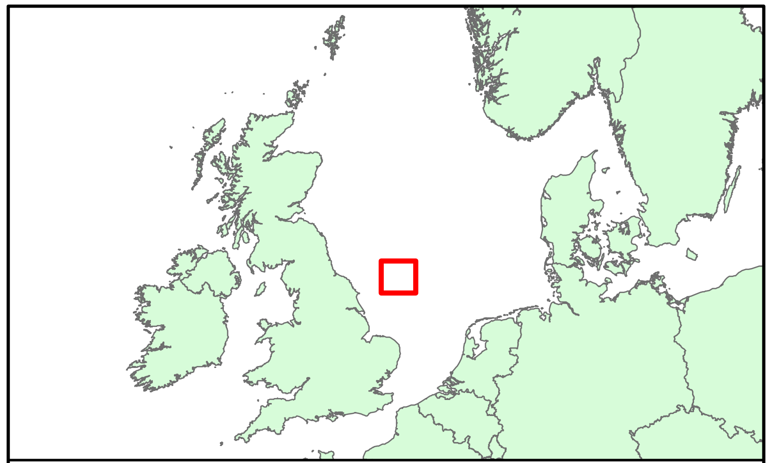
377. Several gas fields are noted in proximity to the array areas Surface installations within the shipping and navigation study area include Cavendish (the nearest at approximately 1.6NM), Munro MH, Cygnus Alpha, Cygnus Bravo, Boulton and Trent. There are no installations within the array areas. Additionally, numerous subsea pipelines are situated running between these various gas fields. Six pipelines are noted intersecting at least one of the array areas.

378. A total of 13 charted wrecks were recorded within the shipping and navigation study area. Two of these were recorded within DBS West while one was recorded within DBS East.

379. A firing practice area is located to the north-west of the shipping and navigation study area, but is only used when the area is clear of vessels.

380. Charted water depths are highly variable in the area, ranging between 14m on the South West patch of the Dogger Bank and more than 60m to the west.





Legend:

- Dogger Bank South Offshore Wind Farms
- Shipping and Navigation Study Area

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
AN	03	05/10/2021	Revised Text	DS	SW	SW
AN	02	06/09/2021	Revised	DS	JM	SW
AN	01	19/07/2021	Initial Draft	DS	JM	SW

Title: Overview of Study Area

Figure: 2-18 Drawing No: PB2340-ANA-OF-DB-DR-Z-0001

Co-ordinate system: WGS 1984 World Mercator | Page Size: A3 | Scale: 1:600,000

Project: Dogger Bank South Offshore Wind Farms

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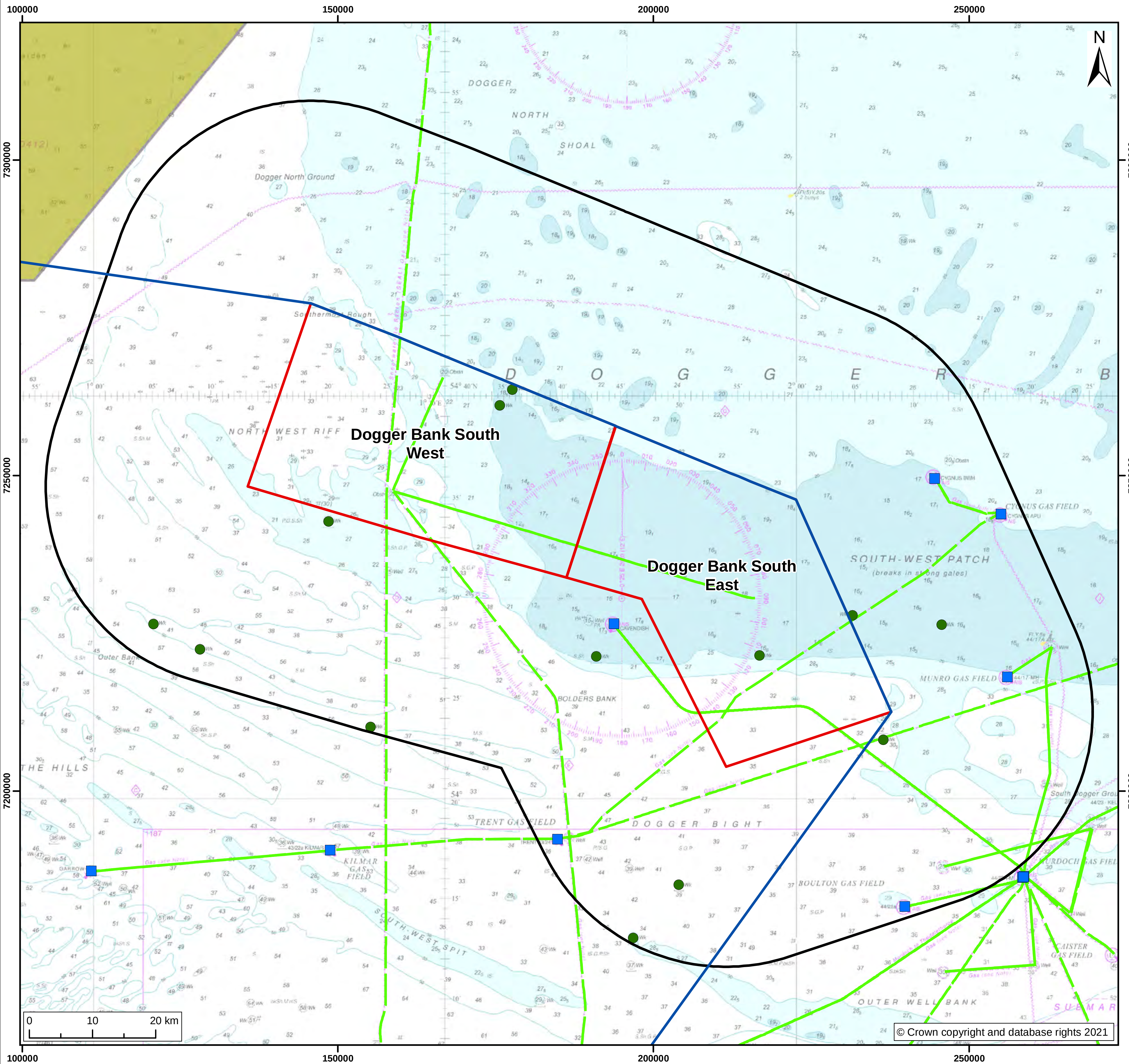

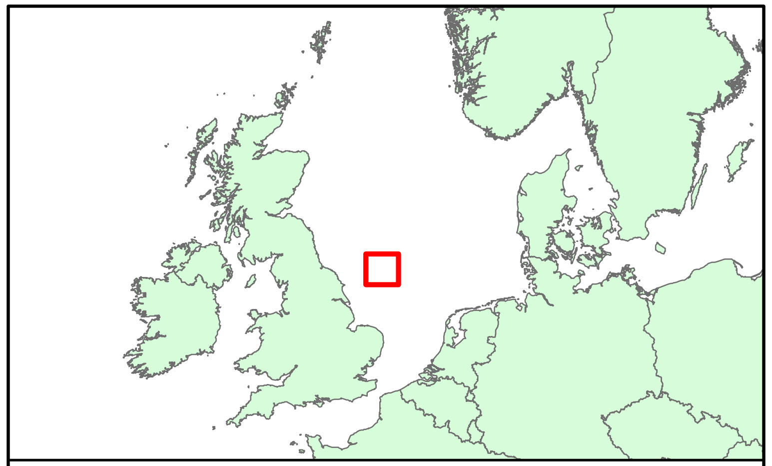

Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Shipping and Navigation Study Area

Navigational Features

- Oil and Gas Installation
- Wreck
- Pipeline
- Firing Practice Area

AN	03	05/10/2021	Revised Text	DS	SW	SW
AN	02	06/09/2021	Revised	DS	JM	SW
AN	01	19/07/2021	Initial Draft	DS	JM	SW
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Navigational features in proximity to Dogger Bank South Offshore Wind Farms

Figure: 2-19 Drawing No: PB2340-ANA-OF-DB-DR-Z-0002

Co-ordinate system: WGS 1984 World Mercator | Page Size: A3 | Scale: 1:600,000

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2.10.1.3 Vessel Traffic

381. The vessel traffic data collected during the summer and winter 2019 Automatic Identification System (AIS) survey periods (**Table 2-22**) are shown in **Figure 2-20** and **Figure 2-21**, respectively. It is noted that vessels deemed as representing temporary traffic (for example vessels engaged in surveys) have been removed. It has been assumed that vessels visiting operational offshore wind farms represent operational traffic and thus have been retained.

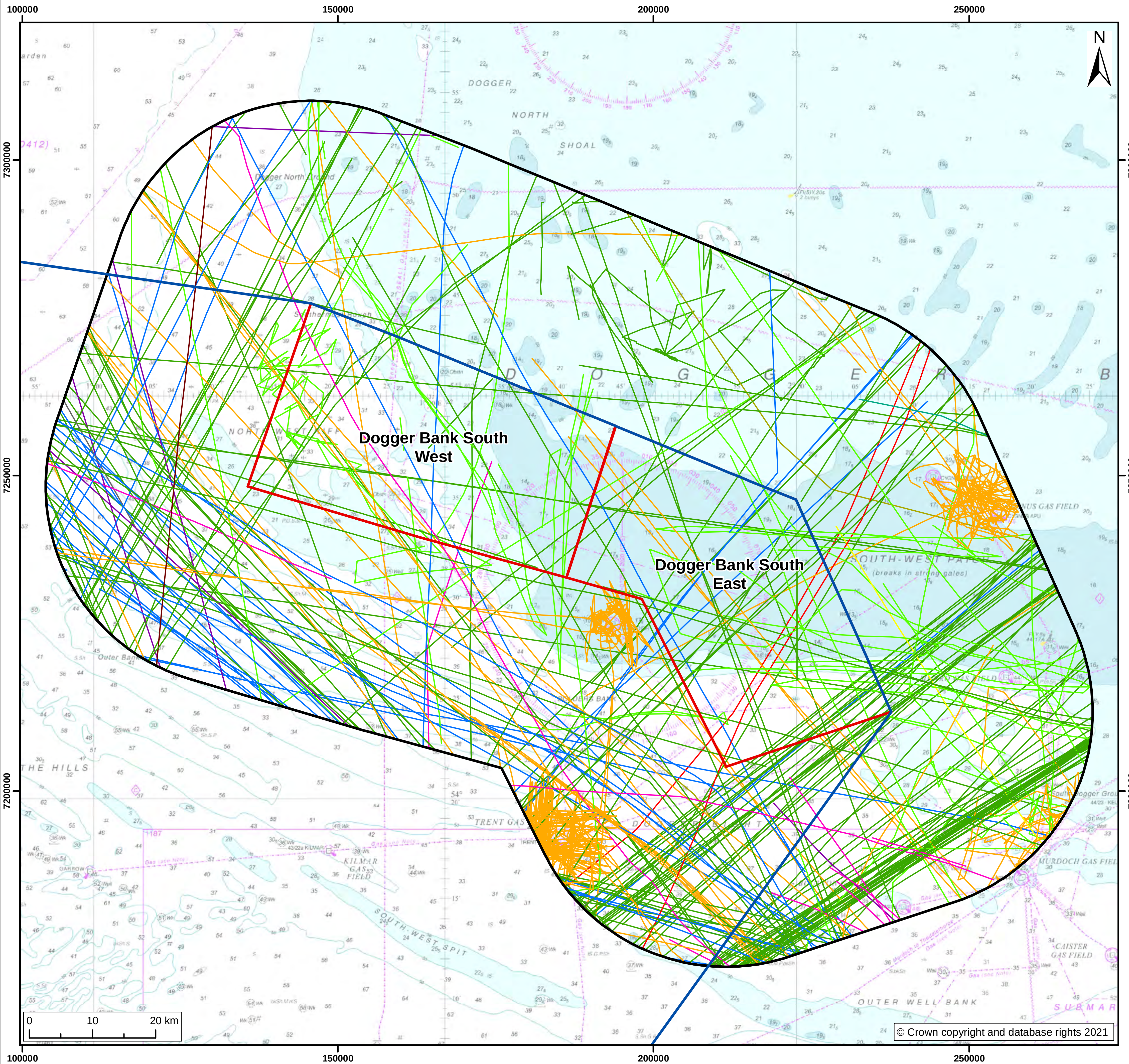
382. An average of 25 vessels were recorded per day within the shipping and navigation study area during summer, with five unique vessels per day intersecting DBS East and three unique vessels per day intersecting DBS West. This represents an increase over the winter period, when an average of 14 vessels per day were recorded within the shipping and navigation study area, with two unique vessels per day intersecting DBS East and less than one unique vessel per day intersecting DBS West. Traffic in the area consisted of cargo vessels (41%), oil and gas vessels (34%), tankers (12%) and fishing vessels (8%) throughout the survey periods.

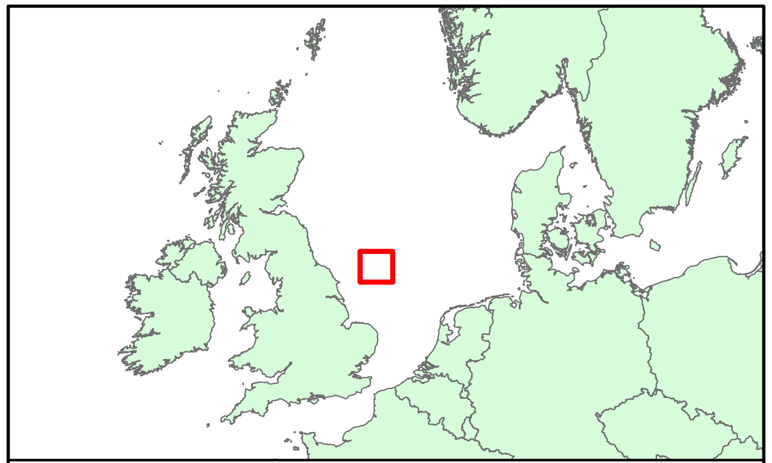
383. A large proportion of the commercial cargo traffic within the shipping and navigation study area was observed transiting in a north-east to south-west direction between Immingham (UK) and Gothenburg (Sweden). A portion of this traffic was noted intersecting the south-eastern extent of DBS East.

384. Tankers were predominantly transiting within the southern section of the shipping and navigation study area, and overall, to the south of Dogger Bank to avoid shallower water depths.

385. Fishing vessels were recorded in transit, as well as actively engaged in fishing activities within the shipping and navigation study area. Fishing vessels less than 15m in length are not obliged to broadcast via AIS and as such the vessel traffic data presented likely do not represent the total fishing vessel activity.

386. A small amount of recreational vessel activity was recorded over the summer survey period. Additionally, no recreational vessels were recorded over the winter survey period. It should be considered that recreational vessel activity may be underrepresented; as noted in section 2.10.2 not all recreational vessels are required to broadcast via AIS.





Legend:
- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Shipping and Navigation Study Area

Vessel Type
- Unspecified
- Fishing
- Military
- Dredger
- Tug
- Passenger
- Cargo
- Tanker
- Other
- Recreational
- Oil and Gas
- Wind Farm

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
AN	03	05/10/2021	Revised Text	DS	SW	SW
AN	02	06/09/2021	Revised	DS	JM	SW
AN	01	19/07/2021	Initial Draft	DS	JM	SW

Title:

14 days AIS (summer 2019) by vessel type

Figure: 2-20 | Drawing No: PB2340-ANA-OFDB-DR-Z-0003

Co-ordinate system: WGS 1984 World Mercator | Page Size: A3 | Scale: 1:600,000

Project: Dogger Bank South Offshore WInd Farms

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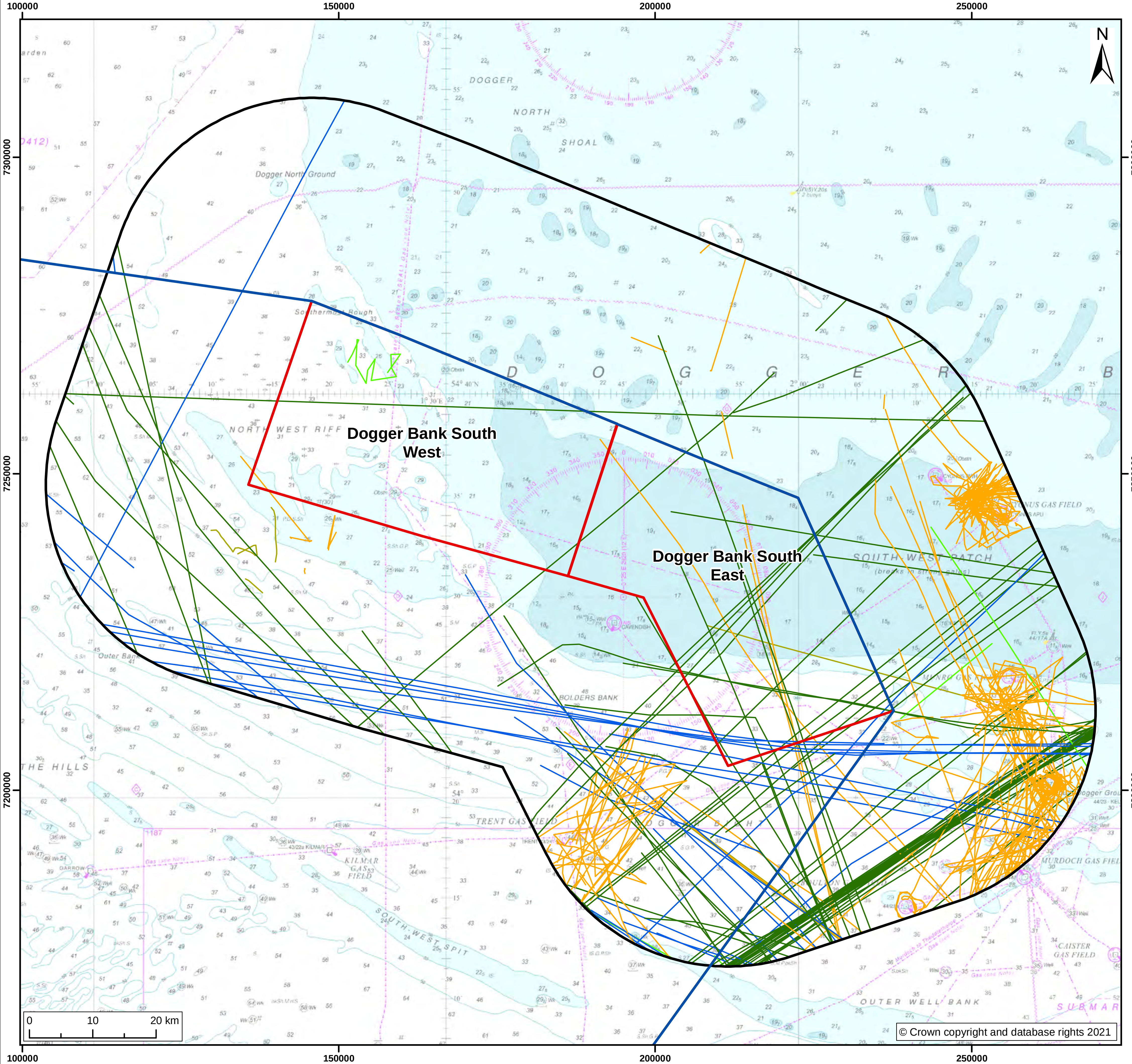

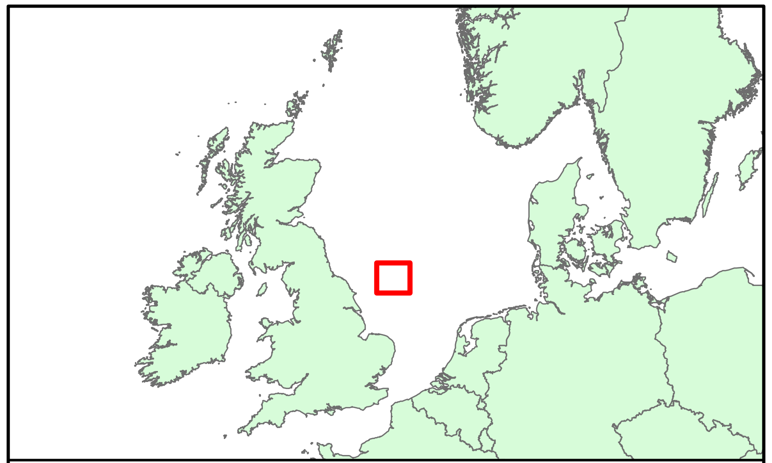

Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Shipping and Navigation Study Area

Vessel Type

- Unspecified
- Fishing
- Tug
- Cargo
- Tanker
- Oil and Gas

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
AN	03	05/10/2021	Revised Text	DS	SW	SW
AN	02	06/09/2021	Revised	DS	JM	SW
AN	01	19/07/2021	Initial Draft	DS	JM	SW

Title:

14 days AIS (winter 2019) by vessel type

Figure: 2-21

Drawing No: PB2340-ANA-OF-DB-DR-Z-0004

Co-ordinate system: WGS 1984 World Mercator

Page Size: A3

Scale: 1:600,000

Project: Dogger Bank South Offshore Wind Farms

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2.10.1.4 Marine Incidents

387. An analysis of Marine Accident Investigation Branch (MAIB) incident data from 2010 to 2019 indicated that two incidents were recorded within the shipping and navigation study area. One of these was a contact involving an offshore supply vessel with a jack-up rig at the Cygnus gas field with the other an accident to person on board an offshore standby vessel at the Trent gas field.

388. Additional MAIB incident data for the previous 10 years (2000 to 2009) will be considered qualitatively in the NRA noting that maritime safety has improved through the years due to changes in legislation and improved maritime safety.

389. An analysis of Royal National Lifeboat Institution (RNLI) incident data from 2010 to 2019 indicated that one incident was recorded within the shipping and navigation study area, relating to a machinery failure.

390. It is noted these incident levels reflect the distance offshore of the array areas.

2.10.2 Approach to Data Collection

391. The following information has been considered during the production of this Scoping Report and will be considered further within the PEIR/ES where relevant matters are scoped in to the EIA process.

392. **Table 2-22** summarises the key data sources used to establish the shipping and navigation baseline in this Scoping Report.

Table 2-22 Key Sources of Shipping and Navigation Data

Source	Date	Summary	Coverage
AIS data	17 to 30 June 2019 / 3 to 16 November 2019	Vessel traffic data covering a 28-day period, collected from satellite receivers covering summer and winter periods.	Shipping and navigation study area
Incident data provided by the MAIB	2010 to 2019	Maritime incident data reported to the MAIB including locations, types of incident and types of vessel involved.	Shipping and navigation study area
Incident data provided by the RNLI	2010 to 2019	Maritime incident data reported by the RNLI including the locations, types of incident and types of vessel involved.	Shipping and navigation study area
British Marine Aggregate Producers Association transit routes	2009	Frequently used marine aggregate dredging routes.	National dataset providing coverage throughout the English region of the North Sea
Royal Yachting Association (RYA) Coastal Atlas of Recreational Boating (RYA 2019)	2019	Tool for identifying areas of importance to recreational boaters.	National dataset providing coverage in proximity to the UK coast
UKHO Admiralty Charts 266-0 and 1191-0.	2021	Admiralty charts and historic mapping relevant to the defined shipping and navigation shipping and navigation study area.	International dataset providing coverage throughout the North Sea
UKHO Admiralty Sailing Directions – NP54 (UKHO, 2016)	2016	Pilot book with information on the surrounding area.	International dataset providing coverage throughout the North Sea

393. It is noted that AIS carriage and broadcast is not compulsory for fishing vessels less than 15m length, or vessels of less than 300 Gross Tonnage. It should therefore be considered that such traffic is likely to be underrepresented within characterisation of the baseline. However, it is noted that smaller vessels are increasingly observed to utilise AIS voluntarily given the associated safety benefits. On this basis and noting that AIS is accepted as being comprehensive for other larger vessel types, the available data are considered fit for the purposes of providing the high level baseline assessment presented in this scoping report.

394. For the ES and NRA, site-specific vessel (separately in DBS East and DBS West) traffic surveys will be undertaken to ensure non AIS vessels are characterised suitably in the establishment of the existing environment. The vessel traffic surveys will be compliant with Marine Guidance Note (MGN) 654 (MCA, 2021) including a minimum of 28 days of data consisting of AIS, visual observations and radar data collected across two 14-day periods. One of these 14-day periods will be a winter period (likely between January and March 2022) and the other a summer period (likely between June and August 2022).

2.10.3 Potential Impacts

2.10.3.1 Embedded Mitigation Measures

395. A number of embedded mitigation measures are proposed to reduce the potential for impacts on shipping and navigation. These will evolve over the development process as the EIA progresses and in response to consultation and thus will be fed iteratively into the assessment process. These measures typically include those that have been identified as good or standard practice and include actions that should be undertaken to meet existing legislation requirements. Where appropriate, these mitigation measures will be detailed in the draft DCO or deemed Marine Licences.

396. The following are considered relevant embedded environmental measures for shipping and navigation:

- Where possible, cable burial will be the preferred option for cable protection with the cable burial depth to be informed by a cable burial risk assessment and detailed within the Cable Specification Plan. Any damage, destruction or decay of cables must be notified to MCA, Trinity House, Kingfisher and UKHO no later than 24 hours after discovered.

- Advance warning and accurate location details of construction, maintenance and decommissioning operations (including details of vessel routes, timings and locations), associated Safety Zones and advisory passing distances will be given via Kingfisher Bulletins at least 14 days prior.
- Ongoing liaison with fishing fleets will be maintained during construction, maintenance and decommissioning operations via an appointed Fisheries Liaison Officer.
- Monitoring of vessel traffic will be undertaken for the duration of the construction period and during the first three years of the operation and maintenance phase.
- Marine Pollution Contingency Plans for each Project will be developed outlining procedures to protect personnel working and to safeguard the marine environment.
- Safety zones of up to 500m will be applied for during construction, maintenance and decommissioning phases.
- Where appropriate, guard vessels will be used to ensure adherence with Safety Zones or advisory passing distances.
- Where scour protection is required, MGN 654 will be adhered to with respect to changes greater than 5% to the under-keel clearance in consultation with the MCA and Trinity House.
- Lights, marks, sounds, signals and other aids to navigation will be exhibited as required by Trinity House, MCA and the Civil Aviation Authority (CAA) including a buoyed construction area around the array.
- The Projects will ensure that local Notifications to Mariners are updated and reissued at weekly intervals during construction activities and at least five days before any planned operations and maintenance works and supplemented with Very High Frequency radio broadcasts agreed with the MCA in accordance with the construction and monitoring programme approved under the relevant Deemed Marine Licence condition.
- Layout Plans (including cables) for each Project will be agreed with the MMO following appropriate consultation with Trinity House and the MCA setting out proposed details of the development areas.
- Aids to Navigation Management Plans for each Project will be agreed with Trinity House.

- The Projects' will ensure compliance with MGN 654 and its annexes, where applicable, including completion of a Search and Rescue checklist.
- Marine coordination will be implemented to manage project vessels throughout construction and maintenance periods.
- Project vessels will ensure compliance with Flag State regulations including the International Regulation for Prevention of Collision at Sea (COLREGs) (International Maritime Organization (IMO), 1972/77) and the International Convention for the Safety of Life at Sea (IMO, 1974).
- There will be a minimum blade tip clearance (air draft height) of at least 22m above Highest Astronomical Tide.
- There will be appropriate marking on UKHO admiralty charts.

2.10.3.2 Potential impacts during construction, operation and decommissioning

397. The potential impacts on shipping and navigation are summarised in **Table 2-23**.

398. No matters relating to construction, operation and maintenance, or decommissioning have been scoped out at this stage. This approach takes into account the fact that MGN 654 (MCA 2021) requires that all impacts listed within **Table 2-23** are given due consideration in the NRA, the technical assessment feeding into the EIA.

2.10.3.3 Cumulative Effects

399. Cumulative effects on shipping and navigation resulting from the effects of the Projects and other developments will be assessed in accordance with the guidance and methodologies set out in section 2.10.4, with all effects assessed for the Projects in isolation considered on the cumulative level.

400. The developments included in the assessment of cumulative effects will be determined by a screening process where developments are tiered based on numerous criteria including (but not limited to) development status, distance from the Projects and data confidence.

2.10.3.4 Transboundary Effects

401. Given the location of the Projects in the southern North Sea, there is the potential for transboundary effects upon shipping routes which transit to/from EEA States. Transboundary effects will therefore be considered in the EIA noting that consultation is undertaken by the Planning Inspectorate.

Table 2-23 Summary of Impacts Relating to Shipping and Navigation. Topics to be Scoped In (✓) and Out (x)

Potential Impact	Construction	Operation	Decommissioning
Displacement of vessels	✓	✓	✓
Increased vessel to vessel collision risk between a third-party vessel and a project vessel	✓	✓	✓
Increased vessel to vessel collision risk between third-party vessels	✓	✓	✓
Vessel to structure allision risk	×	✓	×
Reduction of under keel clearance	×	✓	×
Increased anchor interaction with subsea cable(s)	×	✓	×
Interference with marine navigation, communications and position fixing equipment	×	✓	×
Reduction of emergency response provision including Search and Rescue capability	×	✓	×
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓

402. Impacts will be considered on a base case and future case basis, where the future case incorporates a conservative assumption of a general 10 percent increase in vessel traffic numbers within the shipping and navigation study area. This is aligned with the approach taken to determining the future case scenario in the NRA for other UK offshore wind farm developments.

403. All likely significant effects identified will be considered further as more details of the Projects design becomes available and more baseline data is collected and analysed. No matters or aspects are being scoped out at this stage noting that MGN 654 (MCA 2021) requires that all impacts are given due consideration in the NRA, the technical assessment feeding into the EIA.

2.10.4 Approach to Impact Assessment

404. The approach to the impact assessment for shipping and navigation aligns with regulator and stakeholder requirements, including the use of the IMO's Formal Safety Assessment (FSA) process and compliance with MGN 654 (MCA 2021). This section sets out the proposed methodology which will be applied and how it will address the specific needs for the shipping and navigation assessment. Prior to any assessments being undertaken, the methodology will be agreed at a high level with the MCA and Trinity House.

405. Additionally, the output of this Scoping Report (namely the Scoping Opinion) will be used to inform the NRA.

406. The key guidance document that will be considered within the shipping and navigation aspect of the EIA is MGN 654. Other key guidance is as follows:

- Revised Guidelines for FSA (IMO 2018);
- International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Recommendation O-139 on the marking of Man-Made Offshore Structures (IALA 2013);
- MGN 372 Offshore Renewable Energy Installations (OREIs): Guidance to Mariners Operating in the Vicinity of UK OREIs (MCA 2008); and
- The RYA's Position on Offshore Energy Developments: Paper 1 – Wind Energy (RYA 2015).

407. As per the MCA methodology (Annex 1 to MGN 654), the NRA will assess the impacts on shipping and navigation on a preliminary basis to determine which should be included within the EIA.

408. The IMO FSA methodology (IMO 2018) is the internationally recognised approach for assessing impacts to shipping and navigation receptors, and is the approach required under the MCA methodology. This methodology is centred on risk control and assesses each impact in terms of its frequency and consequence in order that its significance can be determined as “broadly acceptable”, “tolerable”, or “unacceptable”. Should an impact be assessed as “unacceptable” then additional mitigation measures implemented beyond those considered embedded will be required to bring the impact within “tolerable” or “broadly acceptable” parameters – the As Low As Reasonably Practicable approach.

409. Impact significance in the PEIR and ES will be determined via a risk ranking matrix assessing frequency and consequence. The frequency and consequence, as part of the NRA process, will be related to the parameters required by the IMO FSA and agreed at the Hazard Workshop with stakeholders. The risk ranking matrix is illustrated in **Table 2-24** below.

Table 2-24 Risk Ranking Matrix

		Frequency				
		Negligible	Extremely Unlikely	Remote	Reasonably Probable	Frequent
Consequence	Major	Tolerable	Tolerable	Unacceptable	Unacceptable	Unacceptable
	Serious	Broadly Acceptable	Tolerable	Tolerable	Unacceptable	Unacceptable
	Moderate	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable	Unacceptable
	Minor	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable
	Negligible	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable

410. The frequency and consequence rankings per impact will be determined using a number of inputs, notably:

- quantitative modelling undertaken in the NRA (Anatec's COLLRISK software);
- outputs of the characterisation of the baseline including vessel traffic survey;
- consideration of embedded mitigation measures;
- lessons learnt from other offshore wind farm developments;
- level of stakeholder concern;
- consultation output; and
- expert opinion.

411. The following statutory and non-statutory organisations deemed relevant to shipping and navigation will be included in further consultation, noting that additional organisations may be included if identified during the NRA process:

- MCA;
- Trinity House;
- UK Chamber of Shipping;
- RYA;
- Cruising Association;
- National Federation of Fishermen's Organisations;
- regular commercial operators; and
- local fishing representatives.

2.11 Aviation and Radar

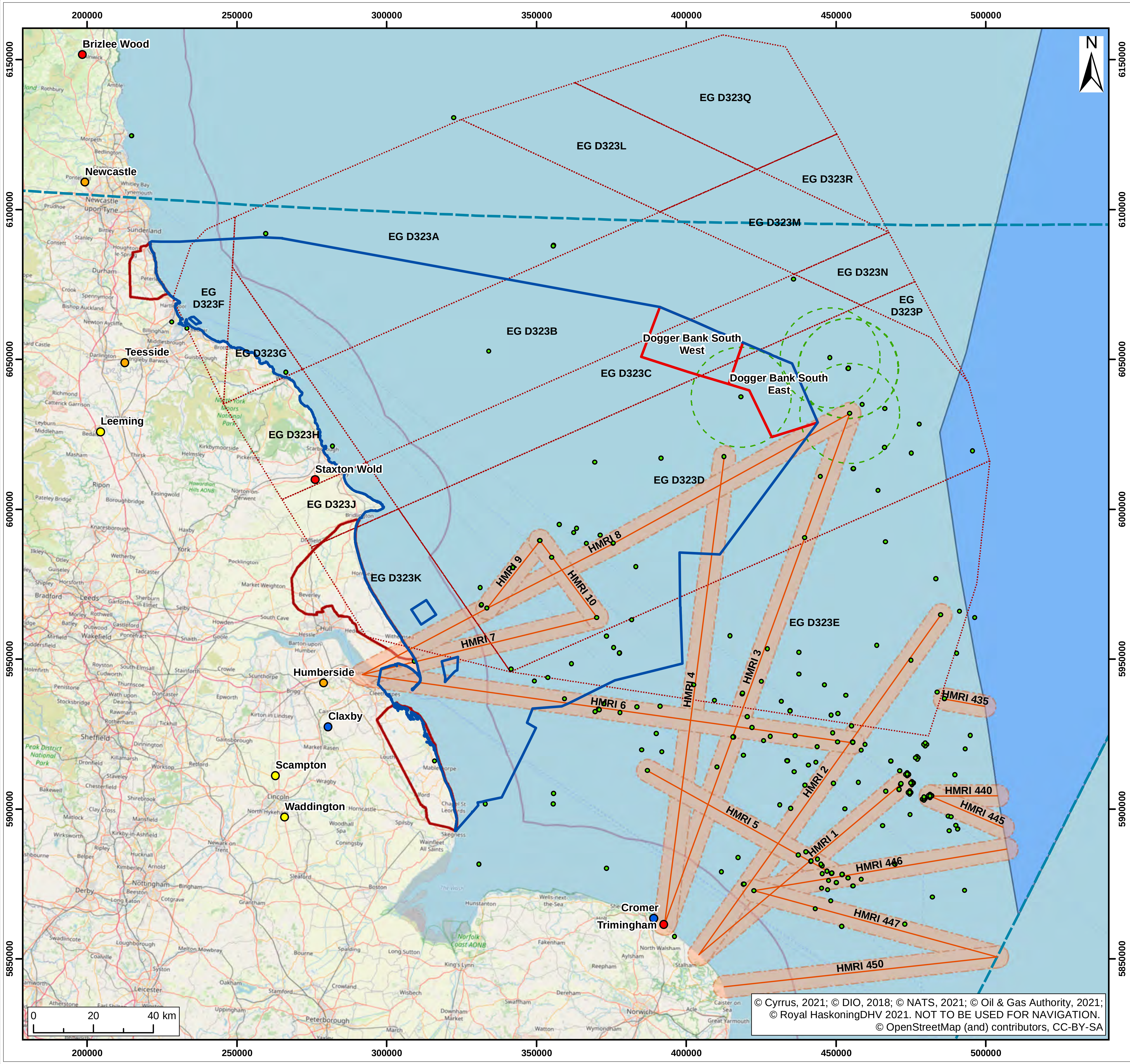
412. This section of the Scoping Report identifies the aviation and radar receptors relevant to the Projects. The potential effects of construction, operation and maintenance, and decommissioning of the Projects on aviation and radar are considered throughout this section.

The following questions are posed to consultees to help them frame and focus their response to the aviation and radar scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Do you agree with the approach to data collection?
- Have all the potential impacts on aviation and radar resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

2.11.1 Existing Environment

413. **Figure 2-22** presents an overview of the existing environment for aviation and radar. The following sections provide further detail on civil aviation, military aviation, helicopter main routeing indicators and offshore helidecks.



Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Onshore Study Area
- Southern Managed Danger Area
- North Sea Area V
- London Flight Information Region Boundary
- Offshore Platforms Within 9NM
- Helicopter Main Routing Indicators (HMRI) 2NM Consultation Buffer
- Helicopter Main Routing Indicators (HMRI)
- Air Defence Radars
- Civil Airports
- Military Airfields
- NERL Radars
- Oil & Gas Surface Infrastructure

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A1	C01	03/11/2021	Authorized	LB	JF	HC

Title:

Aviation & Radar Study Area

Figure: 2-22 Drawing No: PB2340-RHD-OF-ZZ-DR-Z-0077

Co-ordinate system:	Page Size:	Scale:
WGS 1984 UTM Zone 31N	A3	1:1,250,000

Project:	Report:
Dogger Bank South Offshore Wind Farms	Dogger Bank South Offshore Wind Farms EIA Scoping Report

Royal HaskoningDHV Enhancing Society Together RWE

2.11.1.1 Civil Aviation

414. The UK airport nearest to the proposed Projects is Humberside International Airport, which is approximately 152km from the array areas. The second nearest UK airport is Teesside International, which is approximately 172km away. Both airports are equipped with primary surveillance radars. Wind turbines within the array areas would be significantly beyond the ranges at which they could have any impact on the operation of these radar facilities.

415. The nearest major European Airport is Schiphol Airport, approximately 290km from the wind farm site.

416. The airspace above and adjacent to the array areas is used by civil and military aircraft and lies within the London Flight Information Region (FIR) for air traffic control, the airspace regulated by the UK CAA. From sea level to Flight Level (FL) 195, approximately 19,500ft above mean sea level (AMSL), the airspace is Class G uncontrolled airspace. Above FL195 is Class C controlled airspace. The boundary of the London FIR with the Amsterdam FIR (regulated by the Netherlands Aviation Authority) lies 134km to the east at its nearest point, although a portion of UK FIR airspace is delegated to the Netherlands, North Sea area V, which lies approximately 40km east of the array areas.

417. NATS (En Route) plc (NERL) provides en-route civil air traffic services within the London FIR, except in areas such as area V, where responsibility for air traffic services has been formally delegated to the Netherlands. NERL operate a network of radar facilities which provide en route information for both civil and military aircraft. The closest NERL radars to the array areas are based at Claxby, 162km to the south-west, Cromer, 165km to the south, and Great Dun Fell, 237km to the west. Preliminary analysis undertaken for the Projects indicates that wind turbines would not be within radar line of sight of these radars. No other civil radars have been identified as being potentially impacted by wind turbines within the array areas.

2.11.1.2 Military Aviation

418. The nearest primary radar-equipped military airfield to the proposed Projects is Royal Air Force Leeming, which is approximately 182km from the nearest point of the array areas. Wind turbines within the array areas would be significantly beyond the ranges at which they could have any impact on the operation of this radar facility.

419. The nearest Ministry of Defence air defence radars to the array areas are based at Remote Radar Head (RRH) Staxton Wold, 116km to the west, RRH Trimingham, 167km to the south, and RRH Brizlee Wood, 210km to the north-west. Preliminary analysis undertaken for the Projects indicates that wind turbines in parts of the array areas would be within radar line of sight of the Staxton Wold radar. No other military radars have been identified as being potentially impacted by wind turbines within the array areas.

420. The array areas lie within the Southern Managed Danger Area (MDA), one of four MDA complexes in UK airspace that provide segregated airspace for military flying training. Specifically, the array areas lie beneath danger areas EGD323B, EGD323C and EGD323D which, when activated, each have vertical limits from FL50 (approximately 5,000ft AMSL) up to FL660 (approximately 66,000ft AMSL).

2.11.1.3 Helicopter Main Routeing Indicators

421. A network of offshore routes over the North Sea are flown by civilian helicopters in support of oil and gas installations and defined as Helicopter Main Routeing Indicators (HMRIs). These routes have no lateral dimensions, however there should be no obstacles within 2NM of the route centreline. HMRI 8 passes within 2NM of the south-eastern corner of the DBS East array area. The CAA publication Civil Aviation Publication (CAP) 764 Policy and Guidelines on Wind Turbines (CAA, 2016) states that planned obstacles within 2NM should be consulted upon with helicopter operators and the Air Navigation Service Provider.

2.11.1.4 Offshore Helidecks

422. To help achieve a safe operating environment, a 9NM consultation zone for planned obstacles exists around offshore helicopter destinations. There are six platforms within 9NM of the DBS array areas: Cavendish, Cygnus Alpha (three platforms), Cygnus Bravo, and Munro. As stated in CAP 764, this zone does not prohibit development, but is a trigger for consultation with offshore helicopter operators, the operators of existing installations and exploration and development locations to determine a solution that maintains safe offshore helicopter operations alongside proposed developments.

2.11.2 Approach to Data Collection

423. The following information has been considered during the production of this Scoping Report and will be considered further within the PEIR/ES where relevant matters are scoped in to the EIA process.

424. The primary source of aviation related data to be used during desk-based studies in support of the EIA is the UK Aeronautical Information Publication (AIP). The AIP contains details on airspace and en-route procedures as well as charts and other air navigation information. A summary of relevant data sources providing information and guidance that will be considered as part of the EIA process is provided in **Table 2-25**.

Table 2-25 Data Sources – Aviation and Radar

Source	Summary
CAP 032: UK AIP (CAA, 2021)	Contains information on facilities, services, rules, regulations and restrictions in UK airspace.
CAP 168: Licensing of Aerodromes (CAA, 2019)	Sets out the standards required at UK licensed aerodromes relating to management systems, operational procedures, physical characteristics, assessment and treatment of obstacles, and visual aids.
CAP 437: Standards for Offshore Helicopter Landing Areas (CAA, 2018)	Provides the criteria applied by the CAA in assessing offshore helicopter landing areas for worldwide use by helicopters registered in the UK.
CAP 670: Air Traffic Services Safety Requirements (CAA, 2019)	Highlights the requirements to be met by providers of civil air traffic services and other services in the UK in order to ensure that those services are safe for use by aircraft.
CAP 764: Policy and Guidelines on Wind Turbines (CAA, 2016)	Details the CAA policy and guidelines associated with wind turbine impacts on aviation that aviation stakeholders and wind energy developers need to consider when assessing a development's viability.
CAP 1616: Airspace Change (CAA, 2021)	Explains the CAA's regulatory process for changes to airspace.
CAP 2038A00: Air Navigation Order 2016 (CAA, 2021)	Sets out the Rules of the Air and includes the application of lighting to wind turbines in UK territorial waters (articles 222 and 223).

Source	Summary
UK Military AIP (MOD, 2021)	The main resource for information and flight procedures at all military aerodromes.
MOD Obstruction Lighting Guidance (Low Flying Operations Flight, 2020)	Includes requirements for the lighting of offshore developments.
MCA Marine Guidance Note (MGN) 654: Safety of Navigation: OREIs – Guidance on UK Navigational Practice, Safety and Emergency Response (MCA, 2021)	Highlights issues to consider when assessing navigational safety and emergency response, caused by OREI developments.

2.11.3 Potential Impacts

425. Wind turbines have the potential to affect civil and military aviation (fixed-wing and helicopters), either through their physical dimensions limiting access and affecting safeguarding or safe passage, or through their effects on radar systems. These impacts have been scoped in.

426. Helicopter traffic as a result of planned activities in support of the Projects will raise the overall level of air traffic in the area and increase the likelihood of aircraft-to-aircraft collision. This impact has been scoped in.

2.11.3.1 Potential impacts during construction

427. Potential impacts on civil and military aviation and radar during the construction phase are associated with the presence of tall crane vessels and partially constructed structures increasing the risk of collision with low-flying aircraft, extending aircraft routeing to avoid obstructions, and causing permanent interference on civil and military radars. These construction impacts have been scoped in.

2.11.3.2 Potential impacts during operation

428. Potential impacts on civil and military aviation and radar during operation are associated with the presence of wind turbines increasing the risk of collision with low-flying aircraft, extending aircraft routeing to avoid obstructions, and causing permanent interference on civil and military radars. These operation impacts have been scoped in.

2.11.3.3 Potential impacts during decommissioning

429. During decommissioning the potential impacts are anticipated to be similar to those described above for the construction phase, and have similarly been scoped in.

2.11.3.4 Potential cumulative impacts

430. The cumulative assessment will consider the impacts in combination with other offshore wind farms and associated aviation activities, including increased collision risk and cumulative impacts on radar.

2.11.3.5 Potential transboundary impacts

431. The airspace around the array areas is used by international civil aviation and is adjacent to the Amsterdam FIR. The potential impacts on international use of the airspace will therefore be considered.

2.11.3.6 Summary of potential impacts

432. **Table 2-26** summarises the potential impacts to be scoped into the EIA.

Table 2-26 Summary of Impacts Relating to Aviation and Radar. Topics to Be Scoped In (✓) and Out (x)

Potential impact	Construction	Operation	Decommissioning
Impacts on civil and military radar systems due to high construction and maintenance vessels / cranes and partially complete structures	✓	✓	✓
Creation of an aviation obstacle environment for civil and military aircraft due to high construction vessels / cranes and wind turbines	✓	✓	✓
Impacts on civil and military radar systems due to permanent structures during operational phase	x	✓	x
Increased air traffic in the area related to wind farm activities	✓	✓	✓

Potential impact	Construction	Operation	Decommissioning
Cumulative impacts on civil and military radar systems	✓	✓	✓
Cumulative creation of an aviation obstacle environment for civil and military aircraft	✓	✓	✓
Cumulative increased air traffic in the area	✓	✓	✓
Transboundary impacts	✓	✓	✓

2.11.4 Approach to Impact Assessment

433. The EIA process will be supported by further desk-based studies, including radar line of sight modelling, that will identify and examine in greater detail sensitive aviation and radar receptors. Studies will be undertaken in parallel with consultation with relevant stakeholders to provide a detailed understanding of potential impacts. It is expected that consultation will be an iterative process, allowing for any concerns that are raised to be considered in the wind farms design optimisation process.

2.12 Infrastructure and Other Users

434. This section of the Scoping Report identifies the receptors related to infrastructure and other users which are relevant to the Projects. The potential effects of construction, operation and maintenance, and decommissioning of the Projects on infrastructure and other users are considered throughout this section.

The following questions are posed to consultees to help them frame and focus their response to the infrastructure and other users scoping exercise which will in turn inform the Scoping Opinion:

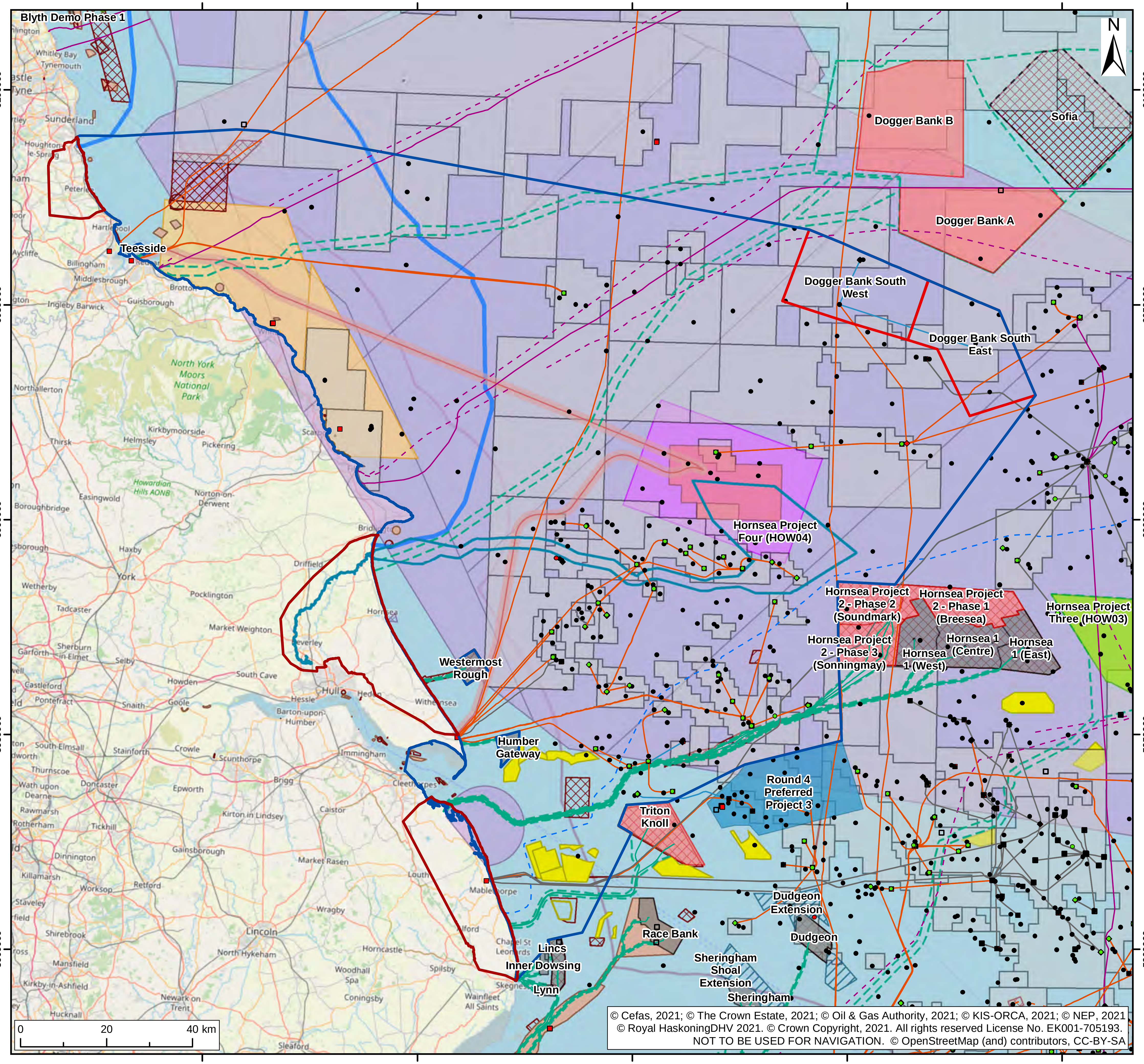
- Do you agree with the characterisation of the existing environment?
- Do you agree with the approach to data collection?
- Have all the potential impacts on infrastructure and other users resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

2.12.1 Existing Environment

435. This section considers other interactions within the offshore study area with industries not already covered as EIA topics in their own right, such as Commercial Fisheries (section 2.9), Shipping and Navigation (section 2.10) and Aviation and Radar (section 2.11).

2.12.1.1 Offshore wind infrastructure

436. Offshore wind developments in the vicinity (50km buffer) of the array areas are summarised in **Table 2-27** and shown on **Figure 2-23**.



Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Onshore Study Area
- Offshore Subsurface Mining Site

Other Offshore Wind Farms
- Government Support on Offer
- Pre-planning Application
- Round 4 Preferred Projects
- Consented
- Under Construction
- Active/In Operation
- HOW04 Application Boundary
- Offshore Wind Farm Export Cable
- Offshore Wind Export Cable Corridor

Marine Aggregate Site
- Exploration and Option Area
- Production Agreement

Marine Disposal Sites
- Closed
- Disused
- Not for waste disposal
- Open
- Carbon Capture Storage Site

Northern Endurance CCS Project
- Geological Store
- Proposed Corridor
- Proposed Route

- PEXA Danger Area
- PEXA Non Danger Area
- Oil & Gas Licence Block

Wells
- Abandoned/Plugged
- Completed
- Drilling

Surface Infrastructure
- Active
- Not in Use
- Precommission
- Removed

Sub-surface Infrastructure
- Active
- Precommission
- Not in Use
- Removed

Pipeline
- Abandoned
- Active
- Precommission
- Not in use
- Removed

Submarine Cable
- Telecommunication Cable
- Out of Use Cable
- Viking Link Interconnector
- Proposed Interconnector

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A01	C01	05/11/2021	Authorized	LB	BH	HC

Title:

Other Marine Users

Figure: 2-23 | Drawing No: PB2340-RHD-OF-ZZ-DR-Z-0023

Co-ordinate system: WGS 1984 UTM Zone 31N | Page Size: A3 | Scale: 1:900,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

Royal HaskoningDHV Enhancing Society Together

RWE

Table 2-27 Offshore Wind Farm Projects Within 50km of the Array Areas

Offshore Wind Farm	Distance from the Projects (km)	
	DBS West	DBS East
Dogger Bank A	8	7
Dogger Bank B	17	25
Sofia	37	34
Hornsea Project Four	42	41

437. Offshore wind farm export cables and corridors within the offshore study area are listed with their status in **Table 2-28** and shown on **Figure 2-23**.

Table 2-28 Offshore Wind Farm Projects Export Cables Within the Offshore Study Area

Offshore Wind Farm	Wind Farm Status
Dogger Bank A	Under Construction
Dogger Bank B	Under Construction
Sofia	Government Support on Offer
Dogger Bank C	Government Support on Offer
Hornsea Project One	In Operation
Hornsea Project Two	Under Construction
Westermost Rough	In Operation
Humber Gateway	In Operation
Triton Knoll	Under Construction
Inner Dowsing	In Operation
Lynn	In Operation

2.12.1.2 Oil and gas infrastructure

438. The southern North Sea has significant oil and gas infrastructure. This includes surface (platforms and buoys) and subsurface (wells, wellheads, manifolds and pipelines) infrastructure.

439. The nearest oil and gas infrastructure is associated with the Cavendish, Gordon and Esmond gas fields. There is no surface infrastructure in the arrays areas. The nearest platform (Cavendish) is 3km west of DBS East, this platform ceased production in August 2018 and was approved for decommissioning in June 2020 (Offshore Petroleum Regulator for Environment and Decommissioning, 2021). Decommissioning activities for Cavendish are scheduled for five years (Lepic, 2020). Within 50km of the array areas, there are 10 active platforms, one wave buoy, guard buoy and wellhead marker buoy.

440. There are no active wells in the array areas. The nearest active well lies 80km south-west of DBS West. There is an active wellhead in DBS West, however all wells within the array areas are abandoned/plugged. Within 15km of DBS East, there are three active subsurface infrastructures (one wellhead and two manifolds).

441. Within the offshore study area there are over 40 active pipelines that contain a range of products, including gas, condensate, chemical (not specified) and methanol. Pipelines that run through the array areas are listed in **Table 2-29** and displayed in **Figure 2-23**.

Table 2-29 Pipelines Within Array Areas

<table>
<tr><th>Project</th><th>Pipeline</th><th>Material</th><th>Status</th></tr>
<tr><td rowspan="4">DBS West</td><td>Shearwater to Bacton</td><td rowspan="6">Gas</td><td>Active</td></tr>
<tr><td>Esmond to Bacton</td><td>Active</td></tr>
<tr><td>Esmond to Forbes</td><td>Abandoned</td></tr>
<tr><td>Esmond to Gordon</td><td>Abandoned</td></tr>
<tr><td rowspan="3">DBS East</td><td>Cygnus to ETS</td><td>Active</td></tr>
<tr><td>Cavendish</td><td>Active</td></tr>
<tr><td>Cavendish</td><td>Methanol</td><td>Active</td></tr>
</table>

442. Both Projects overlap with several oil and gas blocks licensed for exploration and production as listed in **Table 2-30.**

Table 2-30 Licensed Blocks That Overlap With the Array Areas

<table>
<tr><th>Project</th><th>License Blocks</th></tr>
<tr><td rowspan="7">DBS West</td><td>43/7</td></tr>
<tr><td>43/8</td></tr>
<tr><td>43/12a</td></tr>
<tr><td>43/12b</td></tr>
<tr><td>43/13b</td></tr>
<tr><td>43/14b</td></tr>
<tr><td rowspan="2">43/14a</td></tr>
<tr><td rowspan="5">DBS East</td></tr>
<tr><td>43/15</td></tr>
<tr><td>43/19a</td></tr>
<tr><td>43/20b</td></tr>
<tr><td>44/11d</td></tr>
</table>

443. There is also a carbon capture storage site ‘Endurance’ within the offshore study area. It lies 31km south west of DBS West.

2.12.1.3 Subsea cables

444. The southern North Sea has a considerable number of cables, primarily telecommunication connections between the UK and continental Europe. Within the offshore study area, there are approximately 12 active subsea cables. In addition to telecommunications, they include power and offshore wind farm export cables (for example Hornsea Project One and Westermost Rough). The Viking Link Interconnector is currently under construction from Bicker Fen in Lincolnshire to Revsing in Jutland (Denmark) running through the southern section of offshore study area. There are remnants of five cables that are no longer in use within the offshore study area. Only one active subsea cable (UK-Germany 6) transits through DBS West. There are no existing cables in DBS East. There are two proposed interconnector projects that would be within the offshore study area; Scotland England Green Link 1 (SEGL1) and Scotland England Green Link 2 (SEGL2). The SEGL1 is proposed to go from Torness in East Lothian to Hawthorn Pit in County Durham, coming in at the north of the offshore study area. The SEGL2 is proposed to run from Peterhead in Aberdeenshire to Drax in North Yorkshire, also coming in at the north, however running through a greater proportion of the offshore study area.

2.12.1.4 Carbon Capture Storage

445. Located in the centre of the offshore study area is the proposed site of Northern Endurance Carbon Capture Storage (CCS) Project. Associated pipelines of the Northern Endurance CSS Project are proposed to run from Redcar, Teesside and from Easington, Hull, all within the offshore study area.

2.12.1.5 Marine aggregates and mining

446. The array areas do not overlap with any aggregates production areas. The nearest area is 506 licenced to DEME Building Materials Ltd and located 65km to the south of DBS East. Within the offshore study area near the Humber and Skegness there are 11 aggregate production areas. Some dredging vessels may transit through the array areas. Interactions between the Projects and vessel traffic are covered in the Shipping and Navigation section (section 2.10).

447. Within the offshore study area, there are two active subsurface mining sites close to the Yorkshire coast; Boulby and Hundale Potash Mines.

2.12.1.6 Dumping and disposal sites

448. No disposal sites lie within the array areas, the closest (DG025 Dogger Bank Teesside B) being 33km north east from DBS East, which is closed. Within the offshore study area there are eight open disposal sites and 12 closed sites.

2.12.1.7 Ministry of Defence activities

449. The following Practice and Exercise Areas encompass the offshore study area:

- D323A;
- D323B;
- D323C;
- D323D;
- D323G;
- D323E;
- D323F; and
- D307.

450. As a result of both World War 1 and World War 2 , there is also potential for UXO within the offshore study area and in the wider southern North Sea region. Locations of any UXO would be determined post-consent, with mitigation agreed in consultation with Natural England, JNCC and MMO.

2.12.2 Approach to Data Collection

451. The following information has been considered during the production of this Scoping Report and will be considered further within the PEIR/ES where relevant matters are scoped in to the EIA process.

452. The Infrastructure and Other Users assessment will be informed by the latest Geographical Information Systems (GIS) datasets including but not limited to:

- marine disposal sites (Cefas, 2021);
- offshore wind farms and associated export cables (The Crown Estate, 2021);
- marine aggregate sites (The Crown Estate, 2021);
- Military Practice and Exercise Areas (PEXA) (Marine ThemesForest, 2021);
- wells (Oil & Gas Authority, 2021);
- surface infrastructures (Oil & Gas Authority, 2021);
- subsurface infrastructures (Oil & Gas Authority, 2021);
- pipelines (Oil & Gas Authority, 2021); and
- submarine cables (KIS-ORCA, 2021).

453. The above datasets are shown in the **Figure 2-23** above.

454. Where there is potential for interactions with other users, RWE Renewables will liaise with the relevant infrastructure owners/operators.

2.12.3 Potential Impacts

2.12.3.1 Potential impacts during construction

455. Construction works such as the installation of cables or foundations have the potential to impact on other marine infrastructure and users if within the construction footprint or adjacent. The following impacts are scoped in:

- potential interference with other wind farms;
- potential interference with oil and gas operations and decommissioning activities;
- physical impacts on subsea cables and pipelines;
- impacts on disposal sites;
- impacts on aggregate sites; and
- impacts on MoD activities.

456. The presence of increased vessel numbers during construction may also impact on other marine users (see Section 2.12). Cable crossings will also be required.

2.12.3.2 Potential impacts during operation and maintenance

457. The presence of permanent offshore infrastructure has the potential to impact projects either within or adjacent to the offshore study area. These include the following:

- potential interference with other wind farms;
- potential interference with oil and gas operations and decommissioning activities;
- physical impacts on subsea cables and pipelines;
- impacts on disposal sites;
- impacts on aggregate sites; and
- impacts on MoD activities.

458. Also, vessel movements during operation and maintenance may also affect neighbouring activities (see section 2.10).

2.12.3.3 Potential impacts during decommissioning

459. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan would be provided.

460. It is anticipated that the decommissioning impacts will be similar in nature to those of construction although on a smaller scale, including:

- potential interference with other wind farms;
- potential interference with oil and gas operations and decommissioning activities;
- physical impacts on subsea cables and pipelines;
- impacts on disposal sites;
- impacts on aggregate sites; and
- impacts on MoD activities.

2.12.3.4 Potential cumulative impacts

461. Potential impacts of the Projects on infrastructure and other users are expected due to the considerable amount of infrastructure both within, and in close proximity to, the offshore study area. Should such impacts be identified, in all likelihood they can be fully mitigated after consultation with the relevant parties (i.e. through the development of crossing agreements or similar). All other parties (i.e. another wind farm operator) that interact with the same receptor will also need to demonstrate no impact or agree mitigation. Therefore, it is not anticipated that there will be pathways for cumulative impacts. It is, therefore, proposed that these impacts are scoped out.

2.12.3.5 Potential transboundary impacts

462. The only potential transboundary receptors are cables owned by international operators, these will be covered in the assessments outlined above, and therefore there will be no separate transboundary assessment undertaken.

2.12.3.6 Summary of potential impacts

463. **Table 2-31** outlines the potential impacts which are proposed to be scoped in to the EIA. This may be refined through the EPP as additional information and data become available.

Table 2-31 Summary of Impacts Relating to Infrastructure and Other Users. Topics to be Scoped In (✓) and Out (x)

Potential Impact	Construction	Operation	Decommissioning
Potential interference with other wind farms	✓	✓	✓
Potential interference with oil and gas operations and decommissioning activities	✓	✓	✓
Physical impacts on subsea cables and pipelines	✓	✓	✓
Impacts on aggregate dredging activities	✓	✓	✓
Impacts on disposal sites	✓	✓	✓
Impacts on MoD activities	✓	✓	✓
Cumulative impacts	x	x	x
Transboundary impacts	x	x	x

2.12.4 Approach to Impact Assessment

464. RWE Renewables will undertake consultation with all relevant developers, operators and marine users within the vicinity of the Projects to establish any concerns relating to the Projects. Any areas of concern will be identified and considered within the EIA. However, it is likely that any impacts will either be non-significant or able to be fully mitigated after consultation with the relevant parties as discussed above.

465. The EIA will be based on existing data and information gathered through consultation. The EIA will focus on the Projects and consider infrastructure or users that overlap with those boundaries. The assessment will consider agreed or best practice mitigation.

2.13 Offshore Archaeology and Cultural Heritage

466. This section of the Scoping Report identifies the receptors related to offshore archaeology and cultural heritage which are relevant to the Projects. The potential effects of construction, operation and maintenance, and decommissioning of the Projects on offshore archaeology and cultural heritage are considered throughout this section.

467. The marine archaeology and cultural heritage assessment will include all receptors seawards of MHWS. This will include any receptors in the intertidal zone.

468. All receptors landwards of MHWS will be included within the terrestrial archaeology and cultural heritage assessment (section 3.6).

The following questions are posed to consultees to help them frame and focus their response to offshore archaeology and cultural heritage scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Do you agree with the approach to data collection?
- Have all the potential impacts on offshore archaeology and cultural heritage resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

2.13.1 Existing Environment

469. The Projects are within an area of high prehistoric archaeological significance. Within this area, archaeological and palaeoenvironmental evidence related to human occupation of the UK may be preserved.

470. The area is part of the wider prehistoric landscape of the North Sea which, at several times in the past, has been exposed as dry land. This is due to sea level falls driven by climate change. Buried sediments related to this are likely to contain not only direct archaeological evidence of the human occupation of the area, but also evidence relating to the palaeoenvironment. This can be used to develop an understanding of the wider natural environment within which early humans lived.

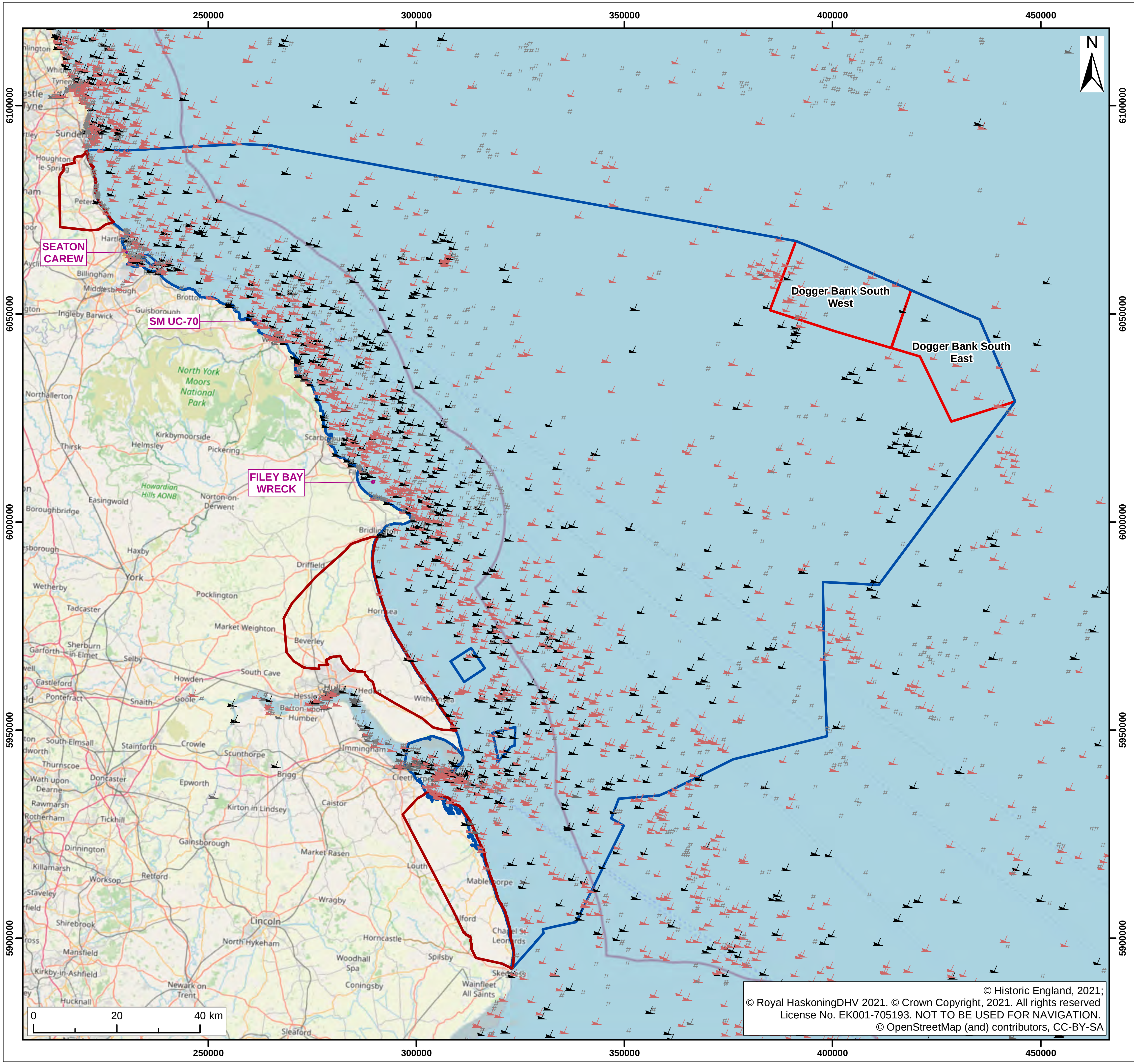
471. In recent years, the archaeological assessment of marine geophysical and geotechnical data acquired for constructed and planned projects in the Dogger Bank area of the North Sea have led to a much greater understanding of the potential for prehistoric, maritime and aviation archaeology. For example, assessment undertaken for the Dogger Bank Wind Farm (A, B and C) and the Sofia Offshore Wind Farm, have demonstrated the presence of palaeolandscape features and sub-seabed deposits of palaeoenvironmental interest.

472. Combined with targeted archaeological investigations, such as the use of Remote Operated Vehicles to ground truth geophysical anomalies, this data has led to the identification of multiple new sites and finds within offshore contexts. Through this process, several wrecks and seabed features of potential archaeological interest within the boundaries of these offshore wind farms have also identified.

473. Within the offshore study area there are three nationally important wrecks protected under the Protection of Wrecks Act 1973 (**Figure 2-24**). These are the *Seaton Carew* (list entry: 1000080), the *SMU UC-70* (list entry: 1446103) and the *Filey Bay Wreck* (list entry: 100077). As these wrecks are of national importance, development that would impact these is prohibited within defined protected areas around the recorded locations. These are 300m for the *Filey Bay Wreck*, 100m around the *Seaton Carew* and 30m around the *SM UC-70*.

474. In addition to these wrecks there is high potential for other wrecks, wreck remains, aircraft and aircraft remains to be present within the study area. There are a large number of UKHO records within the offshore study area, with the highest concentrations towards land. Most of these records are likely wreck related, but others are possibly related to aviation losses (**Figure 2-24**).

475. Within the DBS West area there are 20 UKHO records, while there are seven within the DBS East area. Within the offshore study area there are 1952 UKHO records.



Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Onshore Study Area
- Protected Wreck
- Live Wreck
- Dead Wreck
- Historic Wreck
- Lifted Wreck
- Obstruction

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A1	C01	03/11/2021	Authorized	LB	GSP	HC

Title:

Recorded Losses

Figure: 2-24

Drawing No: PB2340-RHD-OF-ZZ-DR-Z-0076

Co-ordinate system: WGS 1984 UTM Zone 31N

Page Size: A3

Scale: 1:900,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

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476. The coastline and adjacent offshore area have changed significantly since the prehistoric period. Studies suggest that the coastline may have receded by at least 6km since the Bronze Age (Humber Field Archaeology 2008). As such, this area could also have been exposed as dry land in the past suggesting there could be potential for submerged palaeolandscapes.

477. The Holderness coast has undergone significant retreat, most notably from the thirteenth century to sixteenth century (Fulford et al 1997). Therefore, there is potential for lost settlements to exist off this coastline within this landfall AoS.

478. There is also potential for submerged archaeology in the intertidal zone due to the high rate of erosion including prehistoric submerged forest and lost villages. This is particularly the case for the Humber and Lincolnshire coasts (Green, 2015).

479. It is also of note that there is high potential for wetland archaeological sites on the foreshore and under the coastal cliffs in the study area (Maritime Archaeology 2009).

480. Similarly, the remains of costal defences related to WWI and WWII are likely to be present within the intertidal zones of the Landfall AoS. The majority of records identified during assessment undertaken for Dogger Bank C were WWI and WWII defensive structural remains.

481. The potential receptors that may be present within the study area are summarised as:

- palaeolandscape features and sub-seabed deposits of palaeoenvironmental interest;
- prehistoric occupation sites;
- wreck and aviation remains; and
- occupation activity related to all period of human activity within the intertidal zone.

2.13.2 Approach to Data Collection

482. The following information has been considered during the production of this Scoping Report and will be considered further within the PEIR/ES where relevant matters are scoped in to the EIA process.

2.13.2.1 Data Sources

483. The data sources that will be accessed to characterise the existing historic environment with respect to offshore archaeology and cultural heritage are set out in **Table 2-32** below.

Table 2-32 Data Sources to be Used for the Assessment of Offshore Archaeology and Cultural Heritage

Data source	Data contents
UKHO	Records of wrecks and obstructions data including 'dead' and salvaged wrecks that are no longer charted as navigational hazards.
Maritime records maintained by Historic England	Maritime records, including documented losses of vessels, and records of terrestrial monuments and findspots, including the archaeological excavation index.
National Heritage List of England (NHLE)	Records of designated heritage assets within England, maintained by Historic England. GIS data for all Protected Wrecks, Scheduled Monuments, Listed Buildings, Registered Parks and Gardens and Registered Battlefields.
Relevant Historic Environment Record (Durham HER, The Humber HER, Lincolnshire HER or North East Lincolnshire HER)	Contains data on all recorded non-designated heritage assets, held by Durham County Council, the Humber Archaeology Partnership, Lincolnshire County Council and North East Lincolnshire County Council. The data includes archaeological, historic landscape and historic building information. Information on previous events (archaeological surveys and investigations) will also be obtained.
BGS	Historic borehole logs and the wider geological background for the region.
National Historic Seascape Characterisation	GIS data and character texts for the Historic Seascape Character (HSC) of coastal and marine areas around England, mapped through a series of projects funded by Historic England and consolidated into a single national database.

Data source	Data contents
Existing archaeological studies and published sources	Background information on the archaeology of the North Sea and Dogger Bank, including the results of archaeological assessments carried out for Dogger Bank Wind Farm and Sofia Offshore Wind Farm and recent work undertaken in the wider North Sea. Background information relating to submerged landscapes and lost villages.

484. In addition to the data presented in **Table 2-32**, the data presented in **Table 2-33** will be collected for the assessment.

Table 2-33 Site-Specific Data

Data Set	Source	Year Survey/Timings
Geophysical Survey	Array areas and offshore export cable corridor(s)	To be completed in 2022

485. The marine geophysical survey data which will be acquired to inform the EIA during 2022 will be subject to archaeological assessment by a qualified and experienced archaeological contractor. This is in accordance with industry good practice set out in available guidance such as *Marine Geophysics Data Acquisition, Processing, and Interpretation* (Historic England 2013).

486. The data acquired will consist of Side Scan Sonar (SSS), Sub Bottom Profiler (SBP), Magnetometer and Multi-beam bathymetry. The SSS will be acquired at 200% coverage with other data acquired on the same lines.

487. In addition, if any geotechnical investigations are completed, allowance will be made for archaeological involvement in the planning of such surveys and the samples will be made available for geoarchaeological assessment.

2.13.3 Potential Impacts

488. Heritage assets may be affected by direct physical changes or by changes to their setting (Historic England – GPA 2 2015b).

489. Potential impacts to heritage assets include both direct and indirect impacts. Impacts can also occur form changes in the setting of heritage assets, which could affect heritage significance.

490. Direct impacts to heritage assets present on the seafloor or buried under the seabed, may result in damage to, or the destruction of any archaeological material, or the relationship between that material and the wider environment (stratigraphic context or setting). Relationships between archaeological material and the wider environment are crucial to developing a full understanding of such material. These impacts may occur if heritage assets or material are present within the footprint of the proposed scheme (i.e. foundations or cables) or from construction related activities (i.e. seabed clearance and anchoring).

491. There is also the potential for the Projects to directly and indirectly change the local and regional hydrodynamic and sedimentary process regimes. Changes in coastal processes can lead to the re-distribution of erosion and accretion patterns. Similarly, changes in tidal currents may affect the stability of nearby morphological and archaeological features. Indirect impacts to heritage assets may occur if buried heritage assets become exposed to increased wave/tidal action, as these will deteriorate farther than assets protected by sediment. Conversely, if increased sedimentation results in an exposed site becoming buried, it may add some protection and be considered a beneficial impact. This will be considered based on the assessment undertaken for the marine physical processes (section 2.1).

492. Impacts to the significance of a heritage asset may also occur if a development changes the setting of the asset (the surrounding in which the heritage assets us located, experienced and appreciated).

493. Similarly, historic character may also be affected if the proposed scheme results in a change to the prevailing character of the area and/or alters perceptions of the seascape.

2.13.3.1 Potential impacts during construction

494. Direct impact may occur if archaeological material is present within the footprint of the proposed scheme (e.g. cabling, foundations, footprint of jack-up vessels).

495. Indirect impacts to heritage assets may occur if the physical presence of construction vessels and offshore infrastructure impacts the hydrodynamic regime. Similarly, if seabed preparation associated with foundation and cable installation leads to localised effects upon sedimentary processes this could lead to indirect impacts to heritage assets.

496. There would also be potential for temporary impacts to the setting of heritage assets and to the Historic Seascape Character (HSC) from the presence of vessels associated with the installation of offshore infrastructure and activities at the landfall(s).

497. Based on the above, all construction related impacts are scoped in.

2.13.3.2 Potential impact during operation and maintenance

498. Direct impacts may occur if archaeological material is present within the footprint of works required for routine maintenance activities which disturb the seabed (for example, seabed contact by legs of jack-up vessels and / or anchors). Similarly, this can occur in exceptional circumstances such as the replacement of cabling.

499. However, given the areas where such activities would be undertaken would already have been disturbed during construction, there would be limited further impact.

500. Indirect impacts to heritage assets may occur if the physical presence of the installed infrastructure impact the hydrodynamic or sedimentary regime. This includes the potential for increased scour around foundations.

501. There would also be potential for impacts to the setting of heritage assets and to the HSC from the presence of the installed infrastructure and ongoing maintenance activities.

502. Based on the above all impacts that may occur during operation and maintenance are scoped in.

2.13.3.3 Potential impacts during decommissioning

503. The scope of the decommissioning works would most likely involve removal of the accessible installed components. Offshore, this is likely to include removal of all the wind turbine components, part of the foundations (those above seabed level), removal of some or all of the infield cables and export cables.

504. If cables and foundations are left in place there would be no potential for direct impact. Direct impacts to heritage assets may occur if the accessible infrastructure is removed. This is not anticipated as any remains at the locations of the installed infrastructure will already have been impacted/mitigated during the construction phase.

505. If archaeological material is present within the footprint of jack-ups or vessel anchors deployed during decommissioning activities, direct impacts may also occur. As such, all impacts at decommissioning are scoped in.

2.13.3.4 Potential cumulative impacts

506. Individual heritage assets would not be subject to cumulative direct impacts from other known plans or projects as they are discrete and there would be no physical overlap of different infrastructure. However, although individual assets are discrete, taken together they could have collective heritage significance. Therefore, multiple impacts upon similar assets could occur cumulatively.

507. In addition, there is potential for multiple developments to affect the larger-scale archaeological features such as palaeolandscapes. The setting of heritage assets and the HSC of the North Sea may also be affected.

508. There is also the potential for cumulative indirect impacts associated with changes to marine physical processes. There is, therefore, the potential for cumulative impacts. As such, cumulative impacts are scoped in at construction, operation and decommissioning.

2.13.3.5 Potential transboundary impacts

509. Direct transboundary impacts may occur during construction if wrecks or aircraft of non-British nationality are subject to impact from development. Such wrecks may fall within the jurisdiction of another country, and may include, for example, foreign warships lost in UK waters. Similarly, where palaeolandscapes within the North Sea cross international boundaries, direct transboundary impacts may occur.

510. As such, direct transboundary impacts at construction, operation and decommissioning are all scoped in.

511. Indirect transboundary impacts, associated with changes to marine physical processes, where those changes cross an international boundary, are not expected to occur. Based on the ES findings for Dogger Bank A & B (Forewind, 2013), which found no potential for significant transboundary effects, it is proposed to scope out indirect transboundary effects on Offshore Archaeology and Cultural Heritage, recognising that the Projects are located further away from the EEZ boundary.

2.13.3.6 Summary of potential impacts

512. **Table 2-34** outlines the impacts which are proposed to be scoped into the EIA. This may be refined through the EPP as additional information and data become available.

Table 2-34 Summary of Impacts Relating to Offshore Archaeology and Cultural Heritage. Topics to be Scoped In (✓) and Out (x)

Potential Impact	Construction	Operation	Decommissioning
Direct impacts to heritage assets.	✓	✓	✓
Indirect impacts to heritage assets associated with changes to marine physical processes.	✓	✓	✓
Change to the setting of heritage assets, which could affect their heritage significance.	✓	✓	✓
Change to character which could affect perceptions of the HSC.	✓	✓	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts (direct)	✓	✓	✓
Transboundary impacts (indirect)	The Projects are located 40.82km from the EEZ boundary and therefore there is no pathway for transboundary impacts		

2.13.4 Approach to Impact Assessment

513. The marine archaeology assessment will be informed by the interpretation of the geophysical survey data (namely the bathymetry and SSS data to identify seabed features, such as wrecks, magnetometry data to identify magnetic anomalies and sub-bottom profile data to identify palaeolandscape features).

514. A marine archaeological desk-based assessment (ADBA) will be undertaken to establish the baseline for both known and potential heritage assets within the defined areas based upon the desk-based sources listed in **Table 2-32**. Dependent upon the results, a walkover survey at the landfall(s) may be carried out to ground truth existing records of heritage assets and identify any potential unrecorded heritage assets. This may also be required to inform an assessment of potential setting impacts upon heritage assets below MHWS within the intertidal zone.

515. The ADBA and assessment of geophysical data will be used to identify a strategy for mitigation including the avoidance of identified heritage assets through the application of Archaeological Exclusion Zones where appropriate.

516. The methodology of the assessment will also take account of guidance including:

- Joint Nautical Archaeology Policy Committee (JNAPC) Code of Practice for Seabed Development (JNAPC and The Crown Estate 2006);
- Historic Environment Guidance for the Offshore Renewable Energy Sector (Wessex Archaeology 2008);
- Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy (Oxford Archaeology 2008);
- Chartered Institute for Archaeologists' Standard and Guidance for Historic Environment Desk-Based Assessments (2014a) and Code of Conduct (2014b); and
- Institute of Environmental Management and Assessment (IEMA) Principles of Cultural Heritage Impact Assessment (2021).

2.14 Seascape, Landscape and Visual Impact

517. This section considers the impacts of the Projects' offshore elements (array areas and offshore electrical infrastructure) on seascape, landscape and visual amenity. The landscape and visual impacts of the onshore infrastructure and construction works are discussed in section 3.7.

The following questions are posed to consultees to help them frame and focus their response to the Seascape, Landscape and Visual Impact Assessment (SLVIA) scoping exercise which will in turn inform the Scoping Opinion:

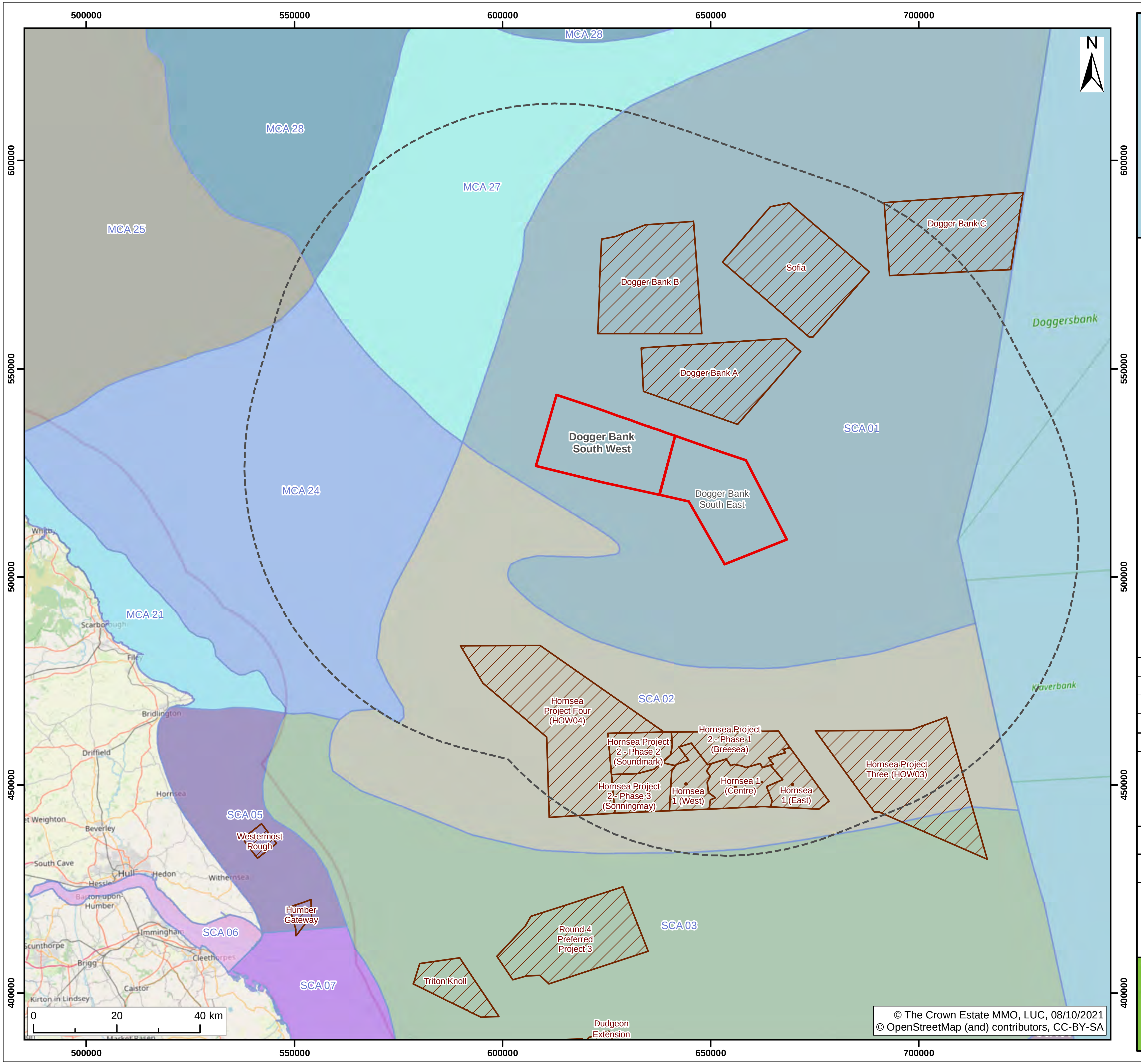
- Do you agree with the characterisation of the existing environment?
- Do you agree with the approach to data collection?
- Have all the potential impacts on SLVIA resulting from the Projects been identified in the Scoping Report?
- Do you agree that SLVIA can be scoped out of further assessment?

2.14.1 Existing Environment

518. The array areas are located off the north-east coast of England: DBS West is a minimum of 100km from the closest point on the coast, at Flamborough Head; and DBS East is a minimum of 118km from the same closest point. The offshore export cables will be submerged and will not give rise to any impacts on seascape character or visual amenity. The offshore export cable corridor(s) are not considered further.

519. **Figure 2-25** shows the array areas in the context of a 70km SLVIA study area. The SLVIA study area includes part of the North Sea, well to the east of coastal settlements such as Sunderland and Hornsea. At its closest point, the SLVIA study area is approximately 30km from the coast at Flamborough Head.

520. The seascape around the array areas includes evidence of human activity, including offshore wind farms, offshore gas platforms and shipping. The array areas are approximately 7.5km from the array area of the consented Dogger Bank A Offshore Wind Farm. The consented Dogger Bank B and C and Sofia wind farms lie further to the north-east. To the south is the operational Hornsea One wind farm, with the planned Hornsea Two, Three and Four projects alongside.



- Dogger Bank South Offshore Wind Farms
- SLVIA study area
- Wind site agreement

Marine Character Area

- MCA 21: North Yorkshire Coastal Waters
- MCA 24: Breagh Oil and Gas Field
- MCA 25: Farne Deeps
- MCA 27: Dogger Bank Edge
- MCA 28: Swallow Hole Plain
- SCA 01: Dogger Bank
- SCA 02: Dogger Deep Water Channel
- SCA 03: East Midlands Offshore Gas Fields
- SCA 04: East Anglian Shipping Waters
- SCA 05: Holderness Coastal Waters
- SCA 06: Humber Waters
- SCA 07: East Midlands Coastal Waters

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
EL	01	31/08/2021	Scoping	EL	DF	PM

Title:

SLVIA Study Area

Figure: 2-25 Drawing No: PC2340-LUC-OF-ZZ-DR-Z-0001

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:900,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

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521. Seascape character is defined at a national scale in the seascape assessments published by the MMO (2012)[4]. The array areas will be within the Dogger Bank Marine Character Area, within the East Offshore Marine Plan Area. The key characteristics for this Marine Character Area are as follows:

- *"Extensive and remote areas of relatively shallow waters.*
- *Visually unified and expansive open water character.*
- *Widespread sand bank habitat.*
- *Significant fisheries area because of important fish spawning and nursery habitats.*
- *Expansive seascape with few surface features.*
- *Important archaeological features present."*

522. The consented Dogger Bank and Sofia offshore wind farms are all located within the Dogger Bank Marine Character Area. Other Marine Character Areas within the SLVIA study area include Dogger Deep Water Channel (which includes the Hornsea wind farms), Dogger Bank Edge, and Breagh Oil and Gas Field. Very small areas of the Swallow Hole Plain, Farne Deeps, , and East Midlands Offshore Gas Fields are also covered.

523. Due to the curvature of the earth, there would be no visibility of the maximum height turbines (397m) from sea level at over 71.5km from the array areas. Although there are more elevated areas along the Yorkshire coast, the limits of visual acuity and atmospheric visibility mean that the wind farm is unlikely to be visible from shore. Visual receptors within the 70km study area will be limited to people working in the marine environment, and people passing through the area on passenger or commercial vessels, and potentially small numbers of recreational vessels.

[4] MMO (2012), Seascape character area assessment: East Inshore and East Offshore marine plans area. Page 4.

2.14.2 Approach to Data Collection

524. The following data sources provide information relevant to SLVIA:

- MMO (2018) Seascape Character Assessment for the North East Inshore and Offshore marine plan areas;
- MMO (2012) Seascape character area assessment East Inshore and East Offshore marine plan areas;
- offshore wind farm data from The Crown Estate;
- offshore gas platform data from the Oil and Gas Authority; and
- admiralty charts and Ordnance Survey (OS) maps at a range of scales.

2.14.3 Potential Impacts

2.14.3.1 Potential impacts during construction

525. During construction of the offshore infrastructure (turbine arrays and cables), the presence of construction activity and partially completed structures within the seascape has the potential to impact seascape character and visual receptors. However, impacts during the temporary construction phase of the offshore infrastructure will never be greater than the operational effects of the completed wind farm. As such, it is proposed that offshore construction effects are scoped out of the SLVIA.

2.14.3.2 Potential impacts during operation

526. Given the existing seascape character and the presence of consented and under-construction wind farms in the area, the susceptibility of the seascape is likely to be low. It is considered that operation of the offshore wind farm is unlikely to significantly impact on the key characteristics of the host Marine Character Area or other Marine Character Areas within the SLVIA study area. It is therefore proposed that operational effects on seascape character are scoped out of the SLVIA.

527. Because of the intervening distance between coastal and non-coastal landscapes, the presence of the offshore wind farm in the sea is unlikely to significantly impact landscape character or the special qualities of landscape designations. It is proposed that impacts on landscape character and designations, resulting from operation of the offshore wind farm, are scoped out of the SLVIA.

528. The visual receptors within the offshore study area are likely to be of low susceptibility to changes in their views of the surrounding sea, and significant impacts are not anticipated. Visibility of the offshore wind farm from the coast, over an intervening distance of approximately 100km, will be very limited, and there will be no significant impacts on the visual amenity of onshore receptors. Consequently, it is proposed that visual effects resulting from operation of the offshore wind farm are scoped out of the SLVIA.

2.14.3.3 Potential impacts during decommissioning

529. The presence of activity and partially dismantled structures during decommissioning has the potential to impact seascape and visual receptors. However, impacts during the temporary decommissioning phase will never be greater than during construction or operation phases considered in the SLVIA, and are proposed to be scoped out.

2.14.3.4 Potential cumulative impacts

530. The array areas are in close proximity to consented offshore development at Dogger Bank A, B and C and Sofia offshore wind farms. There is potential for cumulative effects to result within the SLVIA study area. However, given the seascape characteristics of the area and the low susceptibility of potential seascape and visual receptors, it is considered that these effects would not be significant. Cumulative impacts are proposed to be scoped out of the SLVIA.

2.14.3.5 Potential transboundary impacts

531. The array areas are around 40km from the limit of UK waters, and the SLVIA study area extends beyond this into Dutch waters. Seascape and visual transboundary effects could therefore affect receptors in Dutch waters. However, the susceptibility of seascape and visual receptors in this area will be no greater than in UK waters, and the seascape will be similarly affected by the under-construction Dogger Bank and Sofia offshore wind farms. It is therefore considered that transboundary effects would not be significant and are proposed to be scoped out.

2.14.3.6 Summary of potential impacts

532. Although the construction, operation and decommissioning of the offshore wind farm would alter the character of seascape and views experienced by small numbers of offshore receptors, potential effects are considered unlikely to be significant**. Table 2-35** below confirms that all seascape, landscape and visual impacts are proposed to be scoped out, and therefore no offshore SLVIA will be included within the EIA process.

Table 2-35 Summary of Impacts Relating to Seascape, Landscape and Visual Impact. Topics to be Scoped In (✓) and Out (x)

Potential Impact	Construction	Operation	Decommissioning
Seascape and coastal character	×	×	×
Landscape character	×	×	×
Designated landscape	×	×	×
Visual receptors	×	×	×
Cumulative seascape, landscape and visual impacts	×	×	×
Transboundary seascape, landscape and visual impacts	×	×	×

3 ONSHORE

533. This section presents the main baseline characteristic of the onshore environment within the onshore study areas (including the landfall AoS) (**Figure 1-1**), excluding the intertidal zone which is covered in the offshore sections. Unless otherwise stated, the potential impacts of the Projects during construction, operation and decommissioning are considered in line with the methodology presented in section 1.7. Each section outlines which impacts are proposed to be scoped in to the EIA and which will be scoped out.

3.1 Terrestrial Ecology and Onshore Ornithology

534. This section of the Scoping Report identifies the terrestrial ecology and onshore ornithology receptors relevant to the Projects. The potential effects of construction, operation and maintenance, and decommissioning of the Projects on terrestrial ecology and onshore ornithology are considered.

The following questions are posed to consultees to help them frame and focus their response to the terrestrial ecology and onshore ornithology scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Do you agree with the approach to data collection?
- Have all the potential impacts on terrestrial ecology and onshore ornithology resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in for further assessment?
- Do you agree with the proposed approach to assessment?

3.1.1 Existing Environment

535. The scoping assessment for terrestrial ecology and onshore ornithology has been undertaken based on a desk-based assessment using existing available ecological information to identify receptors present within each onshore study area, which are:

- Hawthorn Pit;
- Creyke Beck; and
- South of Humber.

536. Additional detail on these study areas is provided in section 1.5 of this report.

537. The data sources used to inform this ecological desk-based assessment are shown in **Table 3-1.**

Table 3-1 Ecological Desk Study Data Sources

Data	Source	Date
European designated sites (SPA, SAC, Ramsar sites)	JNCC	2021
UK designated sites SSSI, NNR, Local Nature Reserve (LNR)	JNCC Natural England	2021
UK Habitats of Principal Importance	JNCC Multi-Agency Geographic Information for the Countryside (MAIB) website (www.magic.gov.uk)	2021
Protected and Notable species	NBN website (www.nbnatlas.org)	2021

538. Once the onshore grid connection point(s) are confirmed and the onshore study area refined, an application for biological records data will be submitted to the local records centre for information pertaining to protected, notable and non-native invasive species. Any additional data sets will be identified through feedback received from stakeholders in response to the submission of this Scoping Report.

3.1.1.1 Hawthorn Pit

3.1.1.1.1 Designated sites

539. There are a total of 27 designated sites that are located within the Hawthorn Pit onshore study area. These are presented alongside their qualifying feature(s), where known, in **Table 3-2** and on **Figure 3-1**.

Table 3-2 Designated Sites Within the Hawthorn Pit Onshore Study Area

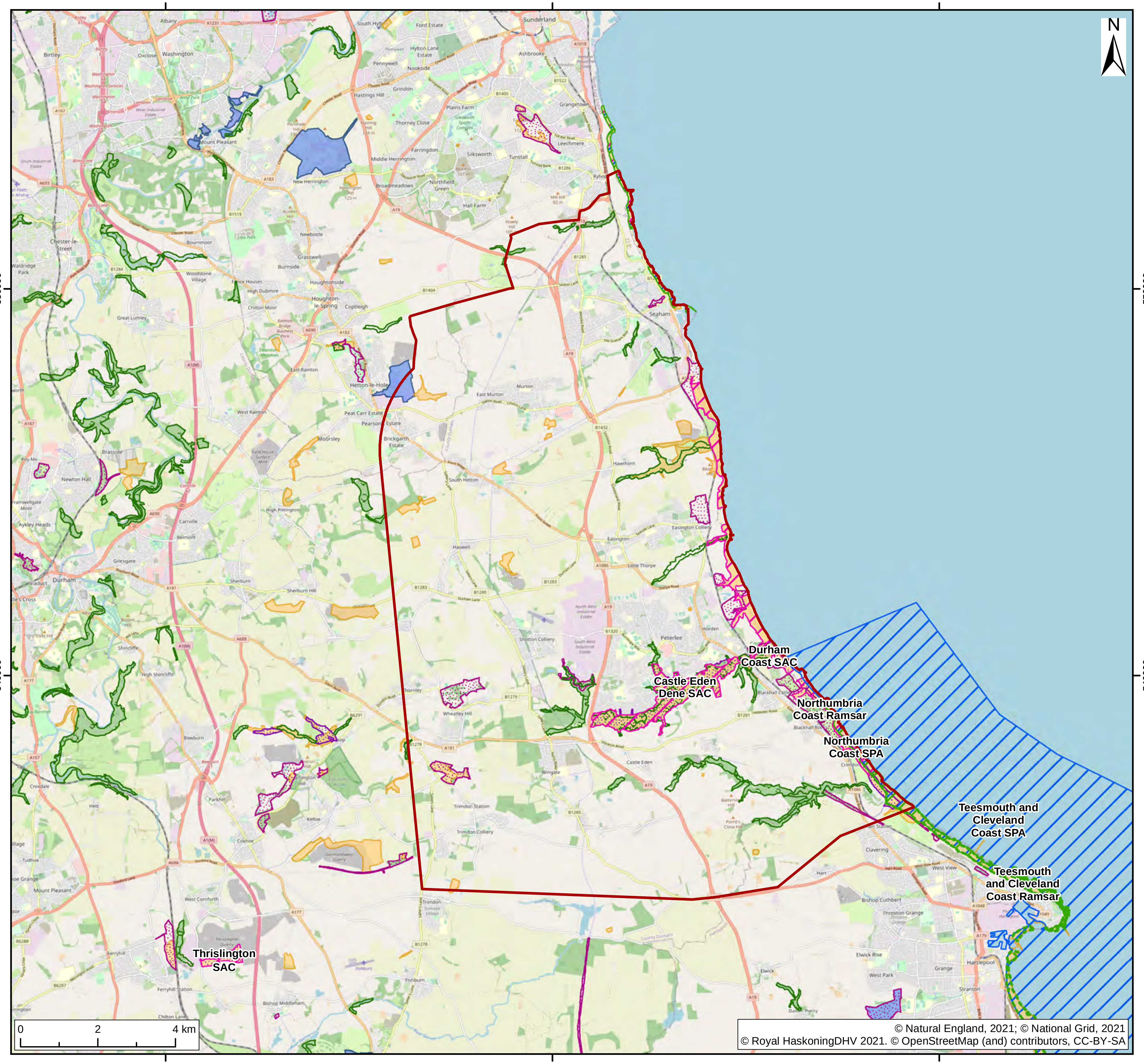
Site name	Designation	Qualifying feature(s)
Northumbria Coast	SPA and Ramsar	The Northumbria Coast SPA and Ramsar consists of breeding Arctic tern *Sterna paradisaea* and Little tern *Sternula albifrons*, alongside non-breeding populations of Purple sandpiper *Calidris maritima* and Turnstone *Arenaria interpres*.
Durham Coast	SSSI and SAC	The Durham Coast between South Shields and Hart Warren is of considerable biological, geological and physiographic interest. It contains most of the paramaritime Magnesian Limestone vegetation in Britain, as well as a species-rich dune system, and supports nationally important numbers of wintering shore birds and breeding little terns which contribute to the internationally important populations of the north-east coast.
Castle Eden Dene	SAC, SSSSI and NNR	Castle Eden Dene is the largest and biologically the richest of a series of steep-sided wooded denes, formed as deep ravines in the Magnesian Limestone and boulder clay of the Durham Coast. Rare and local species include lily-of-the-valley *Convallaria majalis*, herb paris *Paris quadrifolia*, bird's-nest orchid *Neottia nidus-avis* and round-leaved wintergreen *Pyrola rotundifolia*. The insect fauna is exceptionally diverse and includes a large assemblage of nationally and regionally rare species.

Site name	Designation	Qualifying feature(s)
Eppleton Grassland	SSSI	Eppleton Grassland SSSI supports a diverse mosaic of semi-natural habitats, including unimproved neutral and acid grasslands, fen-meadows and rush-pastures, swamps, tall-herb fens, scrub and woodland.
Stony Cut, Cold Hesledon	SSSI	Designated for geological importance.
Hesledon Moor East	SSSI	Hesledon Moor East supports two habitats of particular conservation importance. The majority of the site comprises unimproved neutral pasture, whilst a separate, smaller parcel of land to the south supports a base-rich mire. Scrub and flowing water add further interest to the site.
Hesledon Moor West	SSSI	Hesledon Moor West is a small but very diverse site which includes fen, carr and heathland communities.
Pig Hill	SSSI	The steep hill slopes support an extensive area of primary magnesian limestone grassland in which blue moor-grass *Sesleria albicans* is abundant. The rich assemblage of grassland species includes a number of rare and local species, bird's-eye primrose *Primula farinosa*, adder's-tongue fern *Ophioglossum vulgatum*, lesser club-moss *Selaginella selaginoides*, and grass of Parnassus *Parnassia palustris*, as well as an inland colony of sea plantain *Plantago maritima*.
Dabble Bank	SSSI	The site is important for its communities of nationally scarce grassland on Magnesian Limestone. A feature of the site is grassland characterised by downy oat-grass *Avenula pubescens* which is rare in County Durham. Among the species found is the pyramidal orchid *Anacamptis pyramidalis*, which is rare in the county.

Site name	Designation	Qualifying feature(s)
Tuthill Quarry	SSSI	The site occupies part of a disused quarry, in which areas of primary and secondary magnesian limestone grassland have developed. Such grassland is largely confined to County Durham and increasingly scarce even there. The grasslands at Tuthill Quarry are typical of the type, being characterised by the presence of blue moor-grass *Sesleria albicans*, and small scabious *Scabiosa columbaria*, but a number of less common species are also present, including common butterwort *Pinguicula vulgaris*, and adder's-tongue fern *Ophioglossum vulgatum*. There is a small patch of the nationally scarce bird's-eye primrose *Primula farinosa*, and one of the few records from lowland Durham of lesser clubmoss *Selaginella selaginoides*, is from this site.
Hawthorne Dene	SSSI	Hawthorn Dene supports one of the most extensive, diverse and least disturbed areas of semi-natural woodland on the Magnesian Limestone of County Durham.
Hawthorne Quarry	SSSI	Designated for geological importance.
Yoden Village Quarry	SSSI	Designated for geological importance.
Wingate Quarry	SSSI and LNR	Consists of a large and varied Magnesian limestone grassland, which is nationally scarce and two orchids that are uncommon locally, fragrant orchid *Gymnadenia conopsea*, and frog orchid *Coeloglossum viride*.
Charity Land	SSSI	Consists of grassland with a variety of grassland forbs present.
Hulam Fen	SSSI	This site supports a range of wetland and grassland communities.

Site name	Designation	Qualifying feature(s)
Hart Bog	SSSI	Hart Bog is a small topogenous mire situated within a steep-sided hollow with four distinct types of plant community and supports a considerable invertebrate community including a nationally rare species of water beetle and three locally rare species of harvestmen.
The Bottoms	SSSI	The site's interest lies in an area of unimproved magnesian limestone grassland, in which blue moor-grass *Sesleria albicans*, and small scabious *Scabiosa columbaria*, are the dominant species. This is a scarce vegetation type, which is found only in County Durham and the extent of which has been severely reduced by quarrying and intensive agriculture.
Rockhouse Dene	LNR	This steep sided dene offers an interesting mosaic of woodland, grassland and streamside habitats.
Noses Point	LNR	This site consists of lowland magnesian limestone grassland, ponds and hedgerows, supporting a varied assemblage of bird species.
Easington	LNR	This site consists of grassland meadows and ponds.
Horden Grasslands	LNR	This site consists of lowland magnesian limestone grassland supporting a varied assemblage of small mammals and bird species.
Gore Burn	LNR	The site contains a mosaic of woodlands, grazing fields and approximately one mile of watercourse.
Bracken Hill Wood	LNR	Bracken Hill forms part of an extensive unspoilt wooded valley that offers a variety of woodland and grassland habitats.
Limekiln Gill	LNR	The site consists of coastal heathland and magnesian limestone grassland habitats.

Site name	Designation	Qualifying feature(s)
Blackhall Grasslands	LNR	The site consists of magnesian limestone grassland habitats with a rich and unique group of wildflowers and grasses.
Hart to Haswell Walkway	LNR	The site consists of a rich mix of magnesian limestone grassland, ponds, semi-mature and mature woodland.



Legend:

- Onshore Study Area

Nature Conservation Areas

- Ancient Woodland
- Country Parks
- Local Nature Reserves
- National Nature Reserves
- Proposed Ramsar
- Ramsar
- Special Areas of Conservation
- Special Protection Areas
- Sites of Special Scientific Interest

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A1	C01	03/11/2021	Authorized	LB	CS	HC

Title:

Nature Conservations Areas:
Hawthorn Pit

Figure: 3-1 | Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0024

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:100,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

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3.1.1.1.2 Terrestrial habitats

540. UK Habitats of Principal Importance recorded within the Hawthorn Pit onshore study area include the following:

- ancient woodland;
- maritime cliffs and slopes;
- lowland heath;
- lowland fens;
- lowland meadows;
- deciduous woodland;
- wood pasture and parkland;
- lowland calcareous grassland;
- good quality semi-improved grassland; and
- rocky shores.

3.1.1.1.3 Protected, Notable and Non-native Invasive species

541. The high-level desk review, using the data sources presented in **Table 3-1** has identified the following protected and notable species may be present within the Hawthorn Pit onshore study area:

- badgers *Meles meles;*
- bats;
- dormice *Muscardinus avellanarius*;
- great crested newts *Triturus cristatus;*
- water vole *Arvicola amphibius* and Otter *Lutra lutra;*
- terrestrial and aquatic invertebrates;
- reptiles; and
- birds (breeding and over-wintering).

3.1.1.2 Creyke Beck

3.1.1.2.1 Designated sites

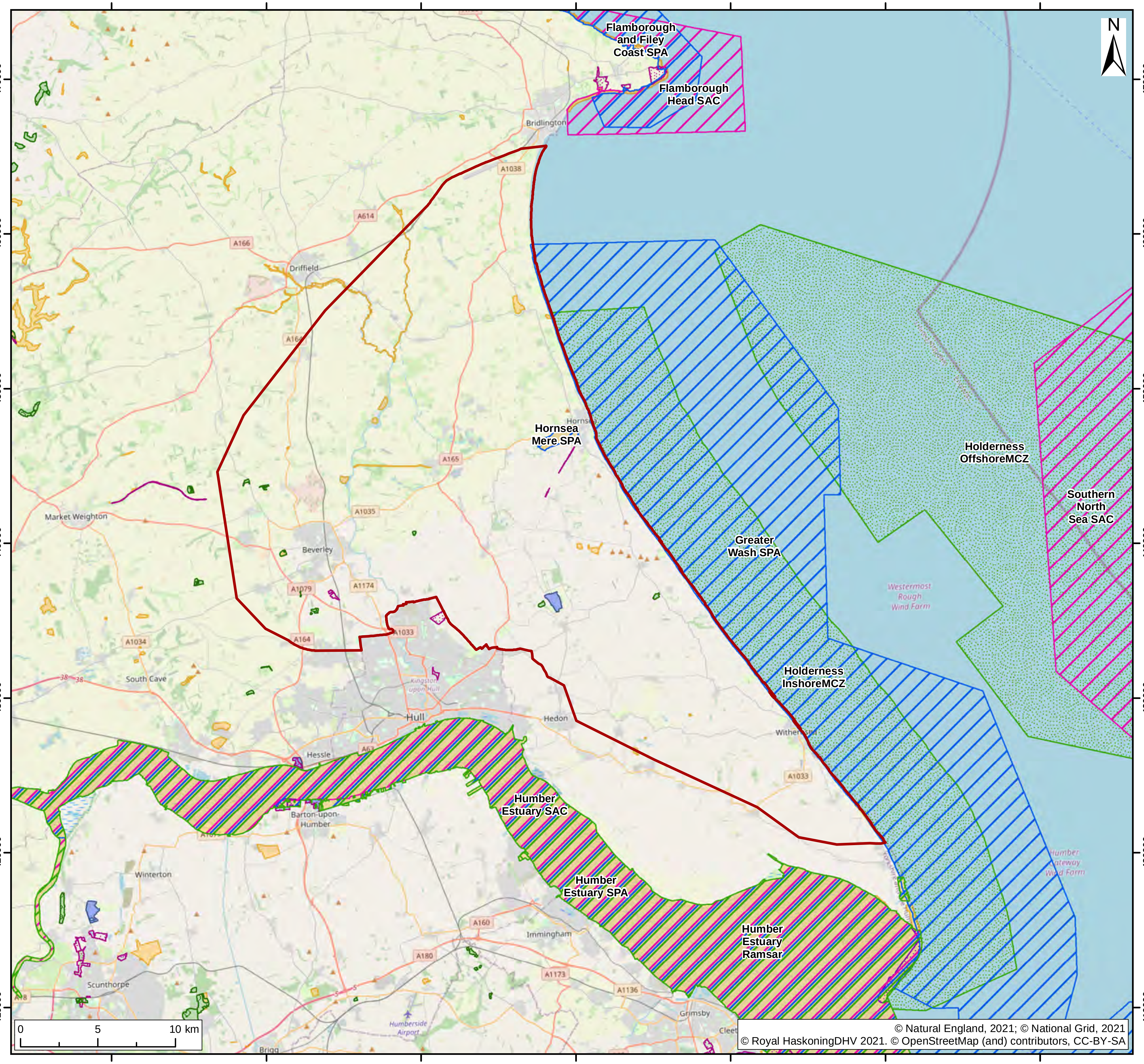
542. There are a total of 17 designated sites that are located within the Creyke Beck onshore study area. These are presented alongside their qualifying feature(s), where known, in **Table 3-3** and on **Figure 3-2**.

Table 3-3 Designated Sites Within the Creyke Beck Onshore Study Areas

Site name	Designation	Qualifying feature(s)
Greater Wash	SPA	The Greater Wash SPA is classified for the protection of red-throated diver *Gavia stellata*, common scoter *Melanitta nigra*, and little gull *Hydrocoloeus minutus* during the non-breeding season, and for breeding Sandwich tern *Sterna sandvicensis*, common tern *Sterna hirundo* and little tern *Sternula albifrons*.
Hornsea Mere	SPA, SSSI	Hornsea Mere is a large, shallow freshwater lake surrounded by areas of fringing swamp, and its catchment includes grassland, woodland and agricultural land.
River Hull Headwaters	SSSI	The headwaters of the River Hull are nationally important as the most northerly chalk stream system in Britain. Also of interest within the site are areas of riverside grassland, woodland and fen; remnants of habitats formerly more widespread but now limited in distribution due to agricultural and urban development.
Skipsea Bail Mere	SSSI	Skipsea Bail Mere is an important site for the study of climatic and vegetational change since the end of the last glaciation.
Withow Gap, Skipsea	SSSI	The site consists of accumulated sediments of an ancient lake (mere).

Site name	Designation	Qualifying feature(s)
Tophill Low	SSSI	Tophill Low consists of two artificial storage reservoirs situated in the River Hull valley that supports wintering wildfowl consisting of nationally important concentrations of gadwall *Mareca strepera*, shoveler *Spatula clypeata* and tufted duck *Aythya fuligula*.
Bryan Mills Field	SSSI	The site notified as Bryan Mills Field comprises a tall fen community which occupies the centre of a small ungrazed field, the surrounding drier areas of which have been planted with trees.
Leven Canal	SSSI	The 5km length of the Leven Canal was cut in 1802 across the marshes and meres of the Hull valley. Following drainage of surrounding marshland, it provided a refuge for wetland plants and now supports an important remnant of this once much more widespread vegetation.
Pulfin Bog	SSSI	Pulfin Bog is one of the last remnants of a fenland reedswamp community in the Hull Valley. It is valued both for its botanical interest, and for the reedbed habitat it provides for breeding birds.
Burton Bushes	SSSI	This oak woodland is known to exceed 200 years in age, and evidence suggests that it is of natural origins. It is considered a good example of the woodland characteristic of Holderness Till soils. The undisturbed nature of the soil profile is an important feature of the site.
Lambwath Meadows	SSSI	Lambwath Meadows consist of a series of low-lying seasonally flooded hayfields which are important as one of the best examples of agriculturally unimproved species-rich, damp neutral alluvial grassland in North Humberside and are maintained by traditional management for hay.

Site name	Designation	Qualifying feature(s)
Kelsey Hill Gravel Pits	SSSI	Designated for geological importance.
Roos Bog	SSSI	Designated for geological importance.
Southorpe	LNR	This site consists of a disused railway line with grassland species present.
Sigglesthorne Station	LNR	No information online, citation will be updated following a biological records search and on request from the LPA.
Beverley Parks	LNR	No information online, citation will be updated following a biological records search and on request from the LPA.
Noddle Hill	LNR	No information online, citation will be updated following a biological records search and on request from the LPA.



Legend:

- Onshore Study Area

Nature Conservation Areas

- Ancient Woodland
- Country Parks
- Local Nature Reserves
- Marine Conservation Zones
- National Nature Reserves
- Ramsar
- Special Areas of Conservation
- Special Protection Areas
- Sites of Special Scientific Interest

A1	C01	03/11/2021	Authorized	LB	CS	HC
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Nature Conservations Areas:
Creyke Beck

Figure: 3-2 Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0025

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:250,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

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3.1.1.2.2 Terrestrial habitats

543. UK Habitats of Principal Importance recorded within the Creyke Beck onshore study areas include the following:

- ancient woodland;
- maritime cliffs and slopes;
- coastal and floodplain grazing marsh;
- deciduous woodland;
- wood pasture and parkland;
- traditional orchards;
- good quality semi-improved grassland;
- lowland meadows;
- reedbeds; and
- lowland fens

3.1.1.2.3 Protected, Notable and Non-native Invasive species

544. The high-level desk review, using the data sources presented in **Table 3-1,** has identified the following protected and notable species may be present within the Creyke Beck onshore study areas:

- badgers;
- bats;
- dormice;
- great crested newts;
- water vole and otter;
- terrestrial and aquatic invertebrates;
- reptiles; and
- birds (breeding and over-wintering).

3.1.1.3 South of Humber

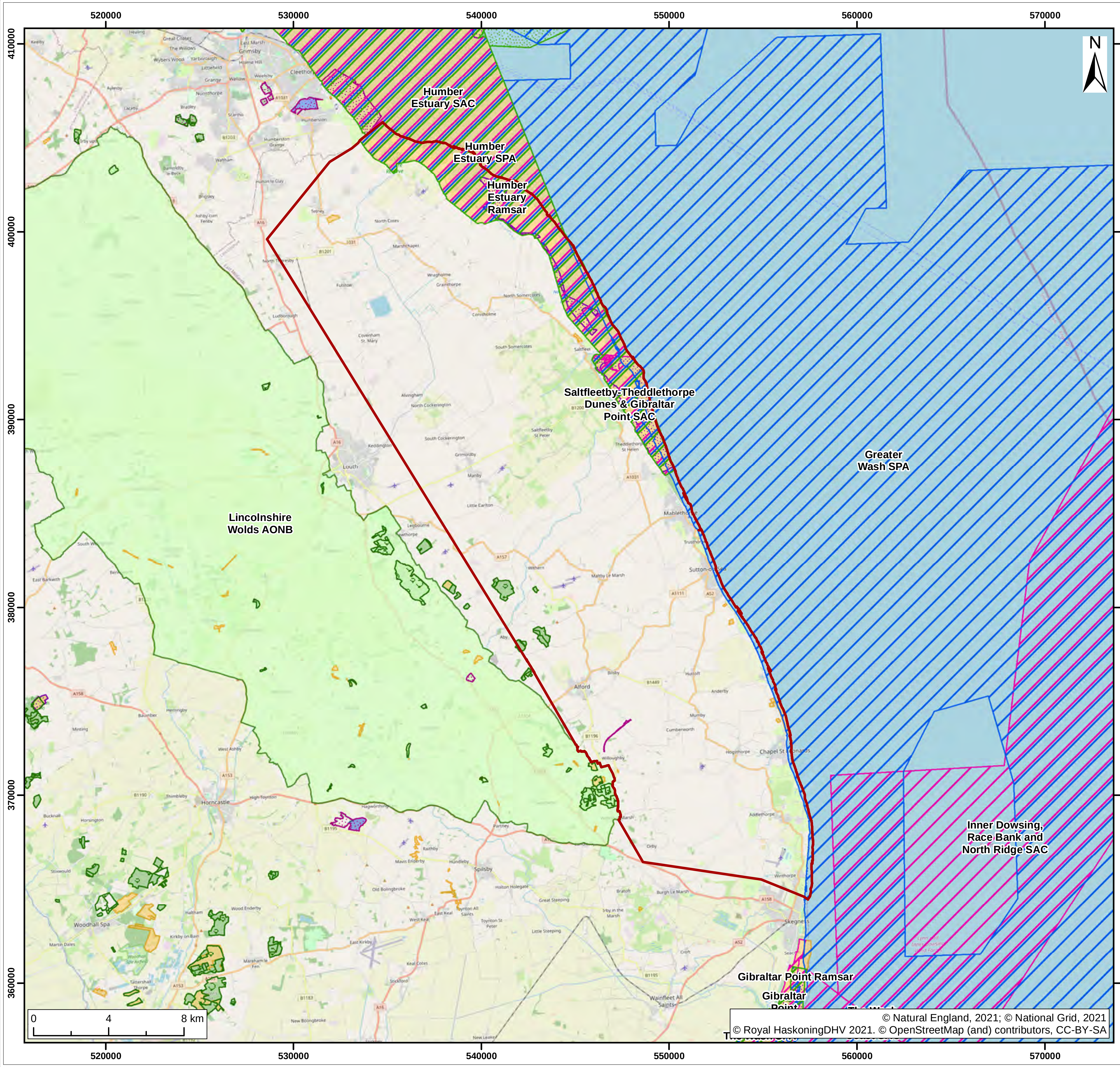
3.1.1.3.1 Designated sites

545. There are a total of nine designated sites that are located within the South of Humber onshore study area. These are presented alongside their qualifying feature(s), where known, in **Table 3-4** and on **Figure 3-3**.

Table 3-4 Designated Sites Within the South of Humber Onshore Study Area

Site name	Designation	Qualifying feature(s)
Greater Wash	SPA	The Greater Wash SPA is classified for the protection of red-throated diver, common scoter and little gull during the non-breeding season, and for breeding Sandwich tern, common tern and little tern.
Humber Estuary	SAC, SPA, Ramsar, SSSI	The Humber is the second-largest coastal plain estuary in the UK, and the largest coastal plain estuary on the east coast of Britain. It is a muddy, macro-tidal estuary, fed by the Rivers Ouse, Trent and Hull, Ancholme and Graveney.
Saltfleetby-Theddlethorpe Dunes and Gibraltar Point	SAC, SSSI	Coastal habitat cited for salt marshes, coastal sand dunes, sand beaches, bog and marshes.
Tetney Blow Wells	SSSI	Four large blow wells, damp woodland, meadow and old water-cress beds.
Sea Bank Clay Pits	SSSI	The Sea Bank Clay Pits comprise a series of isolated flooded clay workings of varying size, depth and topography which now support uncommon aquatic plant communities characteristic of the slightly brackish, eutrophic (nutrient-rich) water in addition to extensive reedbeds and a rich marginal wetland flora.
Hoplands Wood	SSSI	An example of the once extensive oak/ash woods of the calcareous Boulder Clay soils of Lincolnshire.

Site name	Designation	Qualifying feature(s)
Willoughby Meadow	SSSI	The small SSSI meadow on the Middle Marsh Boulder Clay is one of the finest remaining examples of its type in the UK. There is a rich assemblage of meadow plants with approximately 149 species of flowering plants recorded.
Chapel Point to Wolla Bank	SSSI	Designated for geological importance.
Willoughby Branch Line	LNR	The site consists of a disused railway with areas of scrub and grassland.



Legend:

- Onshore Study Area

Nature Conservation Areas

- Ancient Woodland
- Areas of Outstanding Natural Beauty
- Country Parks
- Local Nature Reserves
- Marine Conservation Zones
- National Nature Reserves
- Ramsar
- Special Areas of Conservation
- Special Protection Areas
- Sites of Special Scientific Interest

A1	C01	03/11/2021	Authorized	LB	CS	HC
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Nature Conservations Areas:
South of Humber

Figure: 3-3 | Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0026

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:200,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

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3.1.1.3.2 Terrestrial habitats

546. UK Habitats of Principal Importance recorded within the South of Humber onshore study area include the following:

- coastal saltmarsh;
- coastal sand dunes;
- saline lagoons;
- mudflats;
- coastal and floodplain grazing marsh;
- good quality semi-improved grassland;
- lowland meadows;
- lowland calcareous grassland;
- lowland fens;
- reedbeds;
- deciduous woodland;
- ancient woodland; and
- woodpasture and parkland.

3.1.1.3.3 Protected, Notable and Non-native Invasive species

547. The high-level desk review, using the data sources presented in **Table 3-1**, has identified the following protected and notable species may be present within the South of Humber onshore study area:

- badgers;
- bats;
- dormice;
- great crested newts;
- water vole and otter;
- terrestrial and aquatic invertebrates;
- reptiles; and
- birds (breeding and over-wintering).

3.1.2 Approach to Data Collection

548. The following information has been considered during the production of this Scoping Report and will be considered further within the PEIR/ES where relevant matters are scoped in to the EIA process.

549. This scoping assessment has been undertaken based on a desk-based assessment. Detailed survey information is required to identify the potential impacts on terrestrial ecology receptors within each onshore study area. This information will be obtained through an Extended Phase 1 Habitat Survey of the preferred locations for the onshore export cable corridor(s), landfall(s) and substation(s) within the onshore study areas and followed, where required, by targeted species-specific surveys. Information on habitats and their condition within each onshore study area will be obtained in accordance with the UK Habitat Classification system methodology. The findings of which will be used to inform any potential future biodiversity net gain opportunities.

550. **Table 3-5** sets out the ecological surveys that have been identified at this time as being required within each onshore study area.

Table 3-5 Ecological Scoping Surveys Required in Relation to each Onshore Study Area

Survey title	Proposed year of survey	Summary of proposed survey
Extended Phase 1 Habitat Survey	2022	Will cover the preferred onshore export cable corridor(s), landfall location(s) and onshore substation(s) plus a 50m buffer and will include the mapping of habitats and identification of all UK protected species potential alongside recommendations for targeted species-specific Phase 2 surveys.
Depending on the outcome of the Extended Phase 1 Habitat Survey and the biological records results, the following targeted species-specific survey may be required.		
Wintering bird surveys	October 2021 to March 2022	Will cover all suitable habitats (including any functionally linked habitats) that may be affected by the Projects and/or afforded protection for over-wintering birds.

Survey title	Proposed year of survey	Summary of proposed survey
Great crested newt presence/absence survey	2022	Will consist of a Habitat Suitability Index survey of all ponds within a 250m buffer of the onshore export cable route(s), landfall(s) and onshore substation(s), followed by an Environmental DNA (eDNA) survey of all suitable ponds to determine the presence or likely absence of Great crested newts.
Bat activity survey and bat roost survey	2022	Will consist of activity transect surveys of all suitable commuting/foraging habitats and all potential bat roosts that may be affected by the Projects.
Water vole and otter survey	2022	Will cover all suitable aquatic habitats that may be affected by the Projects.
Reptile survey	2022	Will cover all suitable habitats that may support significant populations of reptiles and which may be affected by the Projects.
Dormice survey	2022	Will cover all suitable woodland habitats that may be affected by the Projects.
Breeding bird survey	2022	Will cover all suitable habitats (including any functionally linked habitats) that may be affected by the Projects and / or afforded protection for breeding birds.
Invertebrate survey (terrestrial and aquatic)	2022	Will cover all terrestrial and / or aquatic habitats that may support rare or notable invertebrates and which may be affected by the Projects.

3.1.3 Potential Impacts

551. Potential impacts have been identified from the information available at the time of preparing this document and based on the project description as set out in section 1.4. The key aspects of construction with respect to onshore ecological receptors are:

- onshore substation construction works; and
- onshore export cable corridor(s) and landfall excavation works and supporting activities during construction.

552. The Terrestrial Ecology and Onshore Ornithology assessment is likely to have key inter-relationships with Geology and Land Quality, Flood Risk and Hydrology, Land Use, Noise and Vibration and Air Quality. These will be considered where relevant.

3.1.3.1 Potential impacts during construction

3.1.3.1.1 Impacts to designated sites

553. Statutory and non-statutory designated sites for nature conservation will be avoided wherever possible as part of the site selection process.

554. Potential indirect impacts upon statutory and non-statutory designated sites that have been scoped into the impact assessment consist of the following:

- disturbance caused by works associated with the onshore substation(s), landfall(s) and onshore export cable corridor(s) due to activities which generate fugitive emissions (i.e. noise and dust);
- activities which may alter the local drainage patterns; and
- activities which result in changes in land use type adjacent to statutory and non-statutory designated sites.

3.1.3.1.2 Permanent and temporary loss of habitats

555. There is likely to be some temporary loss of habitats as a result of the Projects, however this will be dependent on the final location of the infrastructure. The majority of impacts will seek to be avoided through careful site selection of onshore substation(s) and routeing of the onshore export cable corridor(s) including crossing points and the use of HDD methodologies where feasible and possible to do so.

556. Potential impacts that have been scoped into the ecological impact assessment include the temporary loss of Habitats of Principal Importance during trenching activities, such as loss of sections of hedgerows. Key considerations are likely to be habitats which support protected and notable species such as bat, water vole, otter, badger, reptiles, dormice, great crested newt and potentially invertebrates.

3.1.3.1.3 Temporary habitat fragmentation and species isolation

557. Potential impacts that have been scoped into the ecological impact assessment include the potential for temporary habitat fragmentation and species isolation as a result of construction, particularly with regard to the onshore export cable corridor(s). This is particularly relevant for linear habitats such as hedgerows.

3.1.3.1.4 Impacts on protected species or upon their resting or breeding sites

558. The potential exists for protected species to be impacted by construction activities either physically or from disturbance. Until results from the detailed ecological field surveys are available, all UK legally protected and notable species are assumed to be potentially affected by the Projects. Therefore, potential impacts on protected species such as water vole, otter, bats, badger, great crested newt, dormice, reptiles and certain invertebrates have been scoped in to the assessment.

3.1.3.1.5 Spread of non-native invasive species

559. There is potential for the presence of non-native invasive species, which could be spread by construction activities. Control of invasive species, where required, would be incorporated into Outline Ecological Management Plans for the Projects. However, this has been scoped in to the assessment.

3.1.3.2 Potential impacts during operation

560. Planned maintenance at the onshore substation(s) or routine access and maintenance at link boxes along the onshore export cable corridor(s) is anticipated to be localised with a minimal likelihood of disturbance expected to the adjacent habitats and species. During operation of the onshore substation(s) there may be continuous operational noise and lighting which have the potential to cause disturbance and illumination on adjacent habitats and species.

561. In the unlikely event of a cable failure, there may be a need to access the buried cables to enable the replacement of a failed cable section. Such reactive repairs are expected to have potential impacts similar to those of construction, however they would be expected to be more localised, of smaller scale and temporary in nature. These potential impacts have been scoped in to the assessment.

562. Any planting which may be included as part of potential screening proposals could result in a beneficial impact.

3.1.3.3 Potential impacts during decommissioning

563. No decision has been made regarding the final decommissioning policy for the onshore substation(s), as it is recognised that industry best practice, rules and legislation change over time.

564. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning. The Projects will prepare and agree a decommissioning plan with the regulator at that time.

565. It is anticipated that the decommissioning impacts will be similar in nature to those of construction and therefore the following impacts have been scoped into the ecological impact assessment:

- impacts to designated sites;
- impacts as a result of permanent and temporary loss of habitats;
- impacts as a result of habitat fragmentation;
- impacts to UK legally projected and notable species; and
- impacts as a result of the spread of invasive non-native species.

3.1.3.4 Potential cumulative impacts

566. Onshore cumulative impacts will be considered as part of the EIA process. Any other project with the potential to result in impacts that may act cumulatively with the Projects will be identified during consultation and following a review of available information.

567. The assessment would consider the potential for significant cumulative impacts to arise as a result of the construction, operation and decommissioning of the Projects in the context of other developments that are existing, consented or at application stage.

568. Cumulative impacts as a result of the works required by National Grid ESO to connect the Projects to the electricity transmission network will be included as part of this assessment.

3.1.3.5 Summary of potential impacts

569. **Table 3-6** shows a summary of potential impacts during different phases of the Projects

Table 3-6 Summary of Impacts Relating to Terrestrial Ecology and Onshore Ornithology. Topics to be Scoped In (✓) and Out (x)

Potential impacts	Construction	Operation	Decommissioning
Impacts to designated sites	✓	✓	✓
Permanent and temporary loss of habitats	✓	✓	✓
Temporary habitat fragmentation and species isolation	✓	✓	✓
Impacts on protected species or on their resting or breeding sites	✓	✓	✓
Disturbance of bird populations	✓	✓	✓
Spread of non-native invasive species	✓	✓	✓
Cumulative impacts	✓	✓	✓

3.1.4 Approach to Impact Assessment

570. An Ecological Impact Assessment (EcIA) will be undertaken in accordance with the industry guidance, specifically the CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal (September 2018).

571. The approach to assessment and data gathering will be discussed and agreed as part of the EPP (detailed in section 1.6) prior to commencement. Consultation will be undertaken at key stages throughout the EIA process.

572. The CIEEM guidelines aim to predict the residual impacts on important ecological features affected, either directly or indirectly by a development, once all the appropriate mitigation has been implemented.

573. The approach to determining the significance of an impact follows a systematic process for all impacts. This involves identifying, qualifying and, where possible, quantifying the sensitivity, value and magnitude of all ecological receptors which have been scoped into this assessment. Using this information, a significance of each potential impact can be determined.

574. Although not currently a mandatory requirement for NSIPs, RWE Renewables are keen to explore opportunities for biodiversity net gain as the Projects develop and where possible will be included within the Projects' design. Where biodiversity net gain opportunities have been agreed, the EcIA will include an assessment of these opportunities and appended to the ES.

3.2 Geology and Land Quality

575. This section of the Scoping Report identifies the geology and land quality receptors relevant to the Projects. The potential effects of construction, operation and maintenance, and decommissioning of the Projects on geology and land quality are considered throughout this section.

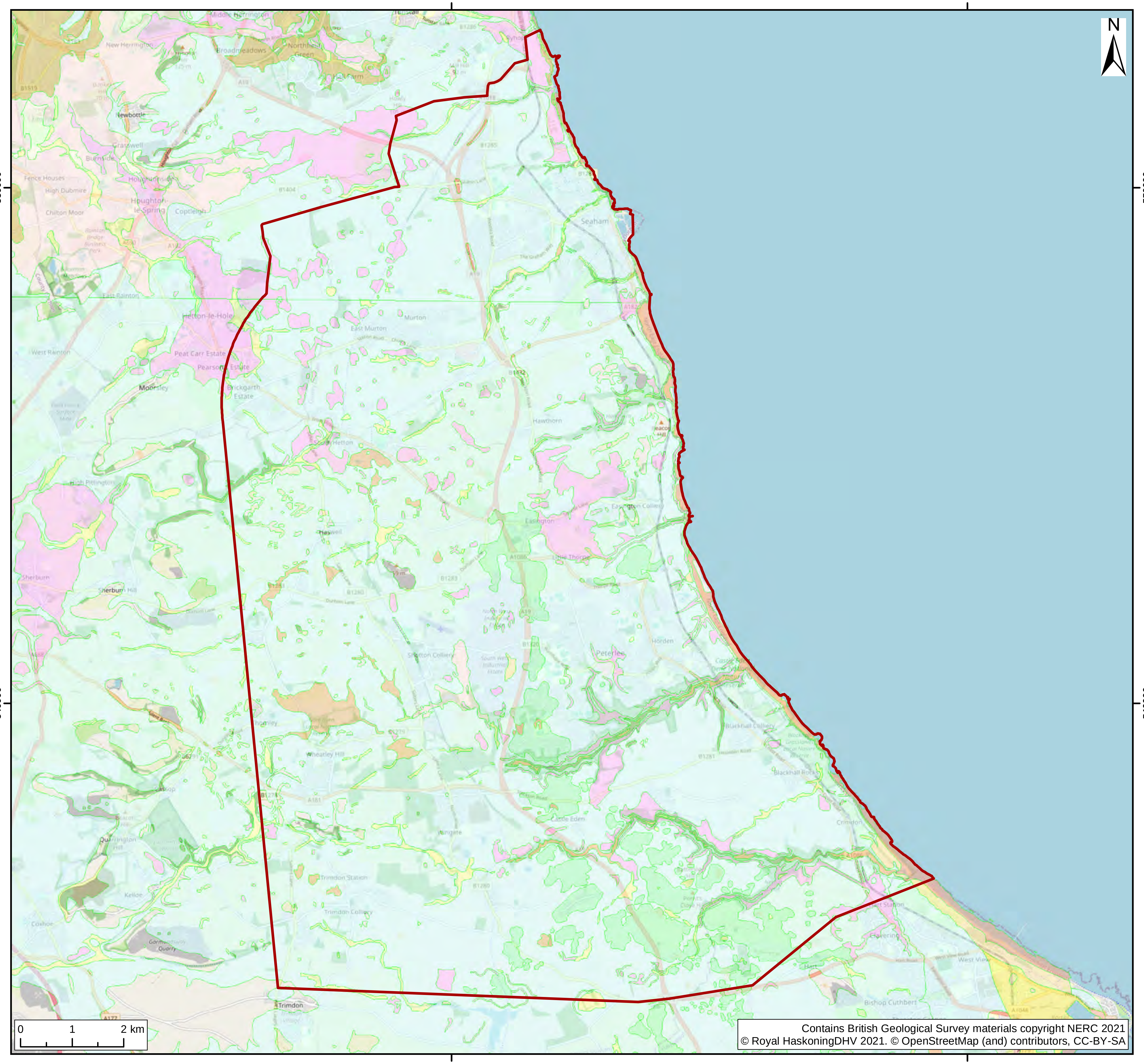
The following questions are posed to consultees to help them frame and focus their response to the geology and land quality scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Do you agree with the approach to data collection?
- Have all the potential impacts on geology and land quality resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in for further assessment?
- Do you agree with the proposed approach to assessment?

3.2.1 Existing Environment

3.2.1.1 Geology and Hydrogeology

576. A review of the published geological mapping available on the BGS Geoindex website (BGS, 2021) and BGS maps portal (BGS, 2021) indicates that the onshore study areas are underlain by a number of different superficial and bedrock deposits as summarised below in **Table 3-7** and shown on **Figure 3-4** to **Figure 3-9**. It is also considered possible that localised areas of Made Ground associated with, for example, previously developed or infilled land may underlie parts of the onshore study areas.



Legend:

Onshore Study Area

Superficial Geology

- Pelaw Clay Member - Clay
- Glaciolacustrine Deposits, Devensian - Clay & Silt
- Glaciofluvial Deposits, Devensian - Sand & Gravel
- Till, Devensian - Diamicton
- Alluvium - Clay, Silt, Sand & Gravel
- Lacustrine Deposits - Clay & Silt
- Hummocky (Moundy) Glacial Deposts, Devensian - Diamicton, Sand & Gravel
- Blown Sand - Sand
- Marine Beach Deposits - Sand & Gravel
- Tidal Flat Deposits - Sand, Silt & Clay
- Raised Marine Deposits - Sand, Silt & Clay

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Title:

Superficial Geology:
Hawthorn Pit

Figure: 3-4 | Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0049

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:75,000

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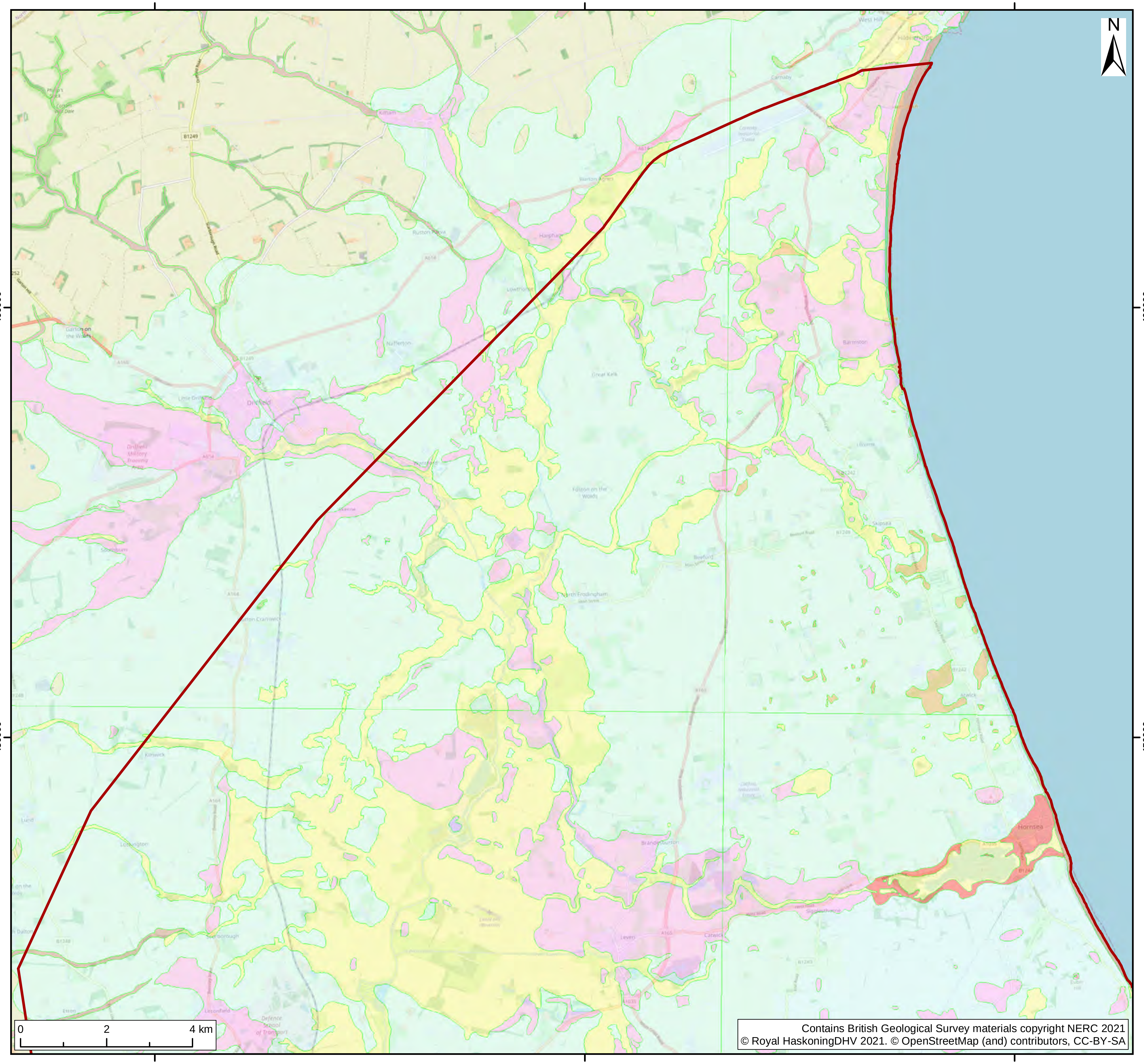

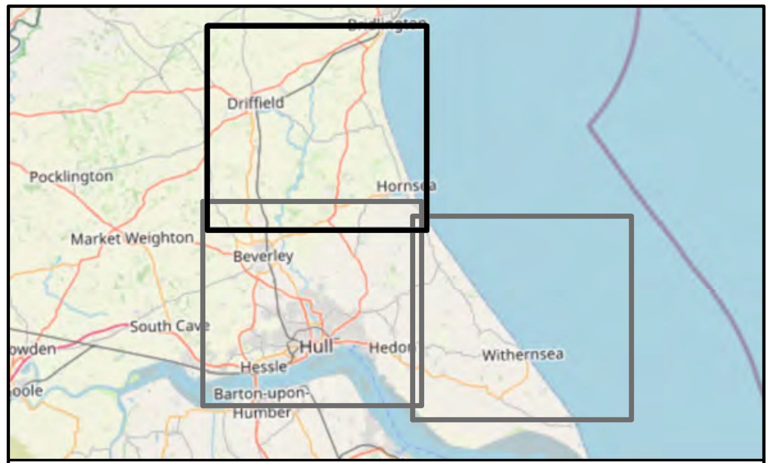

Legend:

Onshore Study Area

Superficial Geology

- Sand & Gravel of Uncertain Age & Origin - Sand &
- River Terrace Deposits (Undifferentiated) - Sand & Gravel
- Glaciofluvial Deposits, Devensian - Sand & Gravel
- Till, Devensian - Diamicton
- Alluvium - Clay, Silt, Sand & Gravel
- Lacustrine Deposits - Clay & Silt
- Head - Clay, Silt, Sand & Gravel
- Kelsey Hill Gravels (Beds) - Sand & Gravel
- Kelsey Hill Gravels (Beds) - Clay & Silt
- Bielby Sand Member - Sand, Gravelly
- Breighton Sand Formation - Sand, Silty
- Marine Beach Deposits - Sand & Gravel
- Tidal Flat Deposits - Sand, Silt & Clay
- Beach & Tidal Flat Deposits (Undifferentiated) - Clay, Silt & Sand

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
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Title:

Superficial Geology:
Creyke Beck (Page 1 of 3)

Figure: 3-5a | Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0050

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:90,000

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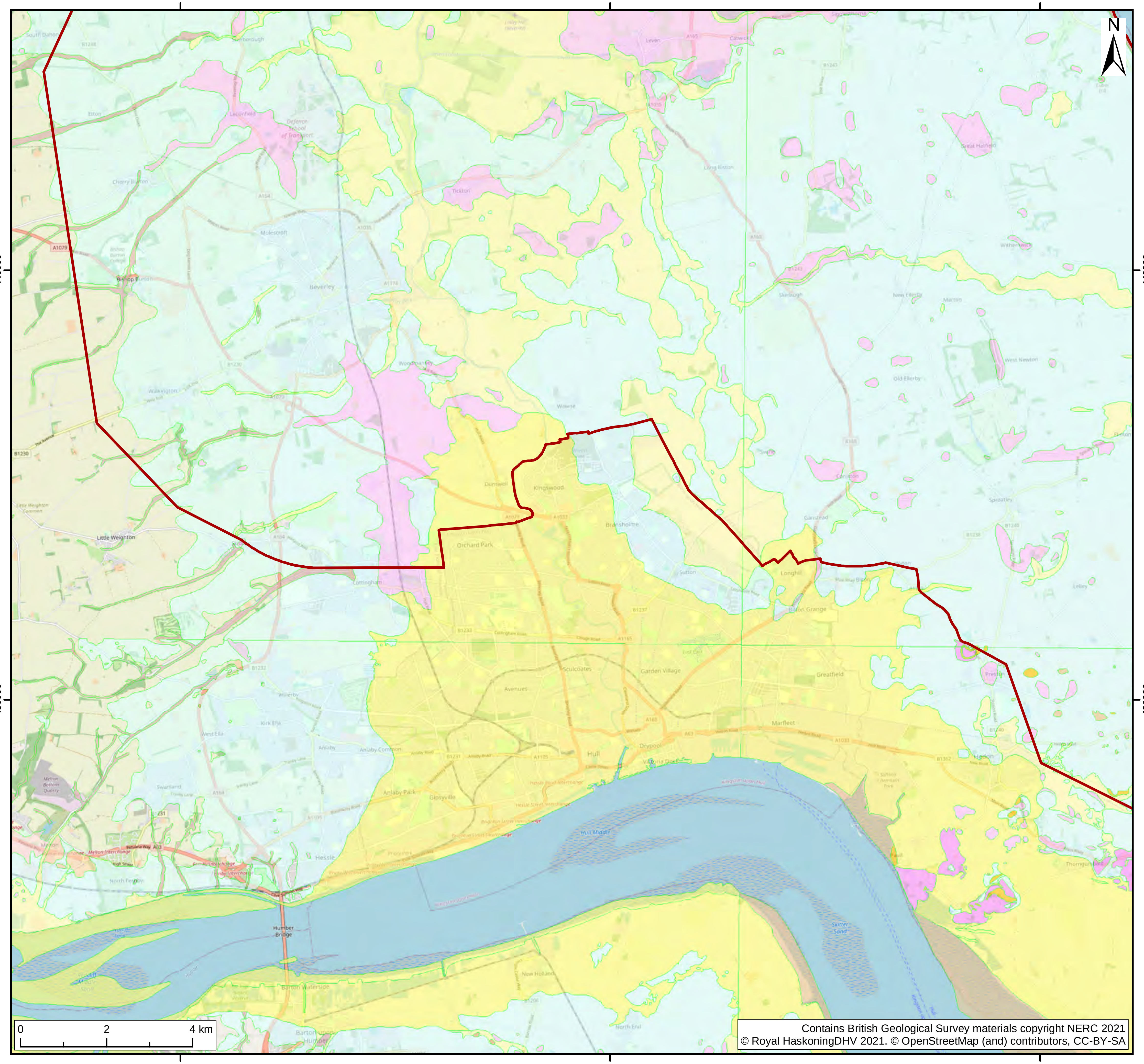

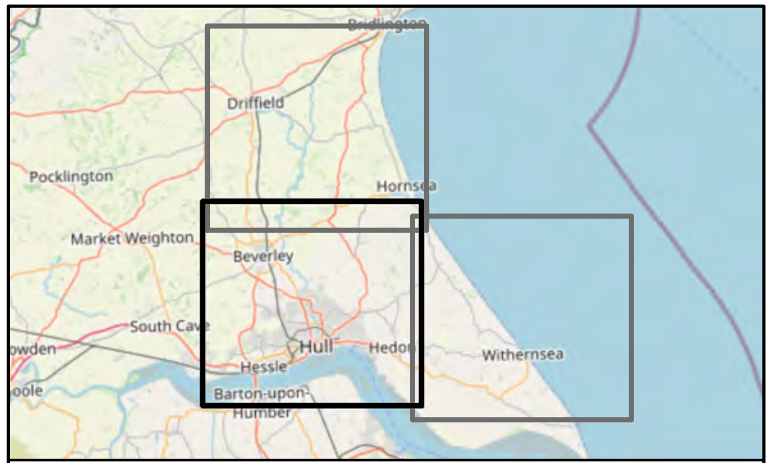

Legend:

Onshore Study Area

Superficial Geology

- Sand & Gravel of Uncertain Age & Origin - Sand &
- River Terrace Deposits (Undifferentiated) - Sand & Gravel
- Glaciofluvial Deposits, Devensian - Sand & Gravel
- Till, Devensian - Diamicton
- Alluvium - Clay, Silt, Sand & Gravel
- Lacustrine Deposits - Clay & Silt
- Head - Clay, Silt, Sand & Gravel
- Kelsey Hill Gravels (Beds) - Sand & Gravel
- Kelsey Hill Gravels (Beds) - Clay & Silt
- Bielby Sand Member - Sand, Gravelly
- Breighton Sand Formation - Sand, Silty
- Marine Beach Deposits - Sand & Gravel
- Tidal Flat Deposits - Sand, Silt & Clay
- Beach & Tidal Flat Deposits (Undifferentiated) - Clay, Silt & Sand

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A1	C01	03/11/2021	Authorized	LB	KD	HC

Title:

Superficial Geology:
Creyke Beck (Page 2 of 3)

Figure: 3-5b | Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0050

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:90,000

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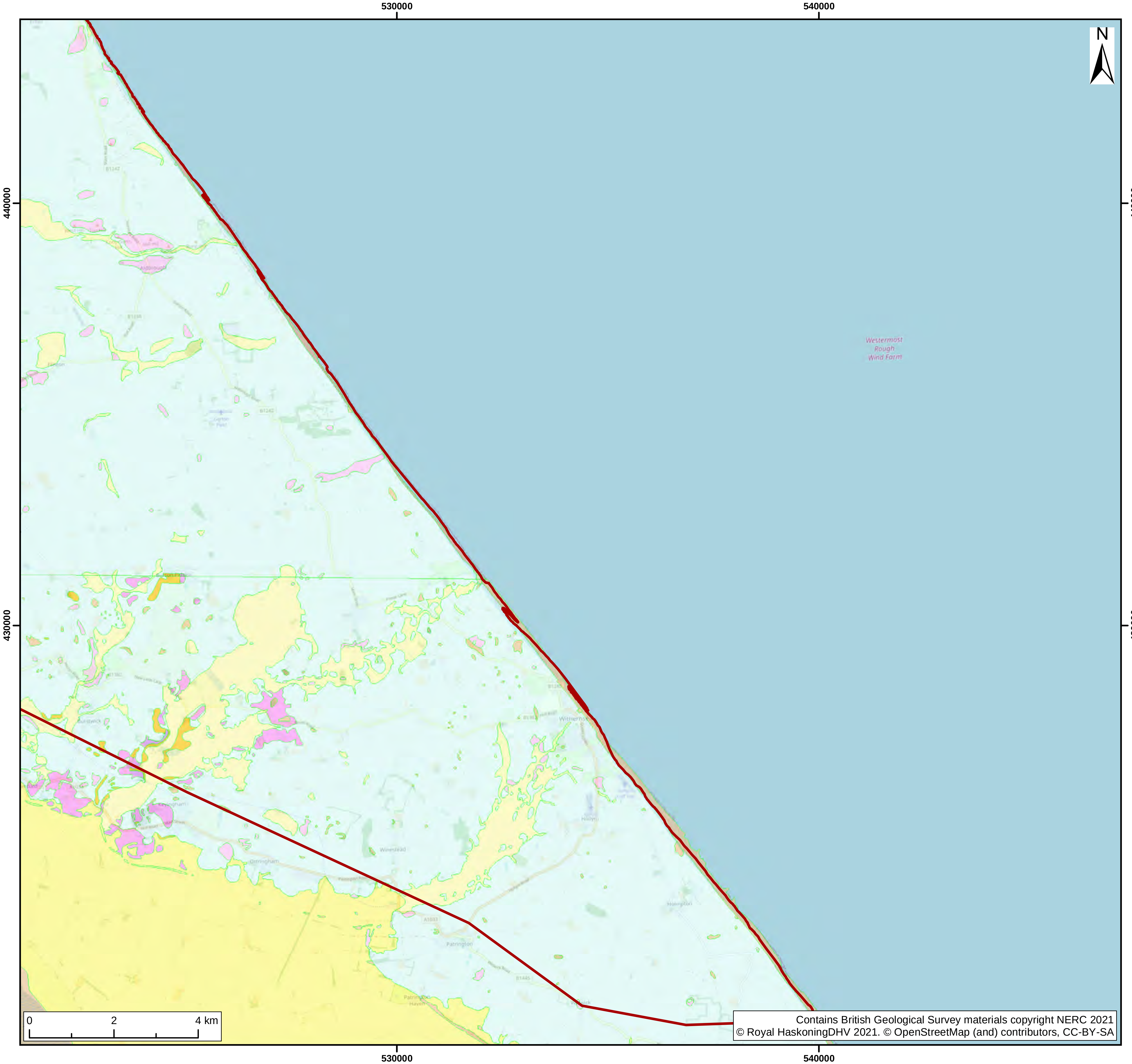

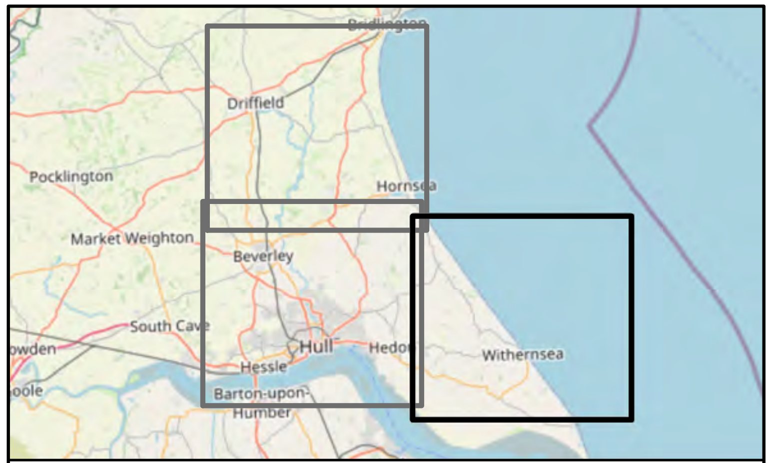

Legend:

Onshore Study Area

Superficial Geology

- Sand & Gravel of Uncertain Age & Origin - Sand &
- River Terrace Deposits (Undifferentiated) - Sand & Gravel
- Glaciofluvial Deposits, Devensian - Sand & Gravel
- Till, Devensian - Diamicton
- Alluvium - Clay, Silt, Sand & Gravel
- Lacustrine Deposits - Clay & Silt
- Head - Clay, Silt, Sand & Gravel
- Kelsey Hill Gravels (Beds) - Sand & Gravel
- Kelsey Hill Gravels (Beds) - Clay & Silt
- Bielby Sand Member - Sand, Gravelly
- Breighton Sand Formation - Sand, Silty
- Marine Beach Deposits - Sand & Gravel
- Tidal Flat Deposits - Sand, Silt & Clay
- Beach & Tidal Flat Deposits (Undifferentiated) - Clay, Silt & Sand

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SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Superficial Geology:
Creyke Beck (Page 3 of 3)

Figure: 3-5c | Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0050

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:90,000

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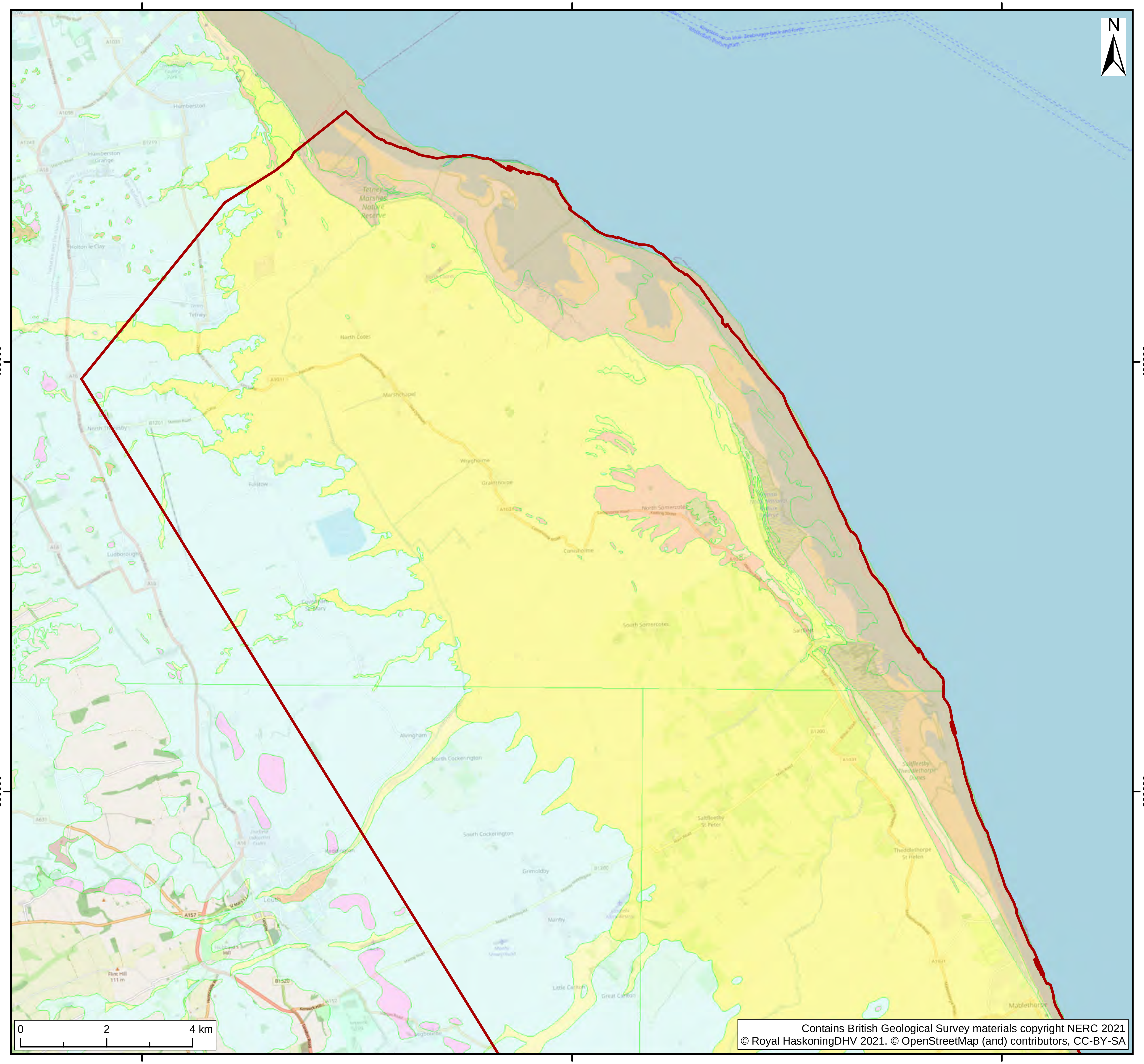

Legend:

Onshore Study Area

Superficial Geology

- River Terrace Deposits (Undifferentiated) - Sand & Gravel
- Glaciofluvial Deposits, Devensian - Sand & Gravel
- Till, Devensian - Diamicton
- Alluvium - Clay, Silt, Sand & Gravel
- Lacustrine Deposits - Clay & Silt
- Head - Clay, Silt, Sand & Gravel
- Blown Sand - Sand
- Storm Beach Deposits - Sand, Gravel & Boulders / Storm Beach Deposits - Sand & Gravel
- Tidal Flat Deposits - Clay & Silt / Tidal Flat Deposits - Sand & Gravel
- Beach & Tidal Flat Deposits (Undifferentiated) - Clay, Silt & Sand
- Peat - Peat

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SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Superficial Geology:
South of Humber (Page 1 of 2)

Figure: 3-6a | Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0051

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:90,000

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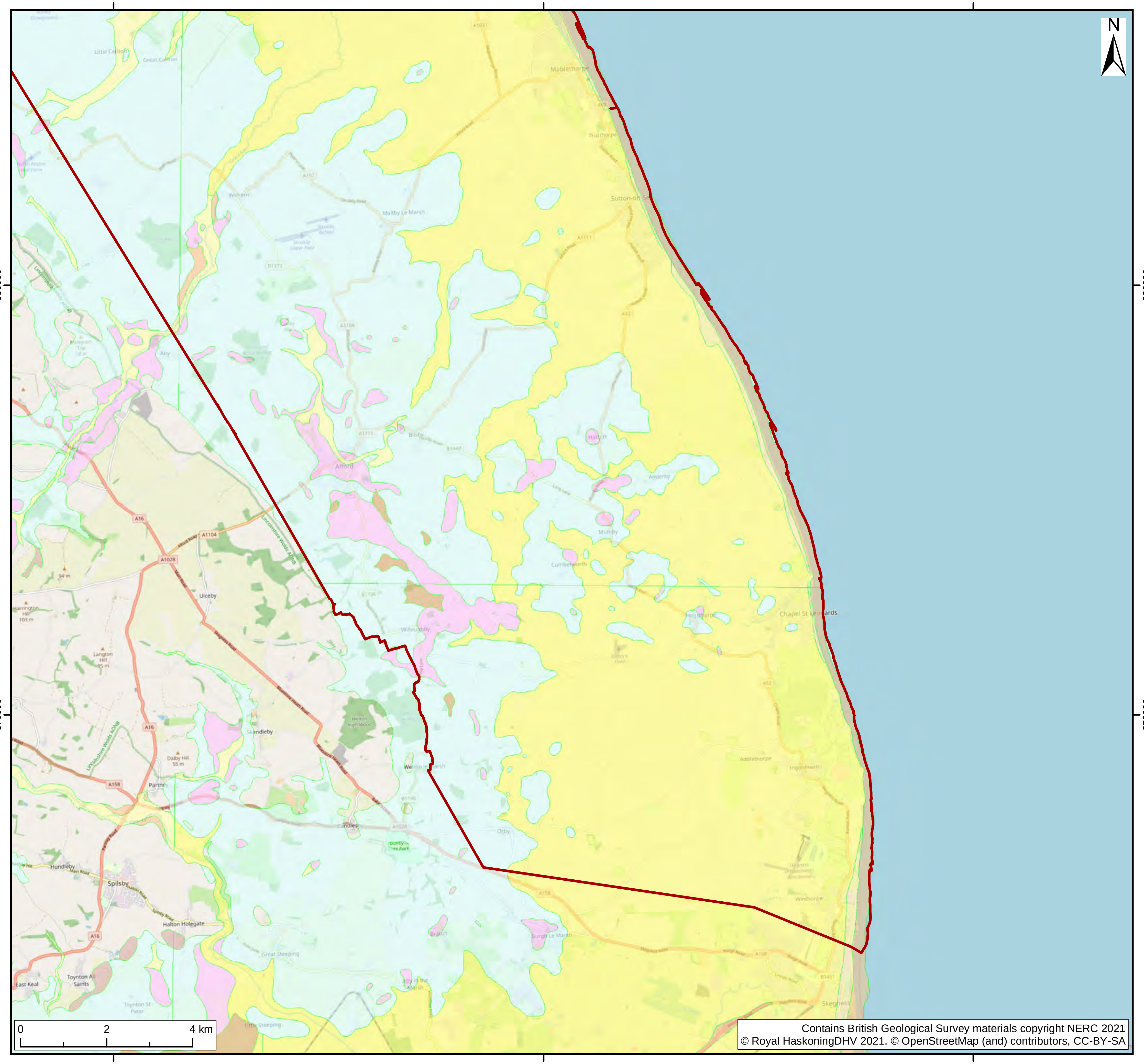

Legend:

Onshore Study Area

Superficial Geology

- River Terrace Deposits (Undifferentiated) - Sand & Gravel
- Glaciofluvial Deposits, Devensian - Sand & Gravel
- Till, Devensian - Diamicton
- Alluvium - Clay, Silt, Sand & Gravel
- Lacustrine Deposits - Clay & Silt
- Head - Clay, Silt, Sand & Gravel
- Blown Sand - Sand
- Storm Beach Deposits - Sand, Gravel & Boulders / Storm Beach Deposits - Sand & Gravel
- Tidal Flat Deposits - Clay & Silt / Tidal Flat Deposits - Sand & Gravel
- Beach & Tidal Flat Deposits (Undifferentiated) - Clay, Silt & Sand
- Peat - Peat

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A1	C01	03/11/2021	Authorized	LB	KD	HC

Title:

Superficial Geology:
South of Humber (Page 2 of 2)

Figure: 3-6b | Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0051

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:90,000

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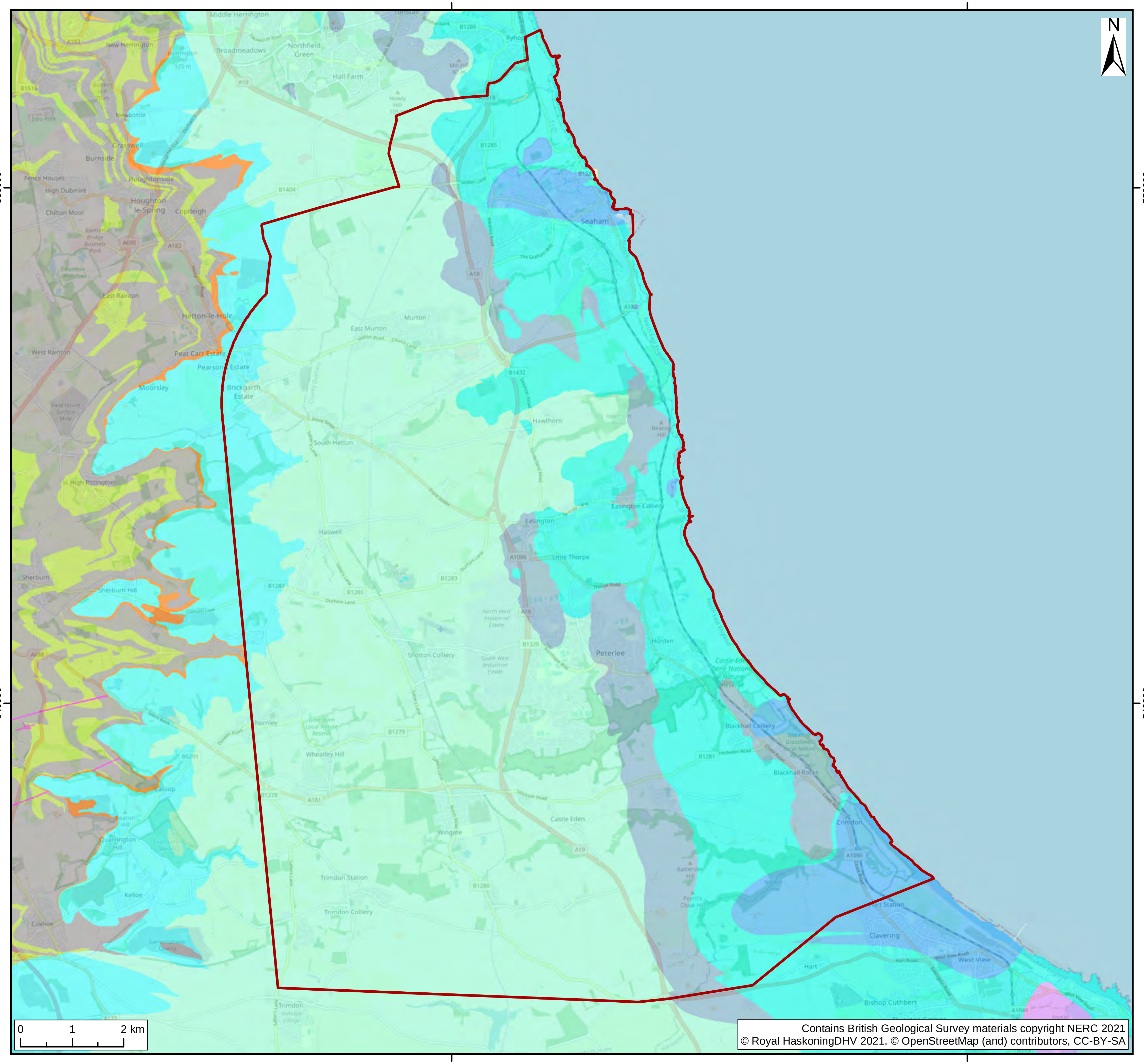

Legend:

Onshore Study Area

Bedrock

- Pennine Middle Coal Measure Formation - Mudstone, Siltstone & Sandstone
- High Main Post Member - Sandstone
- Yellow Sands Formation - Sandstone
- Raisey Formation - Dolostone
- Ford Formation - Dolostone
- Ford Formation (Shelf-edge Reef) - Dolostone
- Roker Formation - Dolostone
- Seaham Formation - Limestone, Dolomitic
- Hartlepool Anhydrite Formation - Anhydrite-Stone

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Title:

Bedrock Geology:
Hawthorn Pit

Figure: 3-7 | Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0046

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:75,000

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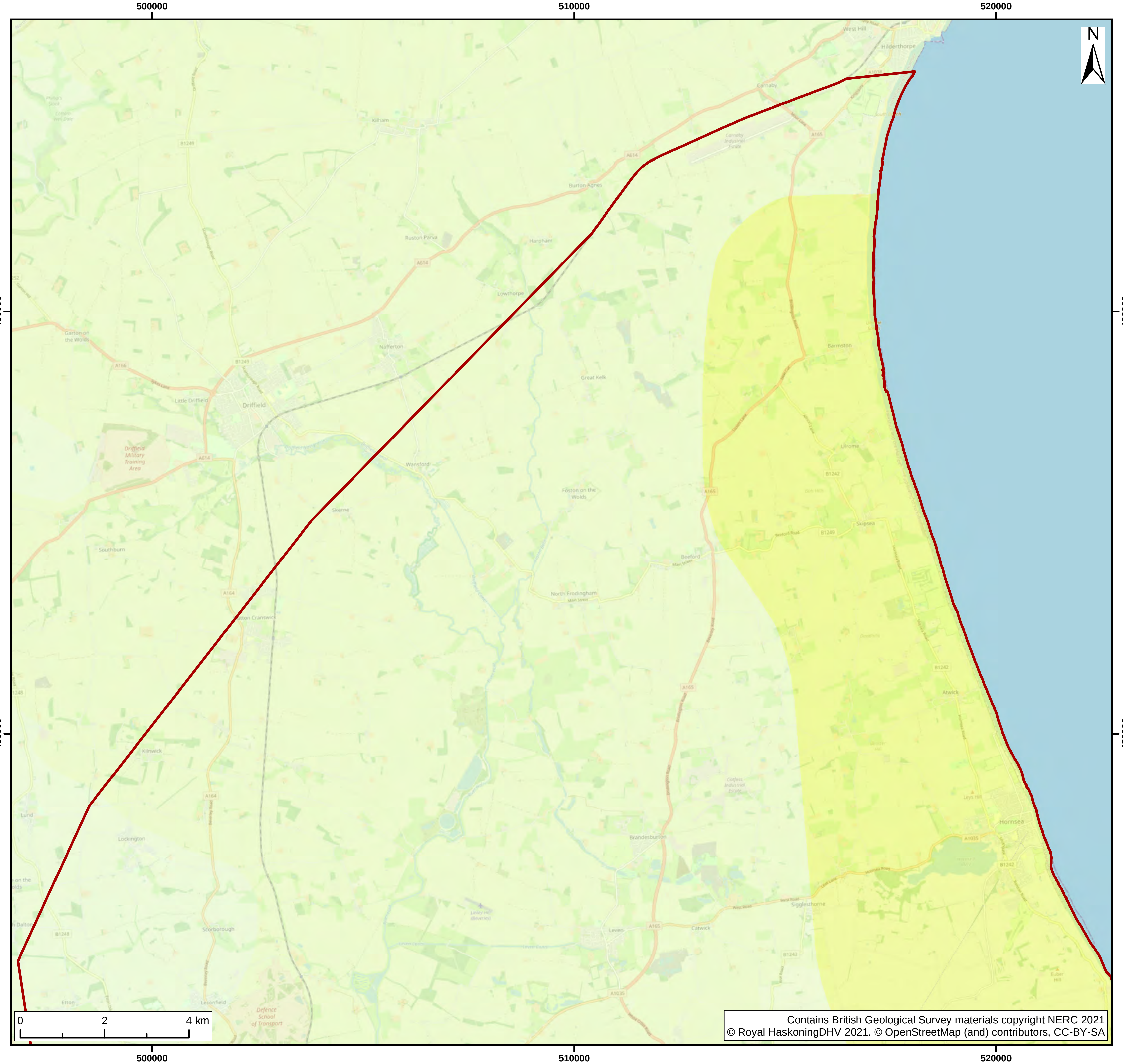

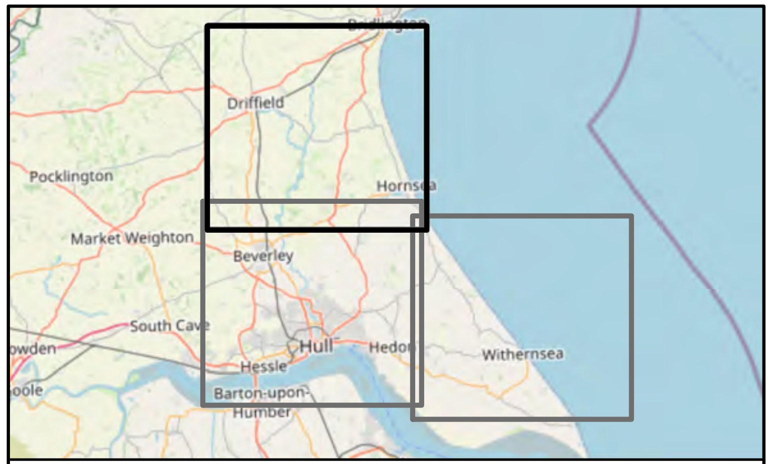

Legend:

Onshore Study Area

Bedrock

- Flamborough Chalk Formation - Chalk
- Rowe Chalk Formation - Chalk
- Welton Chalk Formation - Chalk
- Ferriby Chalk Formation - Chalk
- Ancholme Group - Mudstone
- Ampthill Clay Formation - Mudstone
- West Walton Formation - Mudstone & Siltstone

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A1	C01	03/11/2021	Authorized	LB	KD	HC

Title:

Bedrock Geology:
Creyke Beck (Page 1 of 3)

Figure: 3-8a | Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0047

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:90,000

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Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

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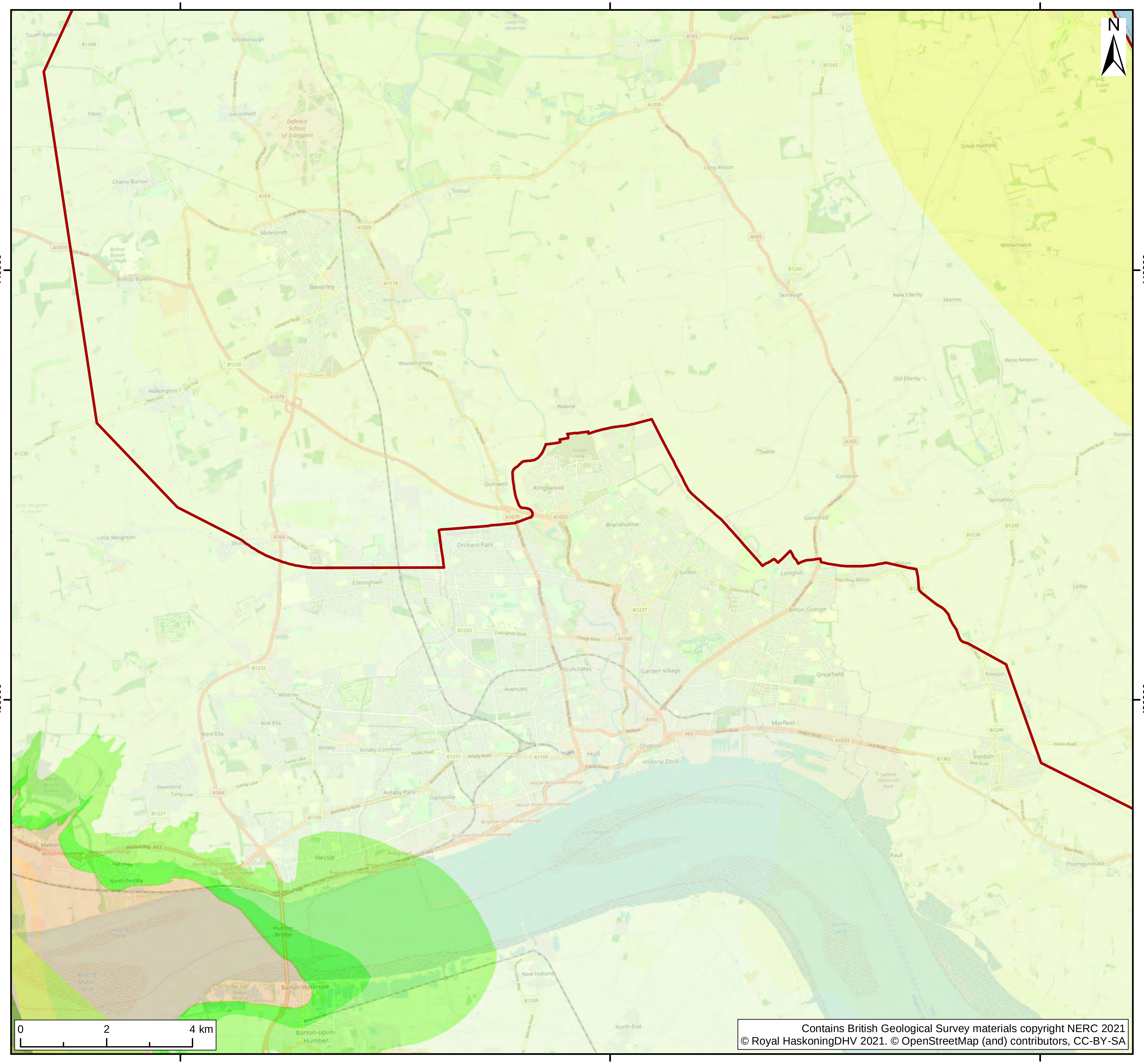

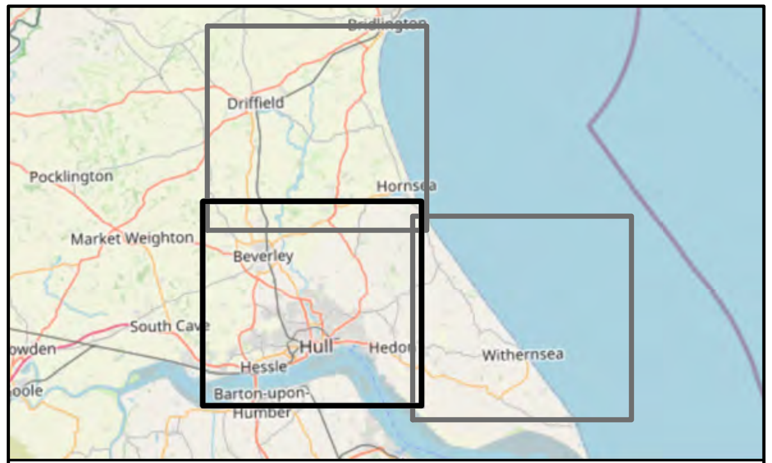

Legend:

Onshore Study Area

Bedrock

- Flamborough Chalk Formation - Chalk
- Rowe Chalk Formation - Chalk
- Welton Chalk Formation - Chalk
- Ferriby Chalk Formation - Chalk
- Ancholme Group - Mudstone
- Ampthill Clay Formation - Mudstone
- West Walton Formation - Mudstone & Siltstone

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A1	C01	03/11/2021	Authorized	LB	KD	HC

Title:

Bedrock Geology:
Creyke Beck (Page 2 of 3)

Figure: 3-8b | Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0047

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:90,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

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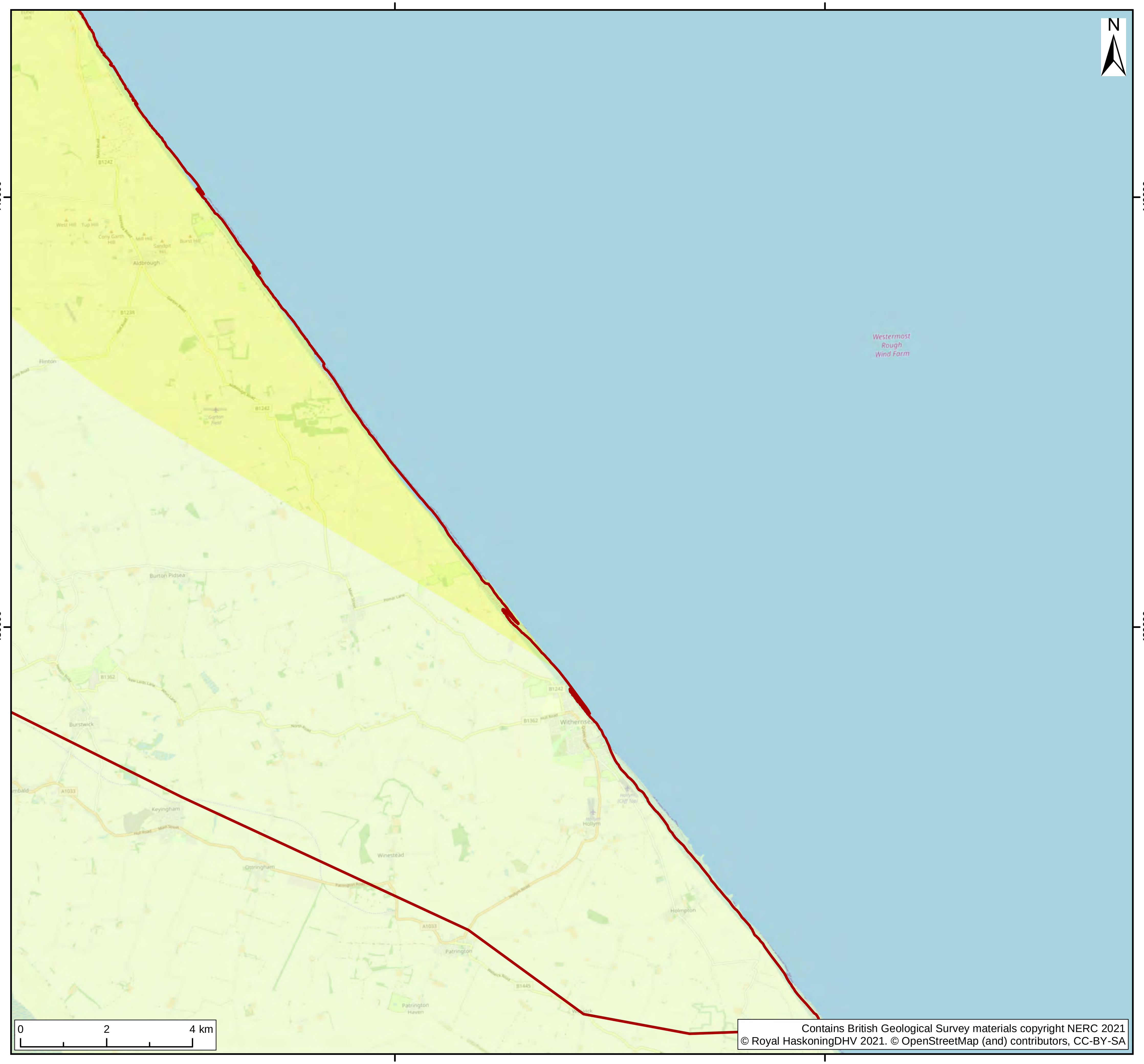

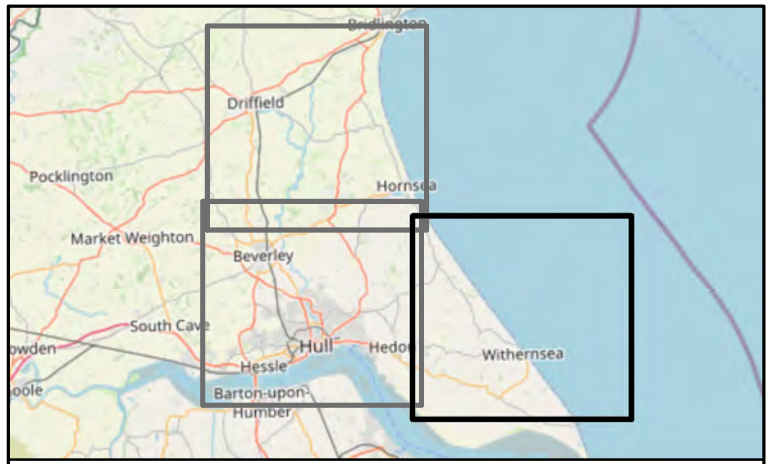

Legend:

Onshore Study Area

Bedrock

- Flamborough Chalk Formation - Chalk
- Rowe Chalk Formation - Chalk
- Welton Chalk Formation - Chalk
- Ferriby Chalk Formation - Chalk
- Ancholme Group - Mudstone
- Ampthill Clay Formation - Mudstone
- West Walton Formation - Mudstone & Siltstone

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A1	C01	03/11/2021	Authorized	LB	KD	HC

Title:

Bedrock Geology:
Creyke Beck (Page 3 of 3)

Figure: 3-8c | Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0047

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:90,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

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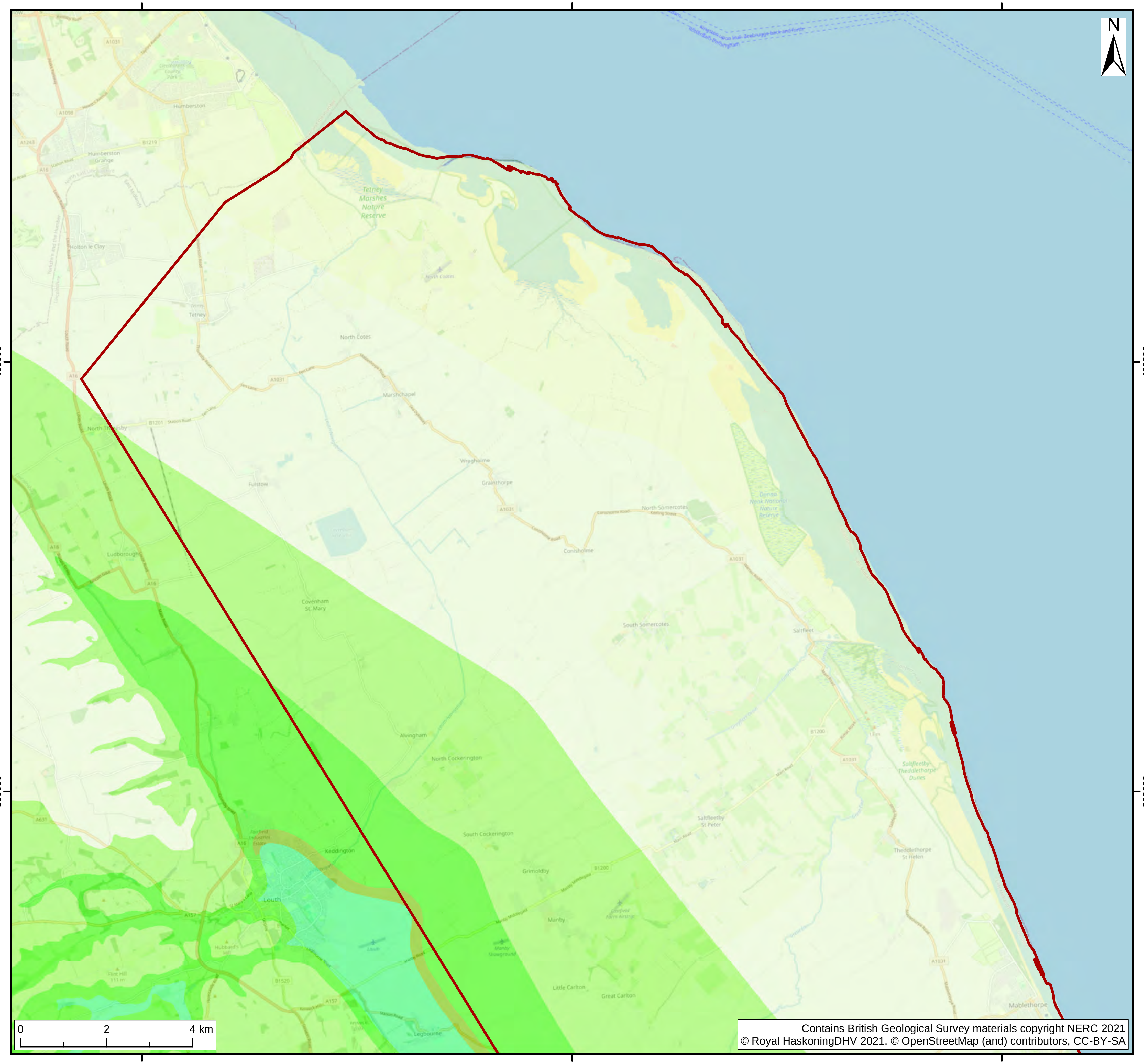

Legend:

Onshore Study Area

Bedrock

- Flamborough Chalk Formation - Chalk
- Welton Chalk Formation - Chalk
- Ferriby Chalk Formation - Chalk
- Hunstanton Formation - Chalk
- Carstone Formation - Sandstone
- Tealby Formation - Mudstone
- Claxby Ironstone Formation - Ironstone
- Soilsby Sandstone Formation - Sandstone
- Hundleby Clay Member - Mudstone
- Kimmeridge Clay Formation - Mudstone
- Claxby Ironstone Formation, Tealby Formation & Roach Formation (Undifferentiated) - Mudstone & Limestone, Interbedded

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
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Title:

Bedrock Geology:
South of Humber (Page 1 of 2)

Figure: 3-9a | Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0048

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:90,000

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Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

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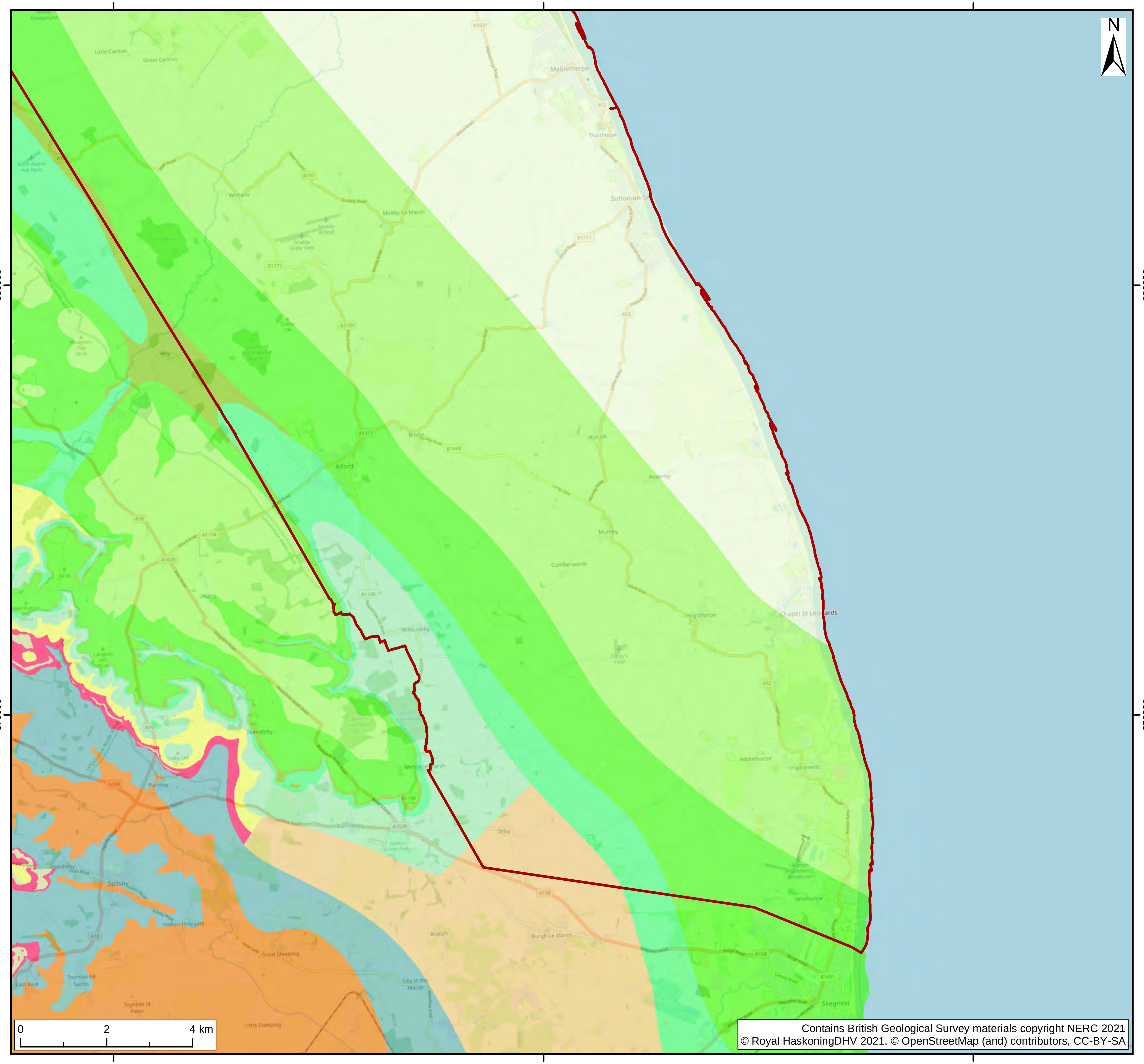

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Legend:

Onshore Study Area

Bedrock

- Flamborough Chalk Formation - Chalk
- Welton Chalk Formation - Chalk
- Ferriby Chalk Formation - Chalk
- Hunstanton Formation - Chalk
- Carstone Formation - Sandstone
- Tealby Formation - Mudstone
- Claxby Ironstone Formation - Ironstone
- Soilsby Sandstone Formation - Sandstone
- Hundleby Clay Member - Mudstone
- Kimmeridge Clay Formation - Mudstone
- Claxby Ironstone Formation, Tealby Formation & Roach Formation (Undifferentiated) - Mudstone & Limestone, Interbedded

A1	C01	03/11/2021	Authorized	LB	KD	HC
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Bedrock Geology:
South of Humber (Page 2 of 2)

Figure: 3-9b	Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0048

Co-ordinate system:	Page Size:	Scale:
British National Grid	A3	1:90,000

Project:	Report:
Dogger Bank South Offshore Wind Farms	Dogger Bank South Offshore Wind Farms EIA Scoping Report

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577. A review of the available mineral resource plans for each of the three onshore study areas and their associated local authorities has indicated that there are multiple areas designated as Mineral Safeguarding Areas protective of extractable resources.

578. The Environment Agency's groundwater vulnerability map (Environment Agency, undated) shows that the geology underlying the onshore study area ranges from 'low' to 'high'. A low groundwater vulnerability classification indicates that these areas provide the greatest protection of groundwater from pollution, whereas a high groundwater vulnerability indicates that the area can easily transmit pollution to groundwater. Parts of the onshore study area are classified as being underlain by unproductive strata and therefore have not been assigned a vulnerability rating.

579. The geology underlying the onshore study areas is designated to reflect the importance of the aquifers present and the groundwater resource they provide. The Environment Agency designation maps (Environment Agency, undated) show that the majority of the onshore study area is fed by superficial deposits which are designated as Secondary A, B and Undifferentiated Aquifers. The superficial deposits are underlain by bedrock units (predominantly chalk) which are designated as Principal, Secondary A and Secondary B Aquifers.

Table 3-7 Summary of Geology and Aquifer Designations

Stratum	Unit	Aquifer Designation
Hawthorn Pit		
Superficial deposits	Glacial Till	Secondary Undifferentiated Aquifer
	Glaciofluvial Deposits – sand and gravel	Secondary A Aquifer
	Alluvium – clay, silt, sand and gravel	Secondary A Aquifer
	Marine Beach Deposits – sand and gravel	Secondary A Aquifer
Bedrock	Seaham Formation - limestone	Principal Aquifer
	Roker Formation - dolostone	Principal Aquifer
	Ford Formation - dolostone	Principal Aquifer

Stratum	Unit	Aquifer Designation
	Raisby Formation - dolostone	Secondary A Aquifer
	Yellow Sands Formation - sand	Secondary A Aquifer
	Pennine Middle Coal Measures Formation – mudstone, siltstone and sandstone	Secondary B Aquifer
Creyke Beck		
Superficial deposits	Glaciofluvial Deposits – sand and gravel	Secondary A Aquifer
	Marine Beach Deposits – shingle, sand, silt and clay	Secondary A Aquifer
	Alluvium – clay, silt, sand and gravel	Secondary A Aquifer
	Glacial Till	Secondary Undifferentiated Aquifer
	Kelsey Hill Gravels – clay and silt	Secondary A Aquifer
	Lacustrine Deposits – sand, silt and clay	Secondary B Aquifer
Bedrock	Flamborough Chalk Formation - chalk	Principal Aquifer
	Rowe Chalk Formation - chalk	Principal Aquifer
	Burnham Chalk Formation - chalk	Principal Aquifer
South of Humber		
Superficial deposits	Beach and Tidal Flat Deposits – clay, silt and sand	Secondary Undifferentiated Aquifer

Stratum	Unit	Aquifer Designation
	Glacial Till	Secondary Undifferentiated Aquifer
	Tidal Flat Deposits – clay and silt	Unproductive
	Storm Beach Deposits	Secondary A Aquifer
	River Terrace Deposits – sand and gravel	Secondary A Aquifer
	Glaciofluvial Ice Contact Deposits – sand and gravel	Secondary A Aquifer
	Alluvium – clay, silt, sand and gravel	Secondary A Aquifer
Bedrock	Flamborough Chalk - chalk	Principal Aquifer
	Burnham Chalk Formation - chalk	Principal Aquifer
	Welton Chalk Formation - chalk	Principal Aquifer
	Ferriby Chalk Formation - chalk	Principal Aquifer
	Carstone Formation - sandstone	Principal Aquifer
	Hunstanton Formation – chalk	Principal Aquifer

580. Within the Hawthorn Pit, Creyke Beck, and South of Humber onshore study areas Zone I, II and III Source Protection Zones (SPZs) are present throughout.

581. A review of the Environment Agency derived data indicates that multiple groundwater abstractions are licensed within the onshore study areas. Licenses for potable groundwater abstractions are also recorded within each of the onshore study areas.

3.2.1.2 Hydrology

582. A number of inland rivers are located either wholly or partially within the onshore study areas as detailed below in **Table 3-8.**

Table 3-8 Summary of Inland Rivers

Study area	Inland river
Hawthorn Pit	Dalton Beck Hawthorn Burn Pittington Beck Old Durham Beck Castle Eden Burn Crimdon Beck
Creyke Beck	Auburn Beck Gransmoor Drain Lowthorpe Beck Kelk Beck Foston Beck Bramston Sea Drain Skipsea Drain Driffield Canal West Beck Upper Skerne Beck Arram Beck Scurf Dike Beverley and Barmston Drain Middleton on the Wolds and Watton Beck Bryan Mills Beck Scorborough Beck Ella Dyke Steam Dyke Lambwath Stream Oldfleet/Wyton/Sproatley Drain Humbleton Beck Burton Pidsea Drain

Study area	Inland river
	Sands/Keyingham/Roos Drain Winestead Drain
South of Humber	Waithe Beck Louth Canal Land Dike Drain Seven Towns North Eau Poulton Drain Black Dyke South Dike and Grayfleet Drain Long Eau Great Eau Trusthorpe Pump Drain Boygrift Drain Anderby Main Drain Willoughby High Drain Ingoldmells Main Drain

583. Numerous smaller streams and ponds/lakes are located within each of the three areas. Some of the smaller streams may be tributaries of the larger named watercourses listed above.

584. A review of the Environment Agency derived data indicates that multiple surface water abstractions are licensed within the onshore study areas, with the greatest number recorded within the Creyke Beck onshore study area.

585. Flood risk and hydrology is considered in further detail in section 3.3.

3.2.1.3 Designated sites

586. Designated sites located either wholly or partially within the onshore study areas are outlined in section 3.1.1. A detailed review of geological Sites of Special Scientific Interest (SSSI) will be conducted after the onshore grid connection location(s) have been confirmed and the onshore study area refined.

587. The onshore study areas are also located within the following Nitrate Vulnerable Zones:

- Hawthorn Pit - Lumley Park Burn (surface water), Hawthorn Burn (surface water), Croxdale Beck (surface water) and Durham (groundwater)
- Creyke Beck - Gypsey Race (surface water), Yorkshire Chalk (groundwater), River Hull (surface water), Holderness Drain (surface water), Bramston Drain (surface water), Hornsea Mere (Eutrophic lake), Wyton Drain (surface water), Burstwick Drain (surface water), Sands/Keyingham/Roos Drain (surface water) and Winestead Drain (surface water).
- South Humber - Waithe Beck (surface water), Louth Canal (surface water), South Dike and Grayfleet Drain (surface water), Great Eau (surface water) and Woldgrift Drain (surface water).

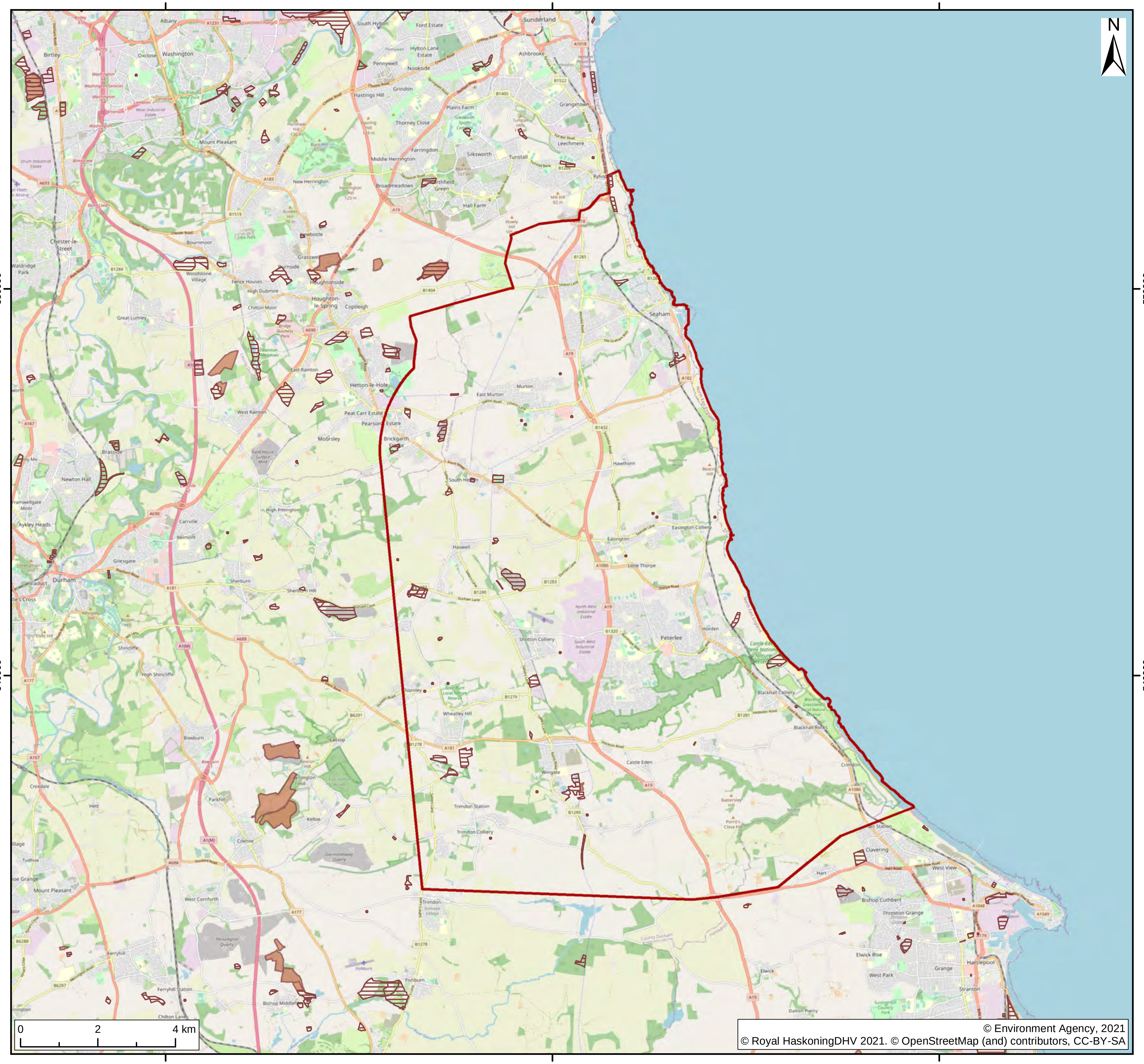
3.2.1.4 Land quality

588. The onshore study areas are largely agricultural in nature, which represents the potential for both diffuse and point sources of ground contamination to be present in relation to historical and current agricultural activities. Settlements within the onshore study areas also have the potential to contain historical sources of ground contamination due to past industrial use.

589. There are approximately 20 records of historical landfill sites within the Hawthorn Pit onshore study area, 34 records within the Creyke Beck onshore study area and 12 within the South of Humber onshore study area (**Figure 3-10** to **Figure 3-12**). The materials accepted at these sites are not recorded for all locations, however where they are recorded inert, industrial, commercial and household waste was permitted.

590. There is one record of an authorised landfill within the Hawthorn Pit onshore study area which is recorded as accepting non-biodegradable waste. A single record of an authorised landfill is also located within the South of Humber onshore study area, the site is permitted to accept household, commercial and industrial waste.

591. There are approximately nine authorised landfill sites within the Creyke Beck onshore study area with permitted wastes recorded as non-biodegradable waste, household, commercial, industrial wastes and 'other wastes'.



Legend:

- Onshore Study Area
- Authorised Landfill Site
- Historic Landfill Site

A1	C01	03/11/2021	Authorized	LB	KD	HC
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Historic and Authorised Landfill Sites: Hawthorn Pit

Figure: 3-10 | Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0052

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:100,000

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Legend:

- Onshore Study Area
- Authorised Landfill Site
- Historic Landfill Site

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A1	C01	03/11/2021	Authorized	LB	KD	HC

Title:

Historic and Authorised Landfill Sites:
Creyke Beck

Figure: 3-11 | Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0053

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:250,000

Project: Dogger Bank South Offshore Wind Farms

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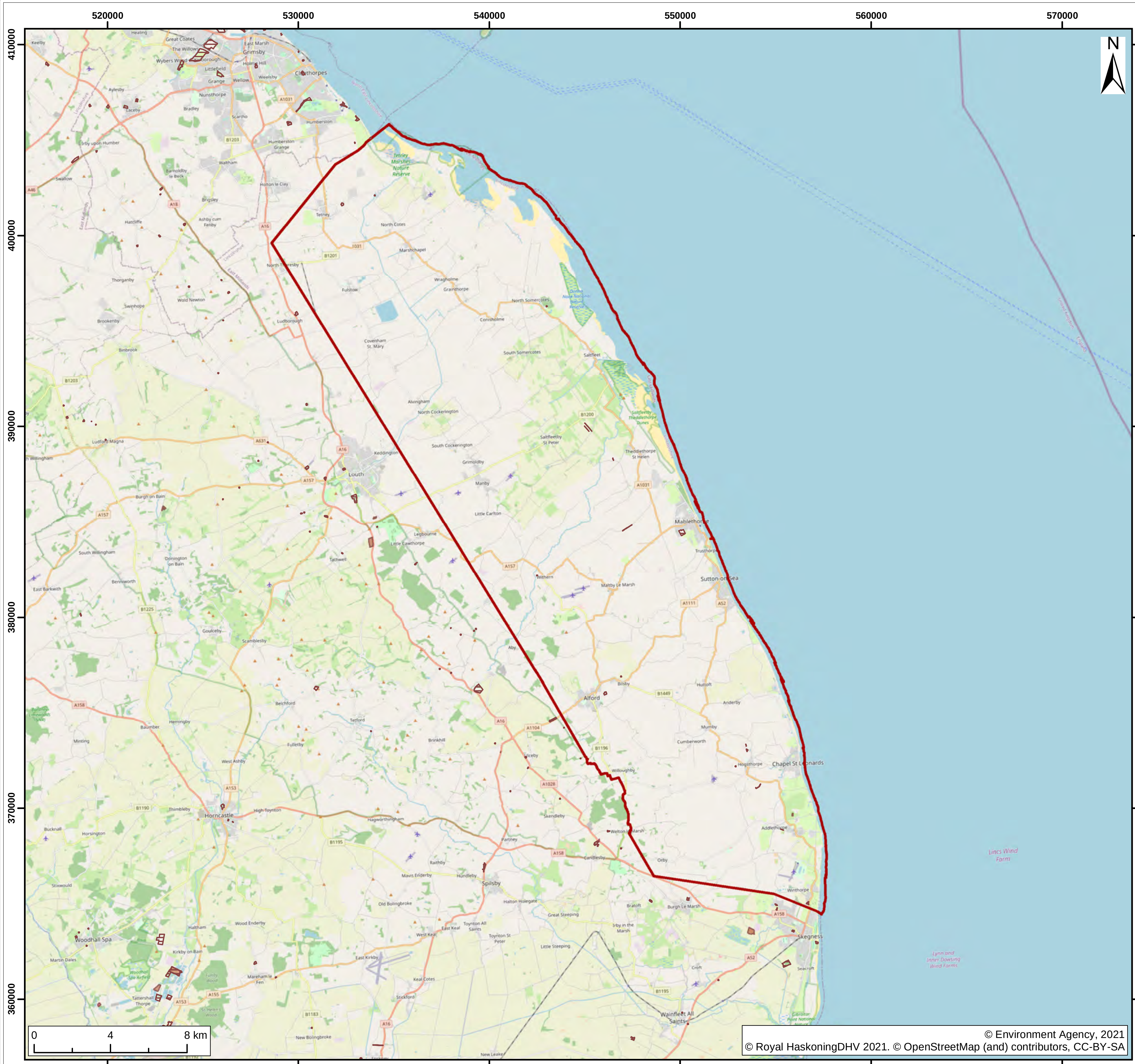

Legend:

- Onshore Study Area
- Authorised Landfill Site
- Historic Landfill Site

A1	C01	03/11/2021	Authorized	LB	KD	HC
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Historic and Authorised Landfill Sites:
South of Humber

Figure: 3-12 | Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0054

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:200,000

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3.2.2 Approach to Data Collection

592. The following information has been considered during the production of this Scoping Report and will be considered further within the PEIR/ES where relevant matters are scoped in to the EIA process.

593. The existing environment will be characterised using the data sources set out in **Table 3-9.**

Table 3-9 Existing Datasets

Data Source	Data Contents
Envirocheck Report	Historical maps, site sensitivity data, trade directory and regulatory information.
Public Health England	Radon gas risk.
Environment Agency	Historical landfill sites, permitted waste sites – authorised landfill site boundaries, aquifer designations, groundwater abstractions and groundwater SPZs.
Coal Authority	Closed mining sites.
BGS	Solid geology, superficial geology and borehole records. Mineral extraction sites.
MAGIC map application	Ramsar sites, SPAs, SACs, SSSIs, National and Local Nature Reserves, groundwater vulnerability and aquifer designations – superficial deposits and bedrock.
East Riding of Yorkshire Council, Lincolnshire County Council and Durham County Council	Mineral Safeguarding Areas and groundwater abstractions. Private groundwater abstractions, brownfield register, contaminated land register, Part 2A sites determined as contamination land. Regionally Important Geological Sites.

594. Any additional datasets will be identified through ongoing consultation with stakeholders.

3.2.3 Potential Impacts

595. The Geology and Land Quality assessment is likely to have key inter-relationships with Flood Risk and Hydrology, Land Use and Terrestrial Ecology. These will be considered where relevant.

3.2.3.1 Potential impacts during construction

596. The following potential construction stage impacts have been identified, all of which have been scoped into the EIA.

597. Direct impacts to the Secondary A, Secondary Undifferentiated, Secondary Aquifers, superficial deposits, SPZs and groundwater abstractions associated with them may occur due to the intrusive nature of earthworks, trenching and piling (if required). The significance of the disturbance will be dependent on the depth of the aquifer units in relation to the proposed depth of the intrusive works.

598. During construction, surface layers will be excavated allowing increased infiltration of rainwater and surface run-off to the subsurface. This could potentially mobilise existing sources of contamination and create new pathways to the superficial aquifers. This could lead to a deterioration in shallow groundwater quality.

599. Direct impacts to the Principal, Secondary A and B Aquifers of the bedrock geology, SPZs, and associated groundwater abstractions, may occur from deep ground workings associated with trenchless crossings. There is the potential for drilling mud to leak along the drill path, or from the immediate area, which could cause contamination of groundwater and a deterioration in groundwater quality. Trenchless techniques also have the potential to create new preferential pathways allowing existing sources of contamination to migrate into the Principal, Secondary A and Secondary B Aquifers.

600. Direct impacts to the Principal, Secondary A and B Aquifers and SPZs may occur as a result of piling methodology. Piling may be required to provide foundations for the onshore substation(s). Piling has the potential to create new preferential pathways allowing existing sources of contamination to migrate into the underlying superficial and bedrock aquifers leading to a deterioration in groundwater quality.

601. Direct impacts to surface water receptors and associated ecological habitats from existing sources of contamination by the creation of new pathways to surface water via groundwater, installation of temporary drainage or surface water run off during construction. This could result in a reduction in WFD status.

602. The construction works could also introduce new sources of contamination for example from the storage of fuels and chemicals or via spillages and leaks. These have the potential to migrate into the underlying aquifers or surface waters. Human receptors may also be directly exposed to these contaminants during construction works.

603. Excavation activities, including trenchless techniques, surface excavation, earthworks during cable laying and site preparation for the onshore substation(s) as well as other onshore infrastructure has the potential to mobilise existing sources of ground contamination. This could result in impacts to human and ecological receptors through the generation of potentially contaminated dusts, vapours or ground gas released during construction works.

604. Direct impacts to geologically designated sites through construction activities such as excavation works during cable laying and site preparation.

605. Construction activities have the potential to result in direct impacts to Mineral Safeguarding Areas located within the onshore study areas through the prevention of future extraction of identified resources.

3.2.3.2 Potential impacts during operation and maintenance

606. Installed cables along the onshore export cable route(s) and the permanent footprint of landfall(s) and the onshore substation(s) infrastructure would prevent future extraction of mineral resources within the permanent footprint of the Projects during their lifetime.

607. Indirect impacts along the onshore export cable route(s) and the permanent footprint of landfall(s) and the onshore substation(s) infrastructure may occur as a result of leakages of stored materials or spillages of materials during the operational phase.

608. Additional significant impacts from the operation of the Projects are considered unlikely. Workers conducting routine operation and maintenance activities would be provided with information regarding ground conditions so that site and task specific risk assessments and method statements can be developed and mitigated, therefore minimising any potential impacts.

3.2.3.3 Potential impacts during impacts during decommissioning

609. It is anticipated that the decommissioning impacts would be similar in nature to those of construction, although the magnitude of effect is likely to be lower. As such all potential construction impacts have been scoped in for the decommissioning phase. It is anticipated that there would be no additional impacts associated with mineral sterilisation during the decommissioning phase.

3.2.3.4 Potential cumulative impacts

610. Cumulative effects on geology and land quality resulting from the effects of the Projects and other developments will be assessed in accordance with the guidance and methodologies set out in section 1.7. The assessment will be dependent on the availability and accessibility of information for other developments.

3.2.3.5 Summary of potential impacts

611. **Table 3-10** outlines the effects which are proposed to be scoped into the EIA.

Table 3-10 Summary of Impacts Relating to Geology and Land Quality. Topics to be Scoped In (✓) and Out (x)

Potential impact	Construction	Operation	Decommissioning
Impacts to human health both on and off site from contamination sources	✓	✓	✓
Direct impacts on groundwater quality and groundwater resources from contamination sources and construction methods	✓	✓	✓
Impacts on surface water quality and the ecological habitats they support, from contamination	✓	✓	✓
Physical impacts on geologically designated sites	✓	✓	✓
Loss, damage or sterilisation of mineral resources	✓	✓	✓
Cumulative impacts	✓	✓	✓

3.2.4 Approach to Impact Assessment

612. As part of the EIA process, the existing environment with respect to geology and land quality will be described, including, but not limited to, the following:

- hydrology;
- geology and mineral resources;
- hydrogeology, aquifer designations and groundwater resources;
- historical land use and potential contamination sources; and
- sensitive land uses (including designated sites).

613. The baseline for geology and land quality will be established following current guidance (see below) which advocates a phased risk-based approach. A Land Quality Desk Study and Preliminary Risk Assessment (PRA) will be undertaken to develop a Preliminary Conceptual Site Model to aid in the identification of potential sources of contamination at the site and the risk they pose to sensitive receptors that currently exist at the site or will be introduced by the Projects e.g. construction workers. The PRA will include the landfall(s), onshore substation(s) and cable corridor(s), plus a 250m buffer zone to assess for potential sources of contamination, discharge consents, pollution incidents, landfills and contemporary trade entries. In addition to the 250m buffer zone, a 1km buffer zone will also be included within the PRA within which historical maps will be reviewed to identify potential contaminant sources in the surrounding area. Both groundwater and surface water abstraction points within the 1km buffer zone will also be assessed as part of the PRA.

614. The key guidance which will be used to inform the assessment will include:

- Defra 'Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance', PB13735 (2012);
- The NPPF (2019);
- Environment Agency 'Land Contamination: Risk Management Framework (2020);
- Department of the Environment 'Industry Profiles for previously developed land' (1995);
- Construction Industry Research and Information Association (CIRIA) 'Assessing Risks Posed by Hazardous Ground Gases to Buildings', C665 (2007);
- British Standard 'Investigation of Potentially Contaminated Sites – Code of Practice', BS EN 10175:2011 +A2:2017;

- British Standard 'Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings' BS8485:2015 +A1:2019;
- British Standard 'Guidance on Investigations for Ground Gas – Permanent Gases and Volatile Organic Compounds', BS 8576:2013;
- British Standard 'Code of Practice for Ground Investigations', BS 5930:2015; and
- CIRIA 'Contaminated Land Risk Assessment – A Guide to Good Practice', C552 (2001).

615. The desk-based study forms the initial step in the assessment of ground conditions and provides valuable information for the design of intrusive investigation works that may be required in the event of the PRA identifying potentially unacceptable risks associated with the ground conditions. The PRA will be progressed based on data obtained from an Envirocheck Report which incorporates historical maps, site sensitivity data, and regulatory information, and will be supplemented with information from those additional sources listed in **Table 3-9.**

616. Following refinements of the onshore study area(s), further liaison with the stakeholders will be undertaken to agree the approach and methodology to data collection for EIA purposes and the specific assessment methodology. A detailed method statement will be developed and agreed with stakeholders through the EPP.

3.3 Flood Risk and Hydrology

617. This section of the Scoping Report focuses on potential effects of construction, operation and maintenance, and decommissioning of the Projects on flood risk and hydrology.

The following questions are posed to consultees to help them frame and focus their response to the flood risk and hydrology scoping exercise which will in turn inform the Scoping Opinion:

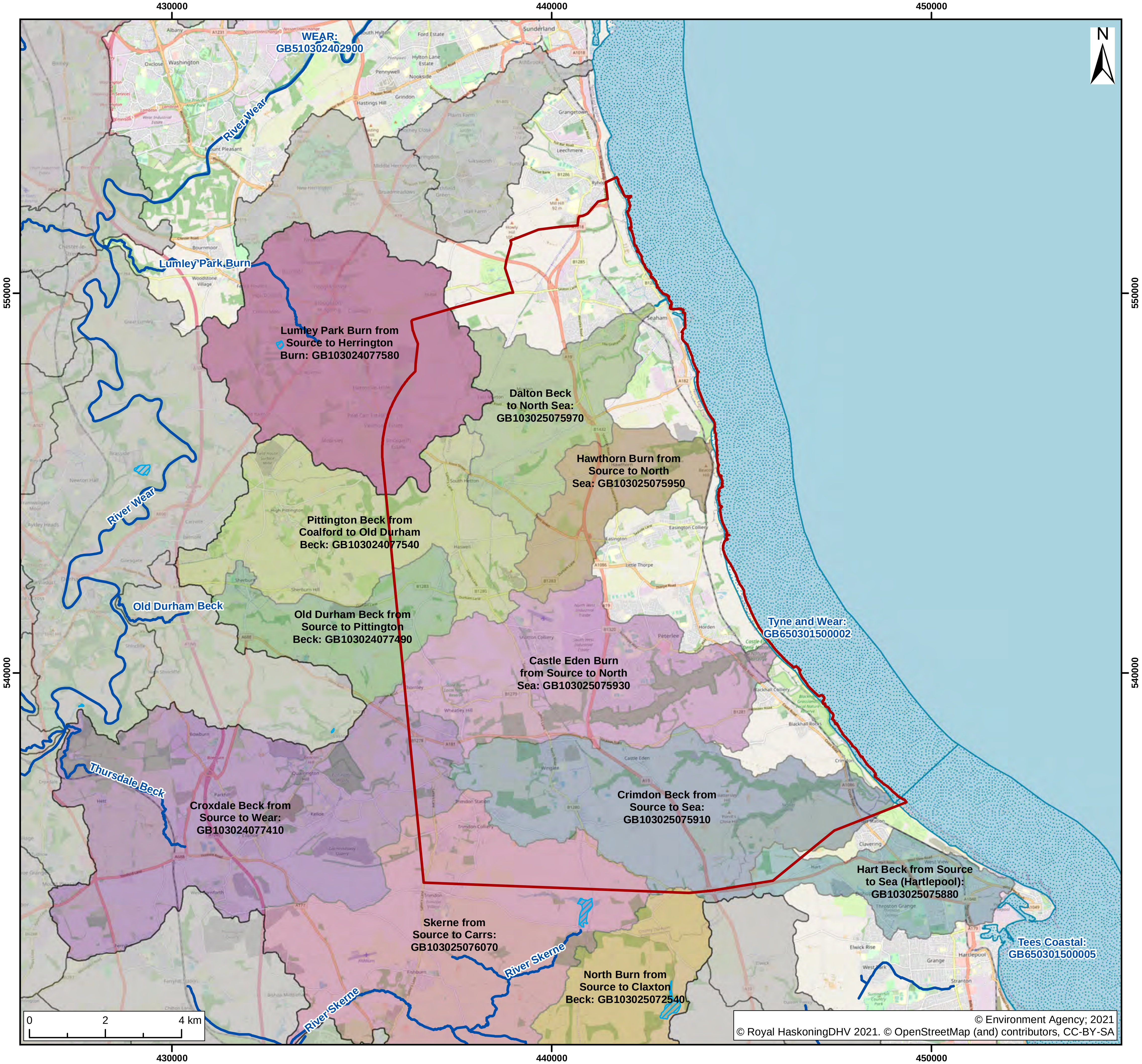
- Do you agree with the characterisation of the existing environment?
- Do you agree with the approach to data collection?
- Have all the potential impacts on flood risk and hydrology resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

3.3.1 Existing Environment

3.3.1.1 Hawthorn Pit

3.3.1.1.1 Surface waters

618. Several short, steep, deeply incised watercourses or 'denes' drain from the east Durham Limestone Plateau in the west, to the North Sea in the east. The main surface water catchments are Ryhope Dene, Seaham Dene, Dalton Beck, Hazel Dene, Hawthorn Burn, Horden Burn, Castle Eden Burn, and Crimdon Beck (**Figure 3-13**). There are several other very short watercourses (<1 km in length) that drain into the North Sea (Ash Gill, Blackhills Gill, Bluehouse Gill).



Legend:

- Onshore Study Area
- Statutory Main Rivers
- WFD Lake Water Bodies
- WFD Transitional & Coastal Water Bodies

WFD River Water Body Catchments

- Castle Eden Burn from Source to North Sea
- Crimdon Beck from Source to Sea
- Croxdale Beck from Source to Wear
- Dalton Beck to North Sea
- Hart Beck from Source to Sea (Hartlepool)
- Hawthorn Burn from Source to North Sea
- Lumley Park Burn from Source to Herrington Burn
- North Burn from Source to Claxton Beck
- Old Durham Beck from Source to Pittington Beck
- Pittington Beck from Coalford to Old Durham Beck
- Skerne from Source to Carrs
- Catchments outside of Study Area

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A1	C01	03/11/2021	Authorized	LB	ID	HC

Title:

Surface Water Features:
Hawthorn Pit

Figure: 3-13 | Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0028

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:100,000

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619. This onshore study area also includes sections of the following surface water catchments that drain from east to west, and form parts of the wider River Wear and River Tees catchments: Rough Dene Burn, Hetton Burn, Coldwell Burn, Shadforth Beck, Kelloe Beck, Coxhoe Beck, Langley Beck, Hurworth Burn.

620. Water quality in the catchments within this onshore study area is adversely affected by diffuse pollution from agriculture and rural land management, and by discharges from the water industry. Some catchments have high levels of pollutants such as lead and zinc.

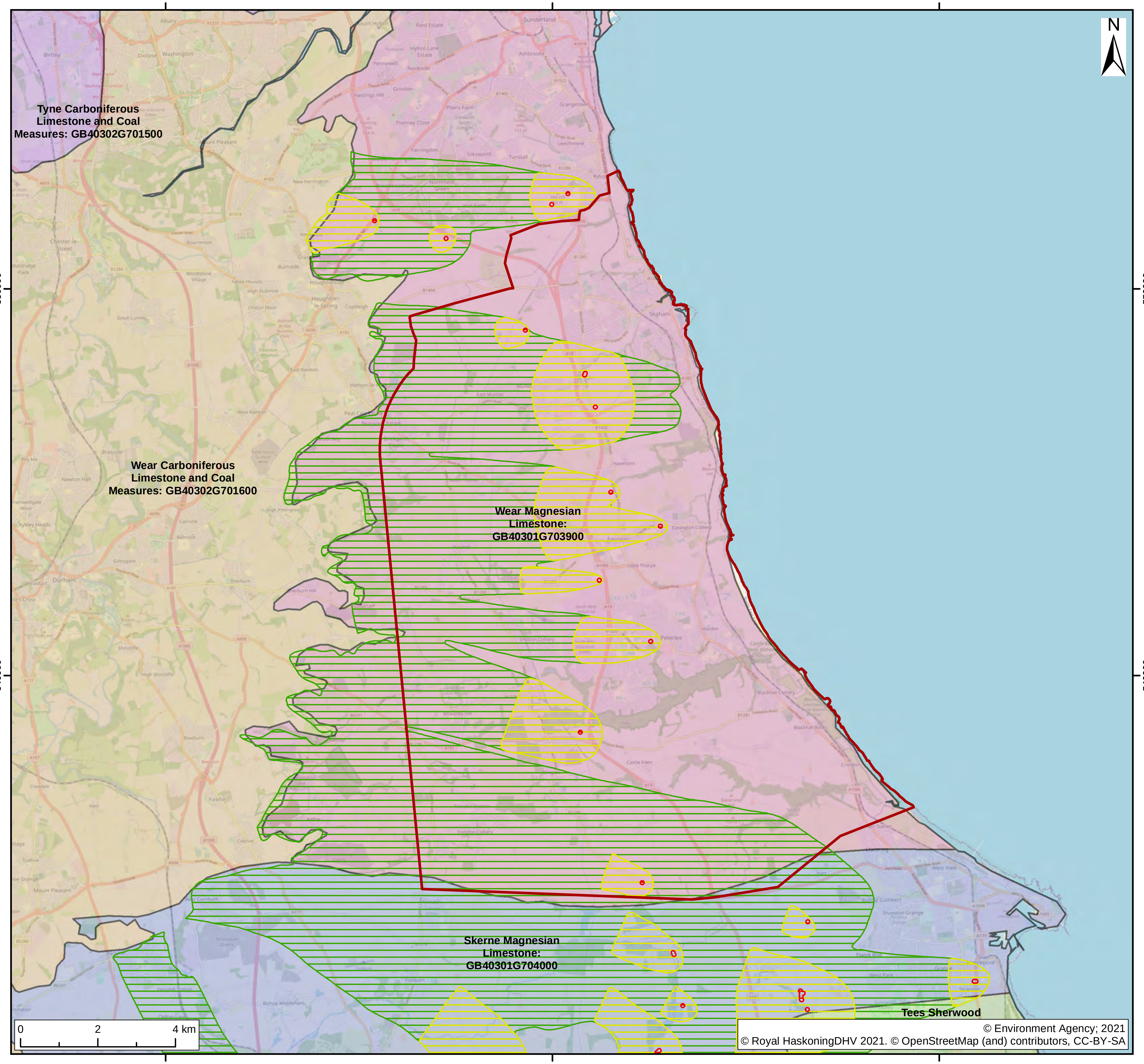
621. The downstream sections of most of the coastal streams overlap with two sites of statutory designation, these being: Durham Coast SSSI and Durham Coast SAC. Hawthorn Dene and Castle Eden Dene are also SSSIs in their own right; the latter is also a SAC and NNR. Inland, watercourses run through the following protected sites: Eppleton Grasslands SSSI (Hetton Burn), Pig Hill SSSI (Coldwell Burn), Charity Land SSSI (River Skerne), Hesledon Moor East SSSI and Hesledon Moor West SSSI (Dalton Beck). Further information regarding each of these designated sites is provided in section 3.1.1.

3.3.1.1.2 Groundwater

622. Bedrock geology is entirely Zechstein Group dolomitised limestone; the short, steep coastal streams are incised into this these deposits. These rocks support a Principal aquifer that covers the entire onshore study area (**Figure 3-14**). A Principal aquifer is characterised by highly permeable rocks that support high levels of water storage.

623. Superficial geology is mostly till (diamicton) deposits, with small pockets of glacial sand and gravel, lacustrine clays, and alluvial sands, silts, and clays. These deposits support Secondary (undifferentiated) aquifers (aquifers that have not been attributed secondary category A or B status). There are also several small Secondary A aquifers (permeable layers capable of supporting water supplies at a local rather than strategic scale).

624. Groundwater quality is adversely affected by diffuse pollution from poor livestock management.



Legend:

- Onshore Study Area

WFD Groundwater Bodies

- Skerne Magnesian Limestone
- Tees Sherwood Sandstone
- Tyne Carboniferous Limestone and Coal Measures
- Wear Carboniferous Limestone and Coal Measures
- Wear Magnesian Limestone

Source Protection Zone

- Zone I
- Zone II
- Zone III

A1	C01	03/11/2021	Authorized	LB	ID	HC
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Groundwater Features:
Hawthorn Pit

Figure: 3-14 | Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0032

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:100,000

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3.3.1.1.3 WFD water bodies

625. **Table 3-11** shows the names and status (2019) of the WFD water bodies within the Hawthorn Pit onshore study area. The overall status of most water bodies is moderate to poor, and Castle Eden Dene is bad. Issues preventing waters reaching good status are related to pollution from towns, cities and transport, as well pollution from rural areas and wastewater. Groundwater quality (Wear Magnesian Limestone) is classed as poor overall, but with a good quantitative element.

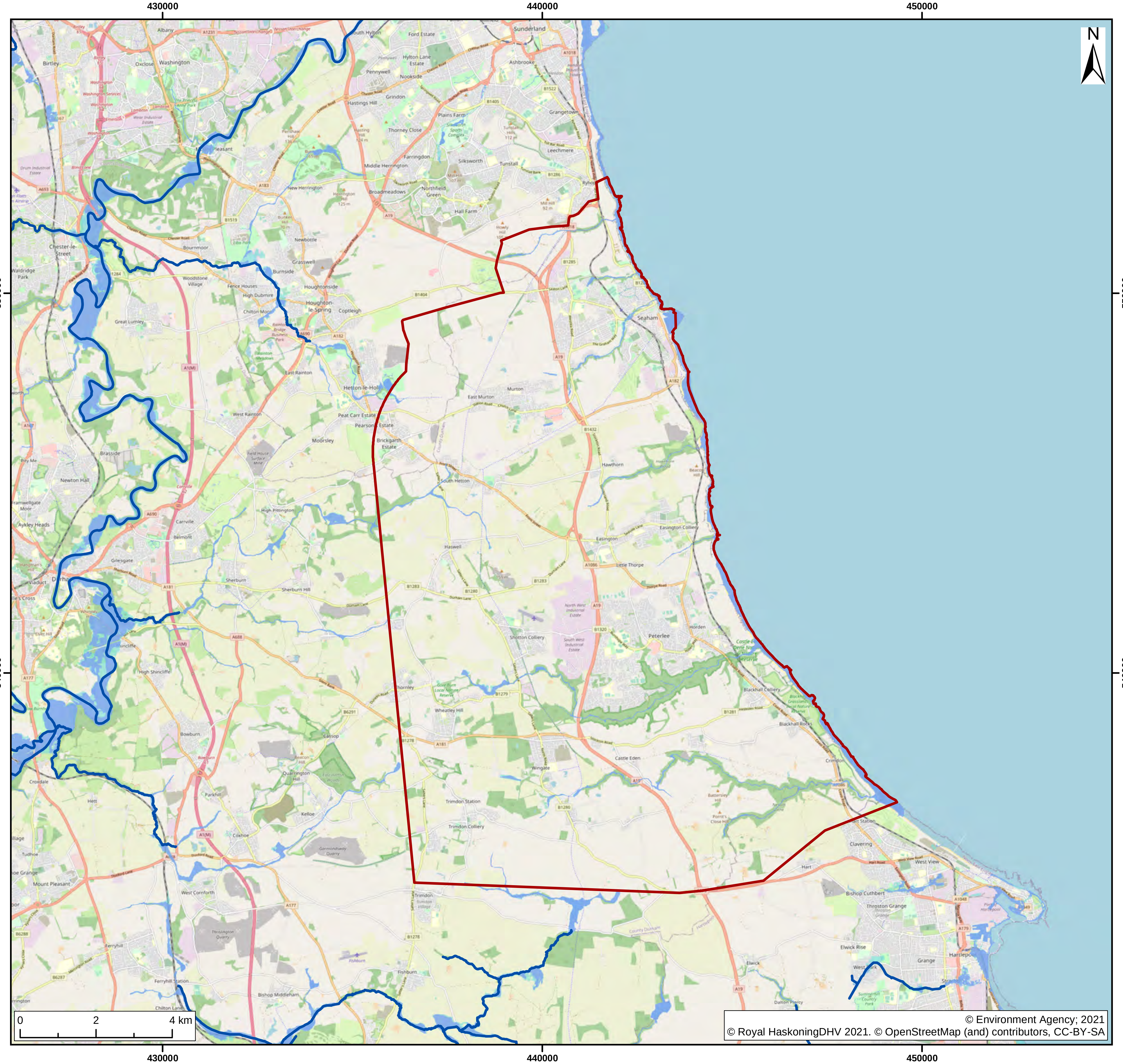
Table 3-11 Hawthorn Pit WFD Water Bodies

WFD Water Body	ID	Type	Overall	Ecological	Chemical
Castle Eden Dene from source to North Sea	GB103025075930	River	Bad	Bad	Fail
Crimdon Beck from Source to Sea	GB103025075910	River	Moderate	Moderate	Fail
Dalton Beck to North Sea	GB103025075970	River	Moderate	Moderate	Fail
Hawthorn Burn from Source to North Sea	GB103025075950	River	Poor	Poor	Fail
Lumley Park Burn from Source to Herrington Burn	GB103024077580	River	Poor	Poor	Fail
Pittington Beck from Coalford to Old Durham Beck	GB103024077540	River	Moderate	Moderate	Fail
Croxdale Beck from source to Wear	GB103024077410	River	Moderate	Moderate	Fail
Skerne from source to Carrs	GB103025076070	River	Poor	Poor	Fail
Hart Beck from source to sea (Hartlepool)	GB103025075880	River	Poor	Poor	Fail
Wear Magnesian Limestone	GB40301G703900	Ground water	Poor	N/A	N/A

3.3.1.1.4 Flood risk

626. Flood zone maps show most of the Hawthorn Pit onshore study area to be within Flood Zone 1 (**Figure 3-15**). This is land with less than a 1 in 1,000 annual probability of river flooding (<0.1%). As most channels are incised, there are only very narrow belts of land in Flood Zone 2 (land between 1 in 100 and 1 in 1,000 annual probability of river flooding (1% –0.1%)) and Flood Zone 3 (land that has a 1 in 100 or greater annual probability of river flooding (>1%)).

627. Surface water flooding is limited and confined to narrow areas adjacent to incised channels. There are also numerous small pockets of land at risk from surface water flooding, related to the irregular formerly glaciated nature of the land surface.



Legend:

- Onshore Study Area
- Statutory Main River
- Flood Zone 2
- Flood Zone 3

A1	C01	03/11/2021	Authorized	LB	ID	HC
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Flood Risk:
Hawthorn Pit

Figure: 3-15 | Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0035

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:100,000

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3.3.1.2 Creyke Beck

3.3.1.2.1 Surface waters

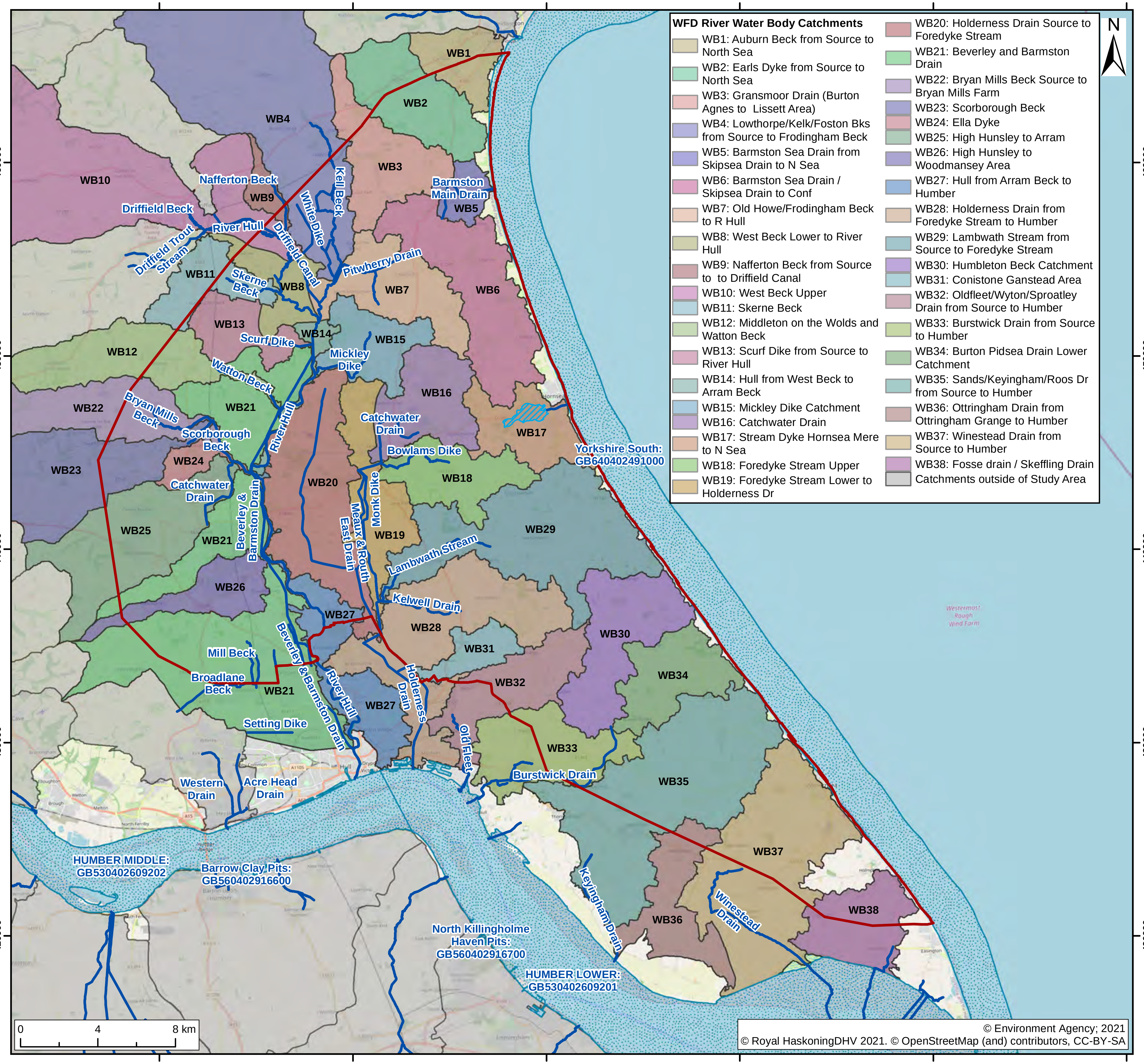
628. The majority of the Creyke Beck onshore study area falls within the catchment of the River Hull and its tributaries (**Figure 3-16**). This river system drains the eastern side of the Yorkshire Wolds and flows in a generally north-south direction to join the Humber Estuary at Hull. Several of the Hull's tributaries rise very close to the coast and flow inland to join the main river. The upstream parts of the River Hull catchment, including tributaries such as West, Lowthorpe, Kelk and Foston Becks, are highly sensitive chalk rivers.

629. The far south of this onshore study area is drained by Humbleton Beck, which rises very close to the coast at Aldbrough and flows south to join the Humber Estuary immediately east of Kingston upon Hull.

630. Much of this onshore study area is relatively flat, improved farmland that has been drained in the past. As well as the main surface water catchments, this onshore study area is characterised by numerous cuts, dikes, drains and ditches. The two main features that drain the south of the study area are Halsham Drain and Winestead Drain.

631. Creyke Beck onshore study area is largely rural. As a result, agricultural and rural land management issues are adversely affecting water quality. There are also water quality issues surrounding waste treatment and disposal, and discharges from the water industry.

632. Several watercourses within this onshore study area are associated with statutory designations. The main sites are the River Hull Headwaters SSSI, Skipsea Bail Mere SSSI, Tophill Low SSSI, Hornsea Mere SSSI, Pulfin Bog SSSI and Lambwath Meadows SSSI. Further information regarding each of these designated sites is provided in section 3.1.1.



Legend:

- Onshore Study Area
- Statutory Main Rivers
- WFD Lake Water Bodies
- WFD Transitional & Coastal Water Bodies

A1	C01	03/11/2021	Authorized	LB	ID	HC
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Surface Water Features:
Creyke Beck

Figure: 3-16 | Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0029

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:200,000

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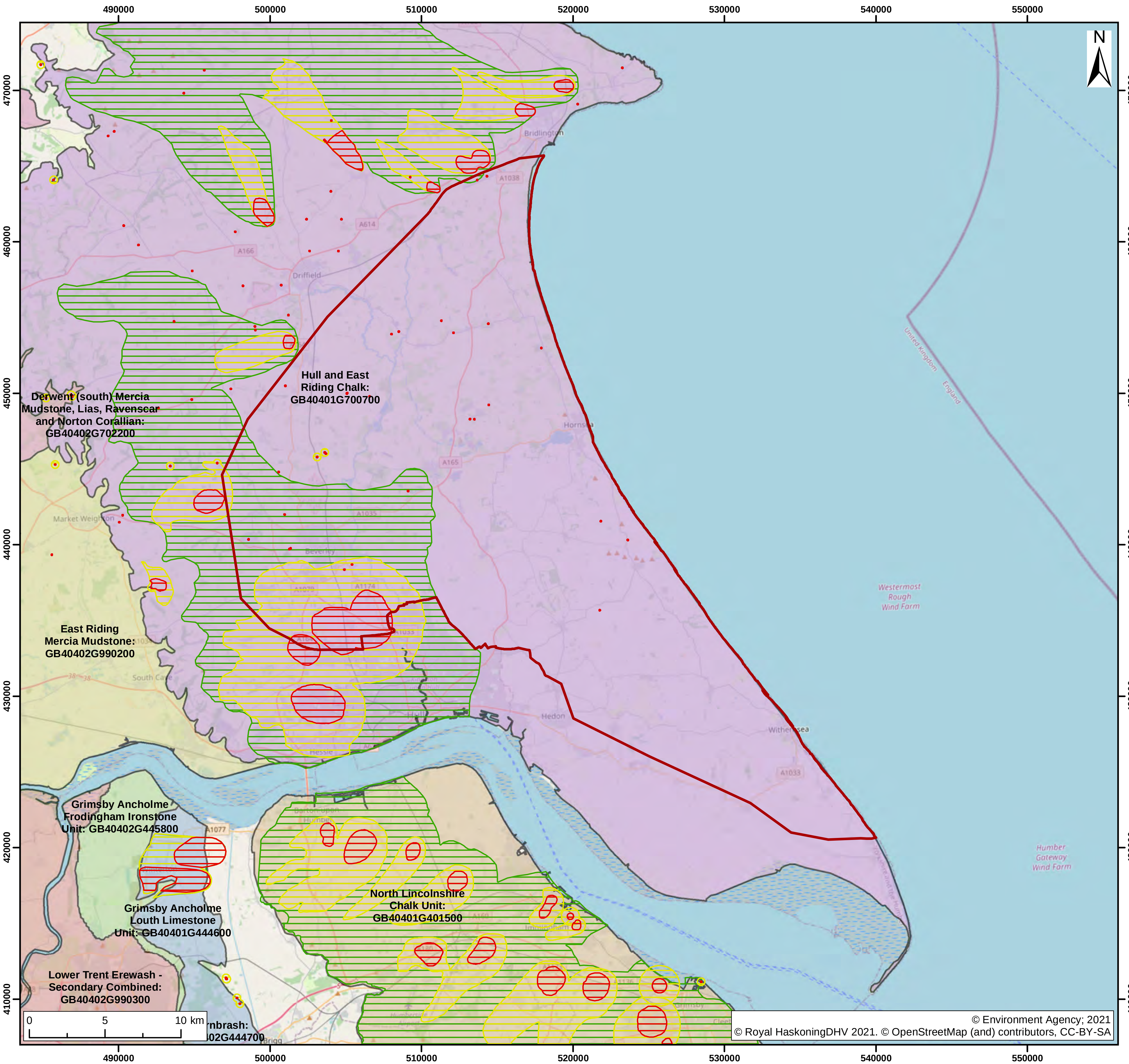
3.3.1.2.2 Groundwater

633. Bedrock geology is characterised by the White Chalk Subgroup across the entire Creyke Beck onshore study area, and these rocks support a similarly extensive Principal aquifer (**Figure 3-17**). Superficial deposits are more varied but dominated by till (diamicton). A wide belt of sand, silt and alluvium runs north to south through the onshore study area, and there are also pockets of glacial sand and gravel, and river terrace deposits.

634. Superficial deposits support Secondary (undifferentiated) aquifers. There are several large Secondary A aquifers in the River Hull valley and other alluvial settings. Small Secondary B aquifers are also present, mainly in an area between Skipsea and Atwick on the coast. Secondary B aquifers are lower permeability layers which may yield limited amounts of groundwater due to localised features such as fissures, permeable horizons and weathering.

635. Groundwater quality is adversely affected by diffuse and point source pollution from a variety of sources, including agriculture, sewage discharge, and groundwater abstraction.



Legend:

Onshore Study Area

WFD Groundwater Bodies

- Derwent (south) Mercia Mudstone, Lias, Ravenscar and Norton Corallian
- East Riding Mercia Mudstone
- Grimsby Ancholme Frodingham Ironstone Unit
- Grimsby Ancholme Louth Limestone Unit
- Hull and East Riding Chalk
- Lower Trent Erewash - Secondary Combined
- North Lincolnshire Chalk Unit

Source Protection Zone

- Zone I
- Zone II
- Zone III

A1	C01	03/11/2021	Authorized	LB	ID	HC
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Groundwater Features:
Creyke Beck

Figure: 3-17 | Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0033

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:250,000

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3.3.1.2.3 WFD water bodies

636. **Table 3-12** shows the names and status (2019) of WFD water bodies within this onshore study area. The overall status of 37 of 38 water bodies is moderate, while Hornsea Mere (lake) is poor. Issues preventing waters reaching a good status are related to physical modifications and pollution (urban and rural). Groundwater quality is classed as poor overall.

Table 3-12 Creyke Beck WFD Water Bodies

WFD Water Body	ID	Type	Overall	Ecological	Chemical
Burstwick Drain from Source to Humber	GB104026067200	River	Moderate	Moderate	Fail
Burton Pidsea Drain Lower Catchment	GB104026066590	River	Moderate	Moderate	Fail
Fosse Drain/ Skeffling Drain	GB104026066530	River	Moderate	Moderate	Fail
Humbleton Beck Catchment	GB104026066610	River	Moderate	Moderate	Fail
Oldfleet/Wyton/ Sproatley Drain from Source to Humber	GB104026066600	River	Moderate	Moderate	Fail
Ottringham Drain from Ottringham Grange to Humber	GB104026066510	River	Moderate	Moderate	Fail
Sands/ Keyingham/ Roos Dr from Source to Humber	GB104026067230	River	Moderate	Moderate	Fail
Winestead Drain from Source to Humber	GB104026066570	River	Moderate	Moderate	Fail
Beverley and Barmston Drain	GB104026067211	River	Moderate	Moderate	Fail

WFD Water Body	ID	Type	Overall	Ecological	Chemical
Bryan Mills Beck Source to Bryan Mills Farm	GB104026067211	River	Moderate	Moderate	Fail
Catchwater Drain	GB104026066970	River	Moderate	Moderate	Fail
Conistone Ganstead Area	GB104026066790	River	Moderate	Moderate	Fail
Ella Dyke	GB104026066941	River	Moderate	Moderate	Fail
Foredyke Stream Lower to Holderness Drain	GB104026066910	River	Moderate	Moderate	Fail
Foredyke Stream Upper	GB104026066890	River	Moderate	Moderate	Fail
High Hunsley to Arram Area	GB104026066841	River	Moderate	Moderate	Fail
High Hunsley to Woodmansey Area	GB104026066820	River	Moderate	Moderate	Fail
Holderness Drain from Foredyke Stream to Humber	GB104026066800	River	Moderate	Moderate	Fail
Holderness Drain Source to Foredyke Stream	GB104026066950	River	Moderate	Moderate	Fail
Lambwath Stream from Source to Foredyke Stream	GB104026066860	River	Moderate	Moderate	Fail
Middleton on the Wolds and Watton Beck	GB104026066980	River	Moderate	Moderate	Fail
Scorborough Beck	GB104026066901	River	Moderate	Moderate	Fail
Hull from West Beck to Arram Beck	GB104026067000	River	Moderate	Moderate	Fail

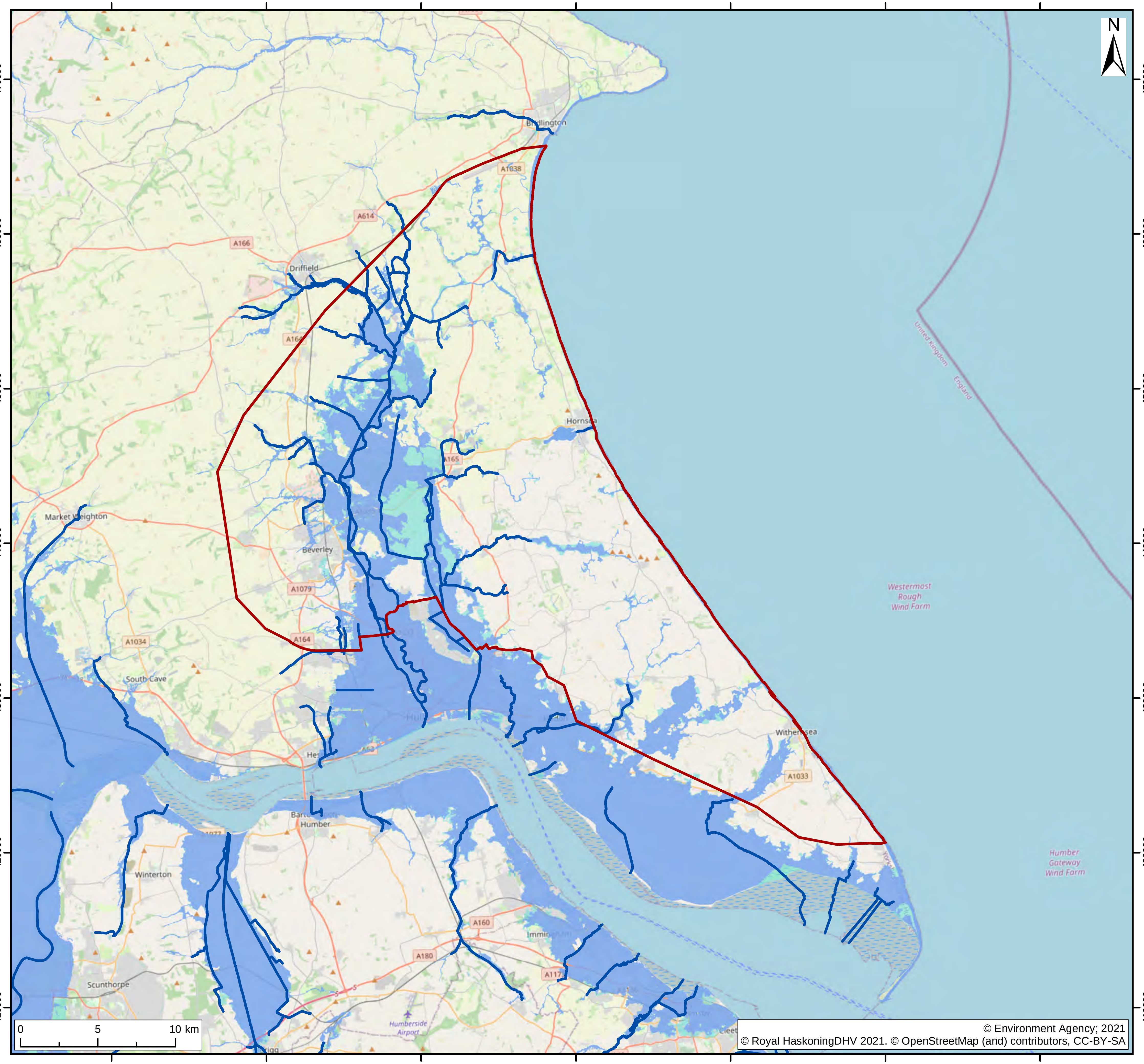
WFD Water Body	ID	Type	Overall	Ecological	Chemical
Lowthorpe /Kelk /Foston Becks from Source to Frodingham Beck	GB104026067101	River	Moderate	Moderate	Fail
Mickley Dike Catchment	GB104026066990	River	Moderate	Moderate	Fail
Nafferton Beck from Source to Driffield Canal	GB104026067090	River	Moderate	Moderate	Fail
Old Howe/ Frodingham Beck to River Hull	GB104026067021	River	Moderate	Moderate	Fail
Scurf Dike from Source to River Hull	GB104026067010	River	Moderate	Moderate	Fail
Skerne Beck	GB104026067041	River	Moderate	Moderate	Fail
West Beck Lower to River Hull	GB104026067040	River	Moderate	Moderate	Fail
West Beck Upper	GB104026067080	River	Moderate	Moderate	Fail
Auburn Beck from Source to North Sea	GB104026066650	River	Moderate	Moderate	Fail
Barmston Sea Drain/ Skipsea Drain to Confluence	GB104026077770	River	Moderate	Moderate	Fail
Barmston Sea Drain from Skipsea Drain to North Sea	GB104026077780	River	Moderate	Moderate	Fail
Earls Dyke from Source to North Sea	GB104026066640	River	Moderate	Moderate	Fail

WFD Water Body	ID	Type	Overall	Ecological	Chemical
Gransmoor Drain (Burton Agnes to Lissett Area)	GB104026066630	River	Moderate	Moderate	Fail
Stream Dyke Hornsea Mere to North Sea	GB104026066620	River	Moderate	Moderate	Fail
Hornsea Mere	GB30430244	Lake	Poor	Poor	Fail
Hull and East Riding Chalk	GB40401G700700	Ground water	Poor	N/A	N/A

3.3.1.2.4 Flood risk

637. Flood zone maps show that most of this onshore study area is in Flood Zone 1 (<0.1% Annual Exceedance Probability (AEP)) (**Figure 3-18**). Within the relatively flat River Hull valley, and further south around Halsham Drain, there are extensive areas of land in Flood Zone 3 (>1% AEP).

638. The risk of surface water flooding is low over most of this onshore study area – the most extensive areas at risk of flooding are adjacent to river channels, dikes drains and ditches (most notably around Winestead Drain and Lambwath Stream).



Legend:

- Onshore Study Area
- Statutory Main River
- Flood Zone 2
- Flood Zone 3

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A1	C01	03/11/2021	Authorized	LB	ID	HC

Title:

Flood Risk:
Creyke Beck

Figure: 3-18 | Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0036

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:250,000

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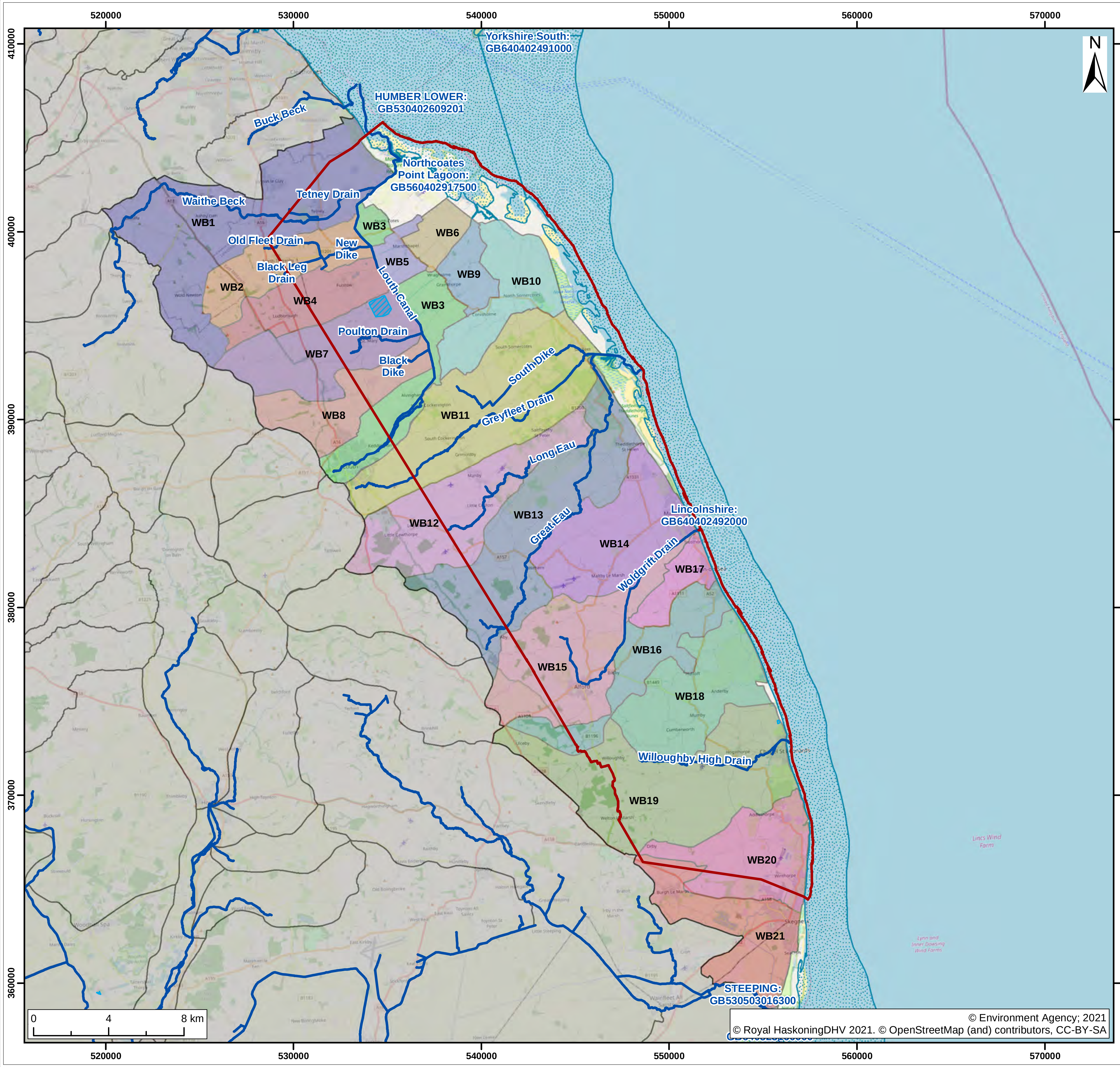
3.3.1.3 South of Humber

3.3.1.3.1 Surface waters

639. South of Humber onshore study area is characterised by numerous watercourses that drain west to east from the eastern edge of the Lincolnshire Wolds. The principal surface water catchments are: Waite Beck, Seven Towns North Eau, Seven Towns South Eau, South Drain, Grayfleet Drain, Long Eau, Great Eau, Boy Grift Drain, Main Drain and Willoughby High Drain (**Figure 3-19**). Floodplains have been heavily engineered and much of the surface water drainage system is formed by drains and ditches. Louth Canal cuts across the northern sector of the onshore study area, joining Waite Beck at Tetney Lock.

640. This onshore study area is largely rural. As a result, agricultural and rural land management issues are adversely affecting water quality. Many watercourses have elevated concentrations of phosphate and ammonia.

641. The only watercourse associated with a SSSI is Tetney Blow Wells, located immediately adjacent to Tetney Drain (this is the downstream section of Waite Beck). A narrow section of the onshore study area lies within the Humber Estuary SSSI, Humber Estuary SAC and Humber Estuary SPA. Estuarine sections of several surface water catchments cross this protected zone. Further information regarding each of these designated sites is provided in section 3.1.1.



Legend:

- Onshore Study Area
- Statutory Main Rivers
- WFD Lake Water Bodies
- WFD Transitional & Coastal Water Bodies

WFD River Water Body Catchments

- WB1: Waithe Beck lower catchment (to Tetney Lock)
- WB2: New Dike Catchment (trib of Louth Canal)
- WB3: Louth Canal
- WB4: Land Dike Drain to Louth Canal (West)
- WB5: Land Dike Drain to Louth Canal (East)
- WB6: Land Dike Drain
- WB7: Poulton Drain Catchment (trib of Louth Canal)
- WB8: Black Dyke Catchment (trib of Louth Canal)
- WB9: Seven Towns North Eau
- WB10: Seven Towns South Eau
- WB11: South Dike and Grayfleet Drain
- WB12: Long Eau
- WB13: Great Eau (downstream of South Thoresby)
- WB14: Trusthorpe Pump Drain (upper end)
- WB15: Woldgrift Drain
- WB16: Boygrift Drain
- WB17: Trusthorpe Pump Drain (lower end)
- WB18: Anderby Main Drain
- WB19: Willoughby High Drain
- WB20: Ingoldmells Main Drain
- WB21: Cow Bank Drain
- Catchments outside of Study Area

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A1	C01	03/11/2021	Authorized	LB	ID	HC

Title:

Surface Water Features:
South of Humber

Figure: 3-19 | Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0030

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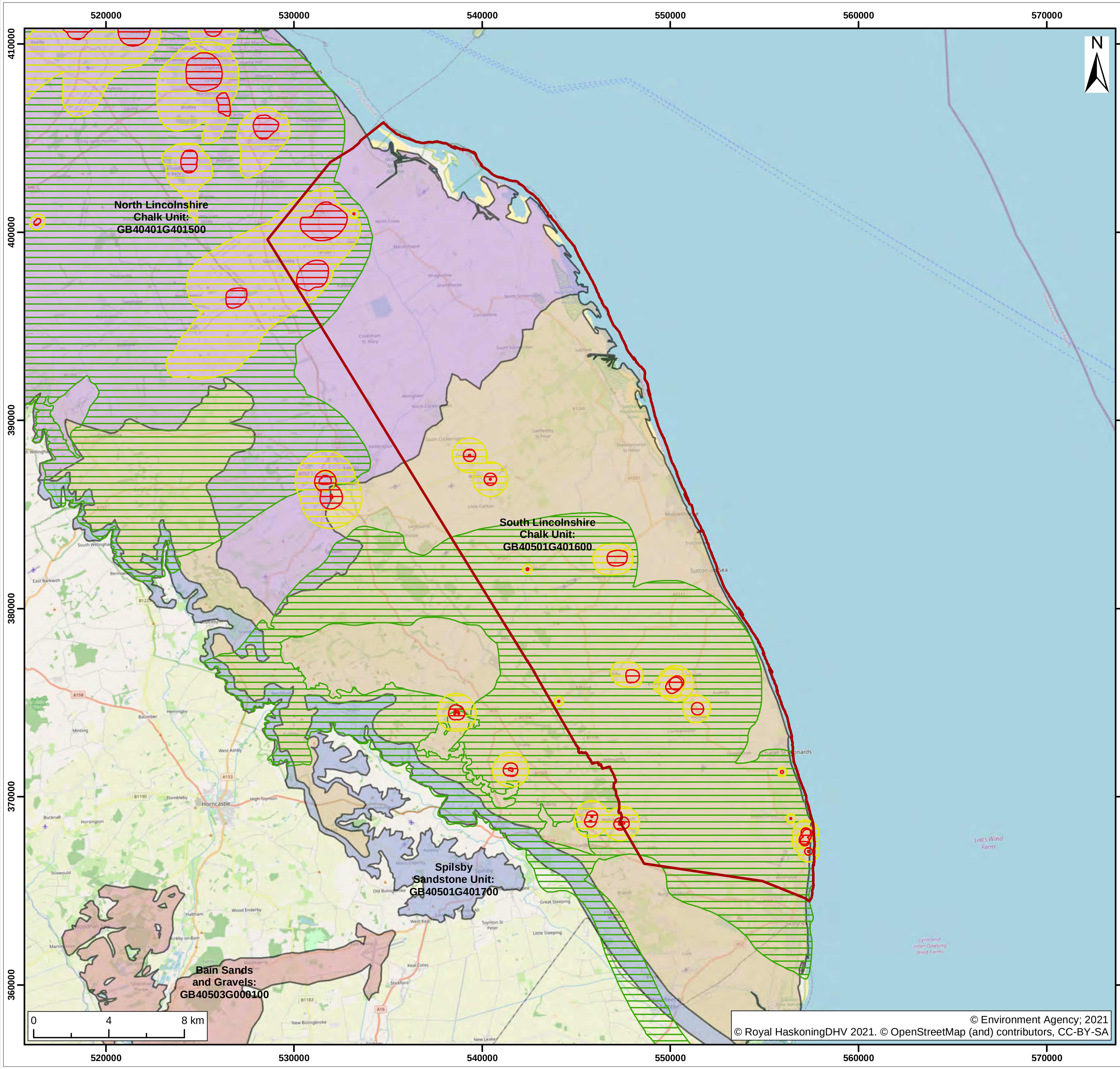
3.3.1.3.2 Groundwater

642. Bedrock geology in this onshore study area is dominated by the White Chalk Subgroup. There are small areas of sandstone associated with the Lower Greensand Group in the south west corner, which overlies a similarly small area of the Wealden Clay Formation. Chalk areas support a Principal aquifer, and sandstone support a small Secondary A aquifer (**Figure 3-20**).

643. Superficial geology is mostly alluvium (sands, silt, and clays) in the east of the onshore study area, and till (diamicton) deposits in the west. At the northern extremity of this onshore study area there are small pockets of river terrace gravels and loess (blown sand). These deposits support Secondary (undifferentiated) aquifers in the west (till), interspersed with restricted Secondary A aquifers in the river valleys. Towards the north there are scattered Secondary B aquifers.

644. Groundwater quality is adversely affected by abstraction (water industry) and poor nutrient management (agriculture).



Legend:

- Onshore Study Area

WFD Groundwater Bodies

- Bain Sands and Gravels
- North Lincolnshire Chalk Unit
- South Lincolnshire Chalk Unit
- Spilsby Sandstone Unit

Source Protection Zone

- Zone I
- Zone II
- Zone III

A1	C01	03/11/2021	Authorized	LB	ID	HC
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Groundwater Features: South of Humber

Figure: 3-20

Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0034

Co-ordinate system:	Page Size:	Scale:
British National Grid	A3	1:200,000

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3.3.1.3.3 WFD water bodies

645. **Table 3-13** shows the names and status (2019) of WFD water bodies in the South of Humber onshore study area. The overall status of 22 of 26 water bodies is moderate; a further two are poor and two bad. Issues preventing waters reaching a good status are related to physical modifications, pollution (mainly rural sources) and invasive non-native species (signal crayfish). Groundwater in the North Lincolnshire Chalk Unit and South Lincolnshire Chalk Unit is classed as poor overall. The South Lincolnshire Chalk Unit has a good quantitative element.

Table 3-13 South of Humber WFD Surface Water Bodies.

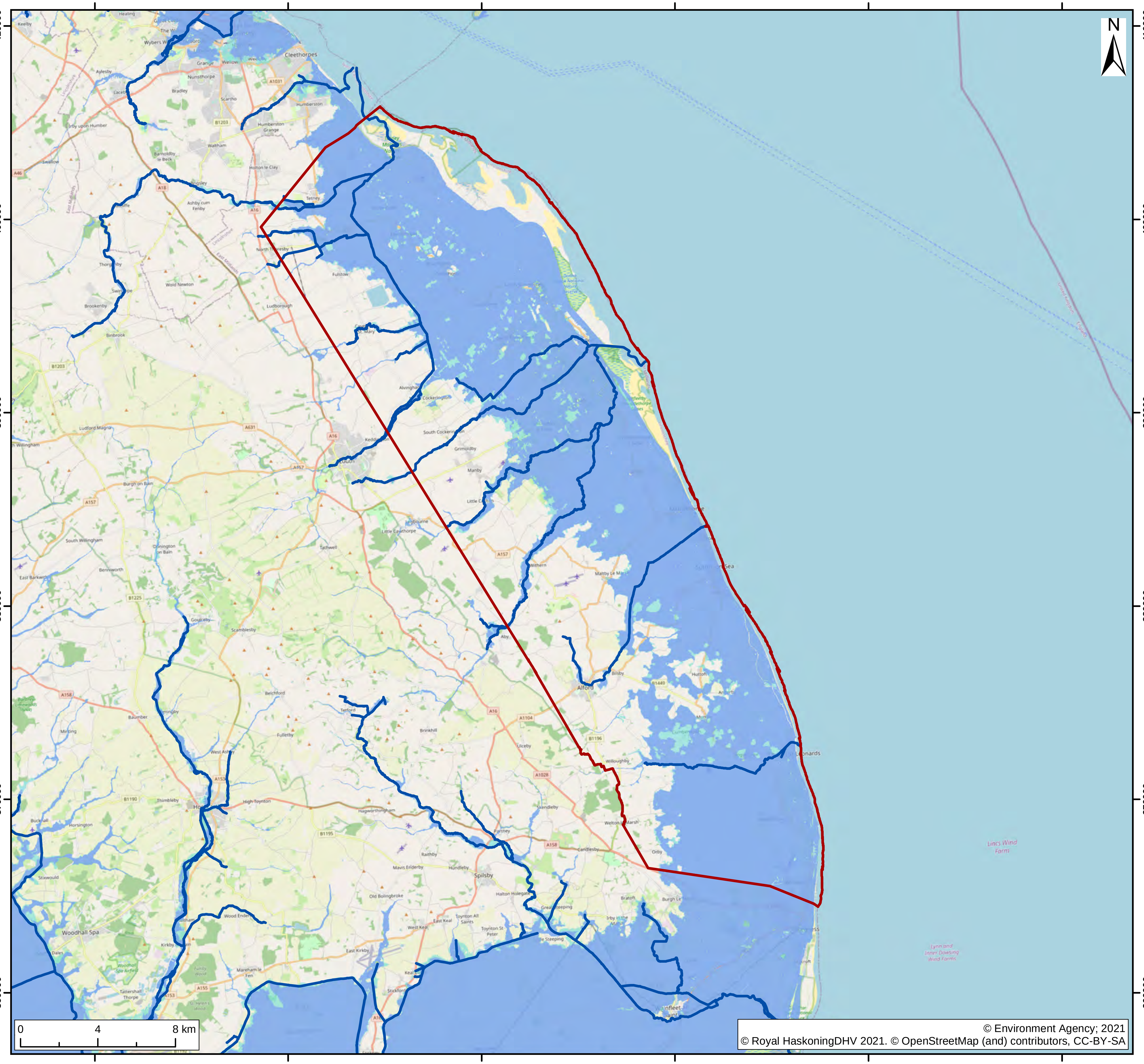
WFD Surface Water Body	ID	Overall	Ecological	Chemical
Anderby Main Drain (River)	GB105029061730	Moderate	Moderate	Fail
Boygrift Drain (River)	GB105029061720	Moderate	Moderate	Fail
Burwell Beck (River)	GB105029061630	Moderate	Moderate	Fail
Cow Bank Drain (River)	GB105030056440	Moderate	Moderate	Fail
Great Eau (downstream of South Thoresby) (River)	GB105029061660	Poor	Poor	Poor
Great Eau (upstream of South Thoresby) (River)	GB105029061620	Bad	Bad	Fail
Ingoldmells Main Drain (River)	GB105029061700	Moderate	Moderate	Fail
Lymn/Steeping (River)	GB105029061670	Moderate	Moderate	Fail
Sea Bank Clay Pits (River)	GB30533132	Moderate	Good	Fail
South Dike and Grayfleet Drain (River)	GB105029061680	Moderate	Moderate	Fail
Trusthorpe Pump Drain (lower end) (River)	GB105029061760	Moderate	Good	Fail
Trusthorpe Pump Drain (upper end) (River)	GB105029061640	Moderate	Moderate	Fail
Willoughby High Drain (River)	GB105029061710	Moderate	Moderate	Fail
Woldgrift Drain (River)	GB105029061750	Moderate	Moderate	Fail

WFD Surface Water Body	ID	Overall	Ecological	Chemical
Waite Beck Lower Catchment (to Tetney Lock) (River)	GB104029062100	Moderate	Moderate	Fail
Louth Canal	GB104029061990	Poor	Poor	Fail
New Dike Catchment (trib of Louth Canal) (River)	GB104029062030	Moderate	Moderate	Fail
Land Dike Drain to Louth Canal (west) (River)	GB104029062162	Bad	Bad	Fail
Land Dike Drain to Louth Canal (east) (River)	GB104029062165	Moderate	Moderate	Fail
Land Dike Drain (River)	GB104029062168	Moderate	Moderate	Fail
Seven Towns North Eau (River)	GB104029062140	Moderate	Moderate	Fail
Seven Towns South Eau (River)	GB104029062150	Moderate	Moderate	Fail
Poulton Drain Catchment (trib of Louth Canal) (River)	GB104029062010	Moderate	Moderate	Fail
Black Dyke Catchment (trib of Louth Canal) (River)	GB104029062000	Moderate	Moderate	Fail
South Dike and Grayfleet Drain (River)	GB105029061680	Moderate	Moderate	Fail
Long Eau (River)	GB105029061670	Moderate	Moderate	Fail
North Lincolnshire Chalk Unit (Groundwater)	GB40401G401500	Poor	N/A	N/A
South Lincolnshire Chalk Unit (Groundwater)	GB40501G401600	Poor	N/A	N/A

3.3.1.3.4 Flood risk

646. Due to the flat nature within this onshore study area, the majority of land is in Flood Zone 3 (>1% AEP) (**Figure 3-21**). At the western edge of the onshore study area, Flood Zone 3 very closely follows the 10m contour. Inland of this topographic boundary, the likelihood of flooding is more constrained by shallow valleys draining the Lincolnshire Wolds. The most extensive areas of land within Flood Zone 3 in this constrained setting are located on the Great Eau and Long Eau.

647. Areas at risk of surface water flooding are confined to areas inland of the 10m contour, in shallow valley settings and especially where these valleys meet flatter areas immediately downstream. The most extensive areas are along New Dike (near Louth Canal), Covenham St Mary, and on parts of the Great Eau.



Legend:

- Onshore Study Area
- Statutory Main River
- Flood Zone 2
- Flood Zone 3

A1	C01	03/11/2021	Authorized	LB	ID	HC
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Flood Risk:
South of Humber

Figure: 3-21 | Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0037

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3.3.2 Approach to Data Collection

648. The following information has been considered during the production of this Scoping Report and will be considered further within the PEIR/ES where relevant matters are scoped in to the EIA process.

649. The assessment will primarily be informed by a desk-based assessment using existing secondary data sets. The secondary data sets that will be used to inform the EIA are set out in **Table 3-14.**

Table 3-14 Secondary Data to be Used in the EIA

Data used to inform the assessment	Source
WFD water body status objectives and classification data	Environment Agency Catchment Data Explorer
Water quality data	Environment Agency Water Quality Data Archive
Aquatic ecology data	Environment Agency Ecology and Fish Data Explorer
SPZs	Environment Agency (data.gov.uk)
Aquifer designation (bedrock and superficial) mapping	Magic.defra.gov.uk
Groundwater vulnerability mapping	Magic.defra.gov.uk
Geological mapping	British Geological Survey
Licensed abstraction data	Environment Agency (available upon request)
Consented discharges	Environment Agency (available upon request)
Statutory and non-statutory designated sites	Natural England (data.gov.uk)
Flood Map for Planning	Environment Agency
Flood risk mapping (rivers and sea, surface water, reservoirs)	Environment Agency (data.gov.uk)
Detailed flood risk information (Product 4, 5 and 8)	Environment Agency (available upon request)

Data used to inform the assessment	Source
Historical flood incident information relating to highways, surface water and drainage flooding	Lead Local Flood Authority (LLFA) (available upon request)
Shoreline Management Plans	Environment Agency East Riding of Yorkshire Council East Lindsey District Council Durham County Council

650. Primary data will be also be collected to inform the EIA, as outlined in **Table 3-15**. A geomorphology baseline survey will be undertaken to acquire primary data on the watercourses which are scoped into the next stage of the EIA. This will be undertaken in accordance with best practice geomorphological walkover methodologies. Agreement on the method and scope of the survey will be obtained from the Environment Agency prior to undertaking the survey.

Table 3-15 Primary Data to be Used in the EIA

Data content	Data information
Geomorphology baseline	The geomorphology baseline survey will collect information about the existing condition of the major watercourses within the onshore study area(s). It will specifically focus on reaches where crossings of main rivers or other sensitive watercourses are proposed.

651. Any additional primary or secondary datasets will be identified through ongoing consultation with stakeholders through the EPP.

3.3.3 Potential Impacts

652. The Flood Risk and Hydrology assessment is likely to have key inter-relationships with Terrestrial Ecology, Geology and Land Quality, Land Use and Onshore Archaeology. These will be considered where relevant.

3.3.3.1 Potential impacts during construction

653. Direct disturbance of surface water bodies: Construction activities within the onshore study area could directly impact upon the geomorphology, hydrology, water quality and physical habitats of the surface water bodies identified. Disturbance could occur from the installation of buried electrical cables and associated infrastructure (e.g. temporary access crossings over surface watercourses). It could also occur in the event of an accidental release of drilling fluid from trenchless drilling techniques (e.g. HDD or auger boring) used to install cables below sensitive watercourses.

654. Increased sediment supply: Construction activities could increase soil erosion and supply of fine sediment (e.g. clays, fine silts and sands) to surface watercourses. This could arise from earthworks and vegetation removal to construct the onshore export cable route(s) and temporary/permanent infrastructure. Increased sediment supply would increase turbidity levels within the water column, resulting in greater fine sediment deposition on the channel bed. This could, in turn, alter local geomorphological adjustment rates and impact upon in-channel morphological features. Higher sediment loads entering the channel could also smother bed habitats, reduce light penetration, and decrease temperature and dissolved oxygen levels. These impacts could adversely affect stream biota, such as fish, macroinvertebrates and macrophytes.

655. Supply of contaminants to surface and groundwaters: The operation of construction machinery working in or adjacent to surface watercourses has the potential to accidentally release lubricants, fuels and oils into a surface water body. This could also be caused by spillage, leakage and in-wash from vehicle storage areas following rainfall, accidental release of foul waters (e.g. from welfare facilities) and construction materials, such as concrete and inert drilling fluids from trenchless crossings. Such contaminants could enter the aquatic system and adversely affect its physico-chemistry. This could have associated impacts upon stream biota. Any activities that disturb the ground, such as excavation or piling, could discharge contaminants below ground and potentially adversely affect groundwater quality elements.

656. Changes to surface and groundwater flows and flood risk: Site preparation and construction activities within the onshore study areas could lead to an increase in surface water runoff due to alterations in surface drainage patterns and surface flows. Infiltration rates could be reduced as a result of soil compaction by construction vehicles and surface infrastructure. Increased surface runoff could have an adverse impact on the geomorphology of surface watercourses (e.g. through associated bed and bank scour and increase in fine sediment input). Flood risk could also be altered and/or increased, particularly to third-party land and property in the onshore study areas designated as Flood Zone 2 or 3. Subsurface flow patterns could also be altered due to potential changes in infiltration rates and surface flow patterns.

657. The impacts of direct disturbance of surface water bodies; increased sediment supply; supply of contaminants; changes to surface water runoff and flood risk; and cumulative impacts have been scoped in. No potential construction impacts have been scoped out at this stage.

3.3.3.2 Potential impacts during operation and maintenance

658. Supply of contaminants to surface and groundwaters: There is the potential for accidental release of contaminants to surface water during planned and unplanned operational maintenance. Activities could lead to accidental release of fine sediment, oils, fuels and lubricants to surface water bodies. This could adversely affect the geomorphology and water quality of the surface water drainage network. Accidental spillage or leakage of fuel oils or lubricants could also impact upon the surface water quality and connected groundwater quality. This in turn could impact on aquatic ecology and the use of water resources for abstractions.

659. Changes to surface runoff and flood risk: Permanent onshore infrastructure (i.e. the onshore substation(s)) is likely to increase the impermeable area across the surface water catchments. This could decrease infiltration rates and permanently change surface runoff pathways which may increase and/or alter flood risk. The greatest flood risk impact from these changes is likely to be in parts of the onshore study areas designated as Flood Zone 2 or 3. Operational activities associated with the TJB will not affect existing sea defences or flood risk.

660. The impacts of increased sediment supply; supply of contaminants; changes to surface water runoff and flood risk and cumulative impacts are scoped in to the assessment. Direct disturbance of surface water bodies during operation has been scoped out as post-construction there will be no mechanisms by which elements of the Projects could directly disturb water bodies.

3.3.3.3 Potential impacts during decommissioning

661. It is anticipated that decommissioning impacts would be similar in nature to those of construction. It is likely that the magnitude of the effects from decommissioning will be lower than that of construction impacts. As such, the same potential impacts from construction have been scoped in for the decommissioning phase.

3.3.3.4 Potential cumulative impacts

662. Potential cumulative impacts related to water resources and flood risk are likely to include increased sediment supply if other projects are being constructed within 1km of the onshore construction area(s). All potential impacts are scoped in to the cumulative impacts assessment.

3.3.3.5 Summary of potential impacts

663. **Table 3-16** shows a summary of potential impacts during different phases of the Projects.

Table 3-16 Summary of Impacts Relating to Flood Risk and Hydrology. Topics to be Scoped In (✓) and Out (x)

Potential Impact	Construction	Operation	Decommissioning
Direct disturbance of surface water bodies	✓	x	✓
Increased sediment supply	✓	✓	✓
Supply of contaminants	✓	✓	✓
Changes to surface water runoff and flood risk	✓	✓	✓
Cumulative impacts	✓	✓	✓

3.3.4 Approach to Impact Assessment

3.3.4.1 Study area

664. The study area for surface water resources and flood risk will include all the surface hydrological catchments that contain components of the Projects or are hydrologically connected to (i.e. directly upstream or downstream) these catchments. The Environment Agency's WFD river water body catchments are based on surface hydrological catchments and will therefore be used to delineate the boundaries of the study area and define surface water receptors.

665. The study area for groundwater resources will include all the hydrogeological units that underlie the Projects or are hydrologically connected to these units. The Environment Agency's WFD groundwater bodies are based on large-scale hydrogeological units and will therefore been used to delineate the boundaries of the study area and define groundwater receptors.

3.3.4.2 Environmental Impact Assessment

666. The EIA will focus on potential impacts on two groups of receptors:

- Water resources, including the hydrology, geomorphology and water quality of surface waters (e.g. rivers, canals, lakes and reservoirs); the quantity and quality of groundwater; abstractions from surface and groundwaters (e.g. Principal, Secondary A and Secondary Undifferentiated aquifers) and associated designated sites (e.g. SPZs, Drinking Water Protected Areas); water-dependent habitats and groundwater-dependent terrestrial ecosystems, including designated sites (e.g. SAC, SPA, SSSI); and water supply infrastructure (including treatment plants, pumping stations and distribution networks) and surface and foul drainage infrastructure.
- Flood risk to the Projects from all sources, including fluvial, coastal, surface water, groundwater, sewer and reservoir flooding; and changes in flood risk from all sources (fluvial, coastal, surface water, groundwater, sewer and reservoir flooding) resulting from the Projects.

667. Whilst there are clear links between the two groups of receptors, the assessment of receptor sensitivity and the magnitude of effect may differ. Definitions of receptor sensitivity and value and impact magnitude and significance will be developed with reference to guidance for the assessment of water resources impacts provided by the Department of Transport (2015) and Highways Agency (2009).

668. The approach to assessment and data gathering will be discussed and agreed through production of a method statement and discussion with stakeholders as part of the EPP. Consultation will be undertaken at key stages throughout the EIA process. Following the refinement of the onshore study area(s), further liaison with the stakeholders including the Environment Agency, Natural England, the LLFA and appropriate water companies will be undertaken to agree the approach and methodology for data collection for EIA purposes and the specific assessment methodology.

3.3.4.3 Supporting assessments

669. The EIA will be supported by two additional assessments:

- A Flood Risk Assessment (FRA) would be undertaken in accordance with the National Planning Policy Framework (MHCLG, 2019) and following suitable guidance (e.g. MHCLG, 2014) to assess the flood risk to the development and surrounding areas. This would inform the identification of any required mitigation measures.
- A WFD Compliance Assessment (which includes risks to ecological status) will be required to assess compliance with the requirements of the WFD in line with The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. Initially this would consist of three stages (screening, scoping and impact assessment), in accordance with the Planning Inspectorate’s guidance (Planning Inspectorate, 2017).

3.4 Land Use

670. This section of the Scoping Report considers the impacts of changes to land use which will arise as a result of the Projects during construction, operation and maintenance, and decommissioning.

The following questions are posed to consultees to help them frame and focus their response to the land use scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Do you agree with the approach to data collection?
- Have all the potential impacts on land use resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

3.4.1 Existing Environment

3.4.1.1 Existing land uses

671. The existing land uses within the onshore study areas are predominantly arable agricultural land in active uses. A range of other land cover types are present including, but not limited to, built-up urban areas, areas of light industry, parcels of woodland, watercourses and ponds.

3.4.1.2 Agricultural land and soil quality

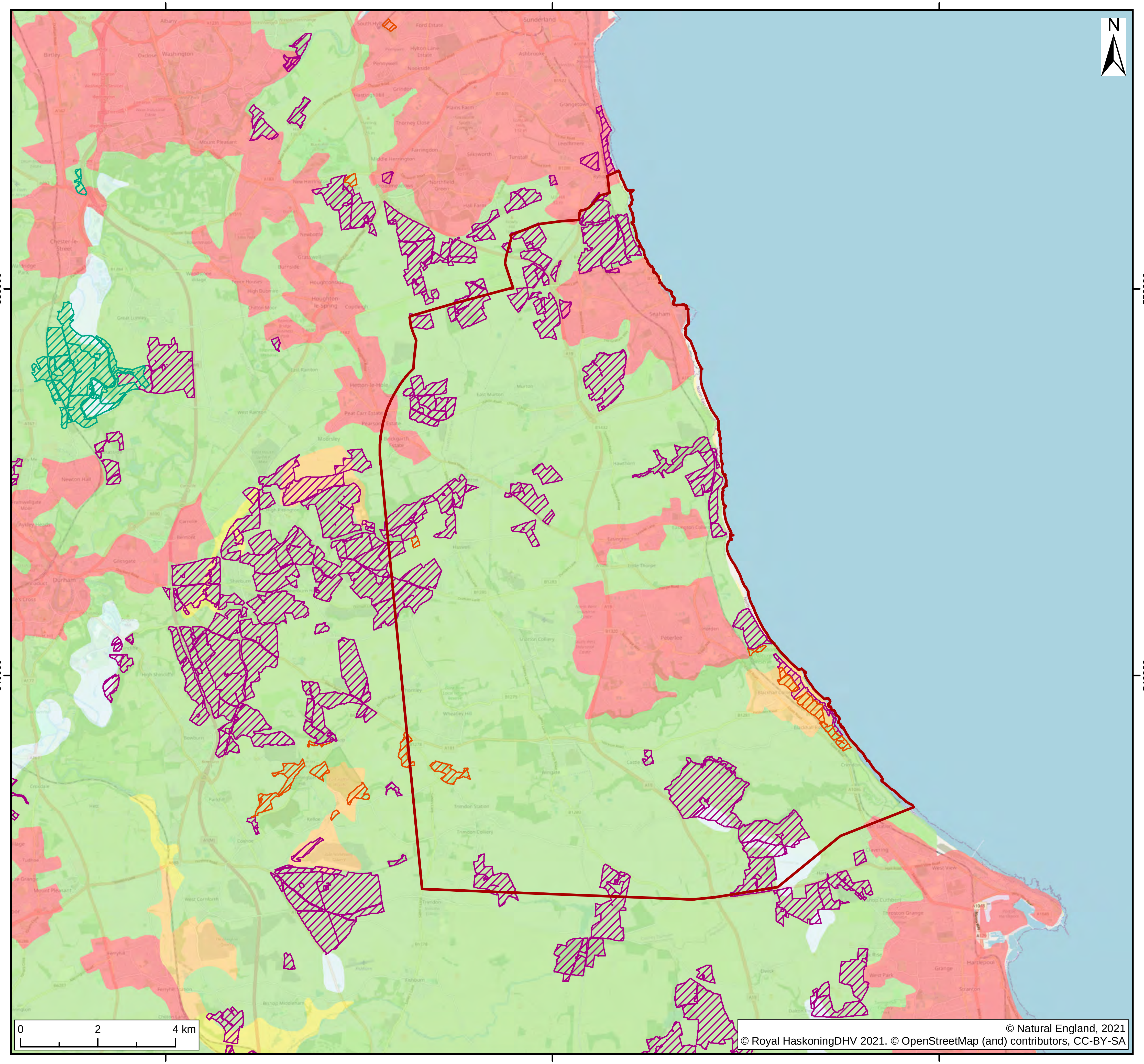
672. The agricultural land which comprises the majority of the onshore study areas are considered in terms of its agricultural value using Natural England's Agricultural Land Classification (ALC) dataset. ALC grades agricultural land from Grade 1 (best quality) through to Grade 5 (poorest quality) based on factors including climate, nature of the soil and site-based factors. 'Best and Most Versatile' (BMV) agricultural land is defined as ALC Grades 1, 2 and 3a (Grade 3 is split into 3a and 3b). As Grade 3 is not split within Natural England's ALC mapping dataset, at this stage it has been assumed that all Grade 3 land could be Grade 3a.

673. The onshore study areas contain agricultural land of Grades 1 – 4, with the majority of land in all three of the onshore study areas classified as Grades 2 – 3. Urban and non-agricultural land is recorded surrounding known settlements and along the coastline (**Figure 3-22** to **Figure 3-24**).

674. A number of Environmental Stewardship Schemes are recorded within the onshore study areas, these are designated to encourage environmentally beneficial land management practices.

3.4.1.3 Utilities

675. It is anticipated that utilities are present within the onshore study areas. These are likely to include telecommunications, buried and above ground electricity cables, gas and public water mains. Detailed utilities data has not been sought at this stage; detailed data will be sought once the Projects have been refined during the EIA process and following confirmation of the onshore gird connection point(s).



Legend:

Onshore Study Area

Agricultural Land Classification

- Grade 2
- Grade 3
- Grade 4
- Non Agricultural
- Urban

Environmental Stewardship Schemes

- Entry Level plus Higher Level Stewardship
- Higher Level Stewardship
- Organic Entry Level plus Higher Level Stewardship

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A1	C01	03/11/2021	Authorized	LB	KD	HC

Title:

Land Use Categories:
Hawthorn Pit

Figure: 3-22 Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0058

Co-ordinate system: British National Grid
Page Size: A3
Scale: 1:100,000

Project:
Dogger Bank South
Offshore Wind Farms

Report:
Dogger Bank South
Offshore Wind Farms
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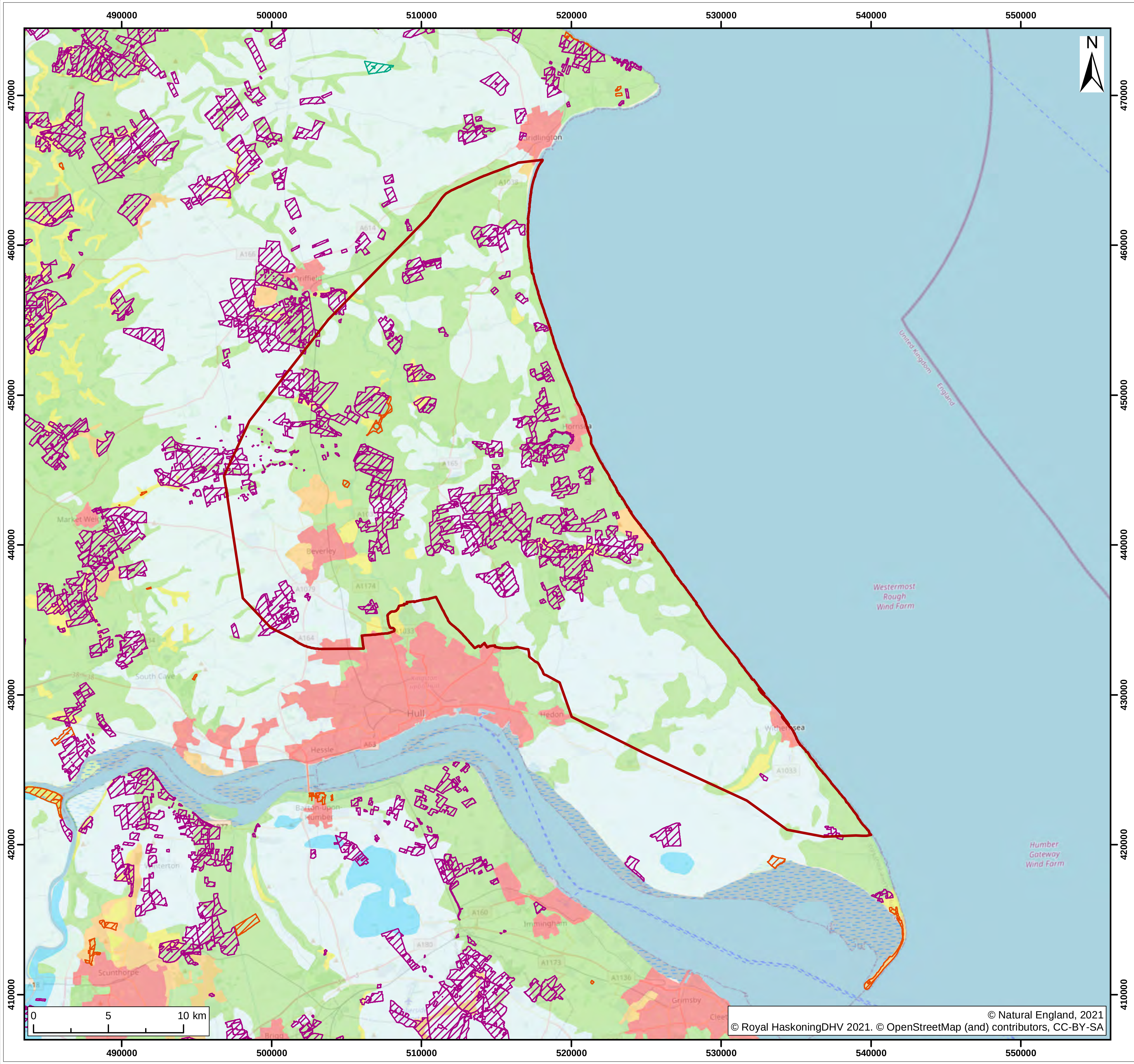

Legend:

- Onshore Study Area

Agricultural Land Classification

- Grade 1
- Grade 2
- Grade 3
- Grade 4
- Grade 5
- Non Agricultural
- Urban

Environmental Stewardship Schemes

- Entry Level plus Higher Level Stewardship
- Higher Level Stewardship
- Organic Entry Level plus Higher Level Stewardship

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A1	C01	03/11/2021	Authorized	LB	KD	HC

Title:

Land Use Categories:
Creyke Beck

Figure: 3-23 | Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0059

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:250,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

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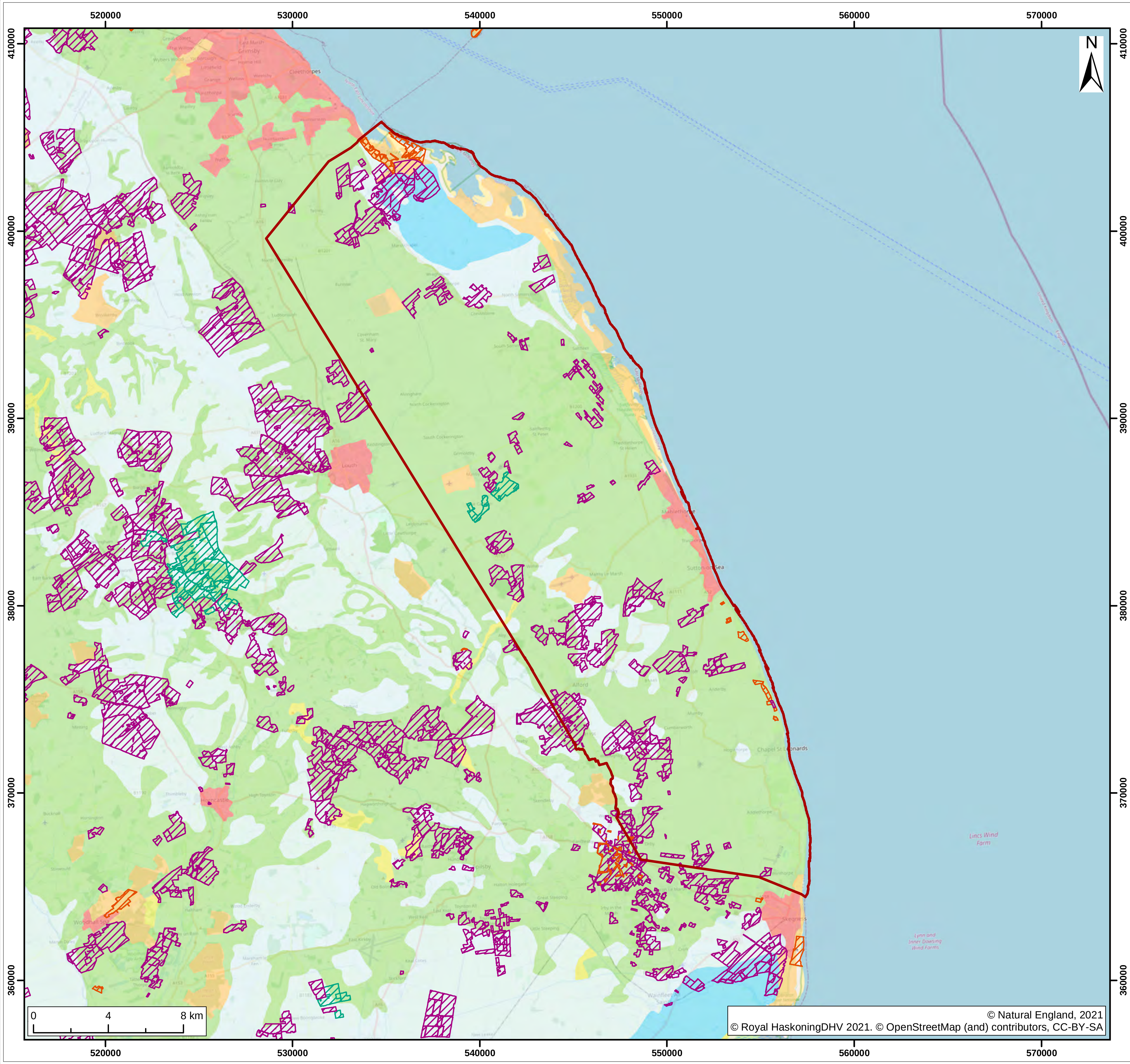

Legend:

- Onshore Study Area

Agricultural Land Classification

- Grade 1
- Grade 2
- Grade 3
- Grade 4
- Non Agricultural
- Urban

Environmental Stewardship Schemes

- Entry Level plus Higher Level Stewardship
- Higher Level Stewardship
- Organic Entry Level plus Higher Level Stewardship

A1	C01	03/11/2021	Authorized	LB	KD	HC
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Land Use Categories:
South of Humber

Figure: 3-24 Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0060

Co-ordinate system:	Page Size:	Scale:
British National Grid	A3	1:200,000

Project:
Dogger Bank South
Offshore Wind Farms

Report:
Dogger Bank South
Offshore Wind Farms
EIA Scoping Report

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3.4.2 Approach to Data Collection

676. The following information has been considered during the production of this Scoping Report and will be considered further within the PEIR/ES where relevant matters are scoped in to the EIA process.

677. The existing environment will be characterised using the data sources set out in **Table 3-17.**

Table 3-17 Existing Datasets

Data source	Data contents
Natural England	Agricultural land classification maps Environmental stewardship schemes
Countryside and Rights of Way Act 2000 – Section 4 Conclusive Registered Common Land, Natural England	Common land
East Riding of Yorkshire Council, Lincolnshire County Council and County Durham County Council	Planning policy adopted proposals maps
OS mapping Aerial photography	'A' Roads, railway lines and urban areas
Utilities records requested from local utilities suppliers (various)	Utilities

678. Any additional datasets will be identified through ongoing consultation with stakeholders. No surveys are proposed to inform the assessment of impacts related to land use.

3.4.3 Potential Impacts

679. The Land Use assessment is likely to have key inter-relationships with Terrestrial Ecology, Traffic and Transport and Socio-economics, Tourism and Recreation. These will be considered where relevant.

3.4.3.1 Potential impacts during construction

680. Agricultural productivity: There is the potential for adverse impacts to soil structure and future agricultural productivity of soils impacted during construction through the use of heavy machinery and disturbance. Therefore, potential impacts to agricultural productivity have been scoped into the EIA.

681. Drainage: There is the potential for an adverse impact to natural and artificial field drainage systems during construction works. Therefore, potential impacts to drainage have been scoped into the EIA.

682. Disruption to farming practices: There is the potential for adverse impacts on farming and other land use practices through the temporary loss of land available to farm, restricted access and disruption caused by working areas and construction traffic. Therefore, potential impacts to farming practices have been scoped into the EIA.

683. Existing utilities: During the construction phase, cable installation activity has the potential to impact on water, power, gas and communication infrastructure. Therefore, potential impacts to existing utilities have been scoped into the EIA.

3.4.3.2 Potential impacts during operation and maintenance

684. Permanent loss of BMV: The presence of permanent infrastructure at the onshore substation(s) will potentially result in the permanent loss of land including agricultural land, and therefore also a loss in productivity of these areas. Given the extent of BMV within the onshore study areas, there is a potential for loss of BMV during the lifetime of the Projects from the onshore substation(s), therefore it is proposed to scope this in. For buried infrastructure, land will be reinstated, and as such, there will be no permanent loss of BMV where buried infrastructure is present and it is proposed to scope this out.

685. Soil heating: Buried cable systems emit some heat, potentially causing impacts to soil characteristics and productivity. The electrical system is designed to minimise heat loss to a level which is not likely to affect crop growth and therefore it is proposed to scope this out.

686. Drainage: Permanent infrastructure and hardstanding at the onshore substation(s), plus the presence of buried cables has the potential to permanently impact upon land drainage. Impacts are considered further in section 3.3.3.

687. Disruption to farming practices: There is the potential for farming practices to be restricted due to the presence of cables and access restrictions.

3.4.3.3 Potential impacts during decommissioning

688. It is anticipated that the decommissioning impacts would be similar in nature to those of construction, although the magnitude of effect is likely to be lower. As such the same potential impacts as for the construction phase have been scoped in for decommissioning. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the relevant regulator.

3.4.3.4 Potential cumulative impacts

689. Onshore cumulative impacts will be considered as set out in section 1.7. Potential cumulative impacts related to land use include other nearby development projects interacting with the same utilities or existing land uses with temporal overlaps with the Projects' construction phase.

3.4.3.5 Summary of potential impacts

690. **Table 3-18** outlines the impacts which are proposed to be scoped into the EIA. This may be refined through the EPP as additional information and data become available.

Table 3-18 Summary of Impacts Relating to Land Use. Topics to be Scoped In (✓) and Out (x)

Potential impact	Construction	Operation	Decommissioning
Agricultural productivity (overground infrastructure)	✓	✓	✓
Agricultural productivity (buried infrastructure)	✓	×	✓
Drainage	✓	✓	✓
Disruption to farming practices	✓	✓	✓
Existing utilities	✓	×	✓
Loss of BMV	✓	✓ (from the onshore substation(s))	✓
Soil heating	×	×	×
Public health and safety	×	✓	×
Cumulative impacts	✓	✓	✓

3.4.4 Approach to Impact Assessment

691. The EIA for land use will identify the likely impacts of the Projects, assess the impacts and identify appropriate mitigation measures if required. The assessment will consider both direct and indirect impacts.

692. The methodology for the assessment of the effects on land use will be informed by the following current guidance:

- NE124 – Look after your land with Environmental Stewardship (Natural England 2012);
- Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 6 (Land Use); and
- Defra guidance including the Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (Defra 2009).

3.5 Human Health

693. This section of the Scoping Report identifies the human health receptors relevant to the Projects. The potential effects of construction, operation and maintenance, and decommissioning of the Projects on human health are considered throughout this section.

The following questions are posed to consultees to help them frame and focus their response to the human health scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Do you agree with the approach to data collection?
- Have all the potential impacts on human health resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

3.5.1 Existing Environment

694. Joint Health and Wellbeing Strategies (JHWS) are published by local councils and identify a number of key aspects of the health landscape in their local area. The following sections summarise the key issues in the relevant JHWS in each of the study areas.

3.5.1.1 Hawthorn Pit

695. The County Durham JHWS 2021-2025 (County Durham Health and Wellbeing Board, 2020) summaries the health landscape in the county, under the topics of deprivation and employment, starting well, living well and ageing well. Key statistics regarding these health landscape have been summarised below:

- County Durham is in the top 40% most deprived upper-tier authorities in England. Nearly half of the population live in the 30% most deprived areas nationally, for children this rises to 54%.
- Life expectancy and healthy life expectancy for both men and women in County Durham is lower than the England average.
- Levels of childhood obesity, teenage pregnancy, smoking in pregnancy, breastfeeding, and the rate of alcohol-specific hospital admissions among those under 18 are worse than the average for England.
- Educational attainment, levels of self-harm hospital admissions and childhood immunisations are better than the average for England.
- Estimated levels of excess weight in adults (aged 18+) and physically active adults (aged 19+) are worse than the England average. Prevalence of hypertension, COPD, cardiovascular disease, diabetes, stroke and coronary heart disease are higher in County Durham than England. But levels of new sexually transmitted infections, people killed and seriously injured on roads, statutory homelessness and new cases of tuberculosis are better than the England average.
- Over 5,000 County Durham residents have a dementia diagnosis. However, it is estimated that the actual number of people over the age of 65 with dementia is closer to 7,300, this is predicated to increase 52% by 2040.
- Rates of premature mortality from the major causes of death are statistically significantly higher in County Durham, this includes rates for cardiovascular disease, cancer, liver disease and heart disease.

3.5.1.2 Creyke Beck

696. The East Riding of Yorkshire Health and Wellbeing Strategy 2019 – 2022 (East Riding of Yorkshire Health and Wellbeing Board, 2019) provides health statistics under the categories start well, develop well, live and work well and age well and end of life. Key statistics from these categories have been summarised below:

- When comparing the rates of under 18s conception, infant mortality (under 1), Obesity (4-5years), under 16s poverty and children in care East Riding of Yorkshire performs better than England as a whole.
- The rate of Accident and Emergency attendance (5-19 years) is higher in East Riding of Yorkshire compared to the rate for England.
- The rates of family homelessness and the wellbeing score are better in East Riding of Yorkshire compared to the England average.
- Across the county the rate of smoking prevalence in adults and the rate of households not connected to the gas network is better than the rate for England, however there are large inequalities within the county.
- The level of excess weight in adults is higher in East Riding of Yorkshire than England average.
- Life expectancy at birth for both males and females is higher than the average for England.
- Dementia prevalence in East Riding of Yorkshire is higher than the average rate for England.

3.5.1.3 South of Humber

697. The JHWS for Lincolnshire (Lincolnshire County Council, 2018) identifies seven priorities: mental health and emotional wellbeing (children and young people), mental health (adults), carers, physical activity, housing and health, obesity and dementia. Key statistics regarding these health priorities have been summarised below (Lincolnshire Research Observatory, 2021):

- 8% of 5 to 10 years olds and 12% of 8 to 16 year olds in Lincolnshire have a diagnosed mental health condition (2019).
- 17% of adults (aged 16 and over) in Lincolnshire suffer from a common mental health disorder. Prevalence of mental health disorders in Lincolnshire is below average at 0.79% (compared to 0.92% nationally, however the prevalence of depression is above average at 10.66% (compared to 9.09% nationally).
- 2.2% of households in Lincolnshire are overcrowded; and 40% of properties may be adaptable to make suitable for people’s needs as a result of disability; 18% of private sector housing stock in the county is estimated to have a serious (Category 1) hazard under the Housing Health and Safety Rating System.
- 15% of reception-aged children in Lincolnshire are classified as obese and 65% of adults are classified as overweight or obese.
- 6.5% of people aged over 65 in Lincolnshire are living with dementia, which accounts for 1.6% of the county’s entire population, with figures expected to increase by 54.15% by 2035 (compared to rates in 2018).

3.5.2 Approach to Data Collection

698. The following information has been considered during the production of this Scoping Report and will be considered further within the PEIR/ES where relevant matters are scoped in to the EIA process.

699. The assessment will focus on the onshore elements of the Projects, and on the local population within the study areas most likely to be affected. Existing baseline statistics will be obtained from publicly available data, such as from the Office of National Statistics (ONS) (i.e. census data) and Public Health England (PHE) (e.g. Public Health Outcome Framework, health asset profiles, etc) to provide information on population health (both general and vulnerable groups) within the onshore study areas. No baseline human health surveys or monitoring are proposed to be undertaken as part of the assessment. The human health impact assessment (HIA) will bring together the conclusions of the assessments made in other relevant chapters of the EIA.

3.5.3 Potential Impacts

700. The Human Health assessment is likely to have key inter-relationships with Geology and Land Quality, Land Use, Air Quality, Flood Risk and Hydrology, Noise and Vibration, Traffic and Transport and Socio-economics, Tourism and Recreation. These topics will be considered as appropriate.

3.5.3.1 Potential impacts during construction

701. Potential impacts on Public Rights of Way (PRoW) have the potential to cause changes in accessing the footpath, cycleway and/or bridleway network (i.e. active travel). Increased traffic associated with construction activities may also lead to an increase in traffic related accidents. Impacts on the public transport network could also impede access to community / health care providers. Therefore, impacts related to changes to traffic and transport have been scoped in to the assessment.

702. Construction of the onshore infrastructure has the potential to cause impacts on wellbeing through stress and disturbance.

703. Onshore related construction works have the potential to impact air quality from the generation of construction dust and traffic emissions, which in turn may cause nuisance and an increase in local air pollutants which affect vulnerable people. See section 3.10 for further information on air quality impacts.

704. Onshore related construction works also have the potential to give rise to increased temporary noise levels that may cause disturbance and affect local residents' health and wellbeing. See section 3.9 for further information on noise and vibration impacts.

705. Contaminated land (if present) disturbed during construction related activities could result in human health effects through ingestion, inhalation or contact with liberated contaminants. These impacts are further assessed in section 3.2. Pollution of surface water or groundwater bodies which are subsequently used as a potable source could result in human effects, further details are provided in section 3.3. The onshore study areas are predominately agricultural and food safety could also be compromised by contaminated soils or water, if encountered.

706. The construction of the onshore infrastructure and its potential to cause impacts on wellbeing through stress and disturbance has been scoped in to the assessment.

707. Beneficial impacts are anticipated in relation to enabling residents within the onshore study areas to access employment opportunities through the construction related activities and have been scoped in to the assessment.

3.5.3.2 Potential impacts during operation and maintenance

708. Onshore operational phase noise emissions associated with the onshore substation(s) have the potential to cause disturbance and therefore affect human health.

709. Beneficial impacts are anticipated as a result of the Projects in respect to employment opportunities associated with the operation and maintenance requirements.

710. The impacts of operational noise on human health receptors have been scoped in to the assessment.

3.5.3.3 Potential impacts during decommissioning

711. It is anticipated that the decommissioning impacts would be similar in nature to those of construction, although the magnitude of effect is likely to be lower. As such the same potential impacts from construction have been scoped in for decommissioning. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the relevant regulator.

3.5.3.4 Potential cumulative impacts

712. Onshore cumulative impacts will be considered as set out in section 1.7. Potential cumulative impacts related to human health include other nearby development projects interacting with the same vulnerable populations during their construction and operation.

3.5.3.5 Summary of potential impacts

713. **Table 3-19** outlines the impacts which are proposed to be scoped into the EIA. This may be refined through the EPP as additional information and data become available.

Table 3-19 Summary of Impacts Relating to Human Health. Topics to be Scoped In (✓) and Out (x)

Potential impact	Construction	Operation	Decommissioning
Interference with recreational users	✓	✗	✓
Stress/disturbance associated with construction activities	✓	✗	✓
Degradation of local air quality	✓	✗	✓
Noise disturbance	✓	✓	✓
Land contamination giving rise to health and effects	✓	✗	✓
Access employment opportunities	✓	✓	✓
Cumulative impacts	✓	✓	✓

3.5.4 Approach to Impact Assessment

714. The HIA methodology will use best practice as published by IEMA in line with the 'Health in Environmental Impact Assessment: A Primer for a Proportionate Approach' (outlined in Cave et al., 2017) and working within the framework of the PHE guidance 'Health Impact Assessment in spatial planning' (PHE, 2020) and the NHS 'Healthy Urban Planning Checklist' for including health in consideration of development planning (NHS, 2017). The methodology will provide a framework to identify:

- the 'likelihood' of the Projects having an effect on health; and
- if an effect is likely, whether it may be 'significant'.

715. The study area for the HIA will include all local populations which have the potential to be affected during the construction, operation and decommissioning phases.

716. Effects will be considered with regard to the general population and vulnerable groups, with populations being considered at a geographical scale in proportion to the Projects, and in accordance with PHE Guidance (PHE, 2020). The conclusions will consider alignment with relevant national, regional and local planning policies on population health and wellbeing protection within the study area.

717. The HIA will bring together the conclusions of assessments undertaken in other relevant chapters in the EIA (e.g. Ground Conditions and Contamination, Air Quality, Water Resources and Flood Risk, Noise and Vibration, Traffic and Transport, Socio-economics, Tourism and Recreation) and the relevant information in terms of population health (i.e. ONS data, PHE data, etc.), thereby assisting in identifying any potential project factors which may affect human health and wellbeing.

3.6 Onshore Archaeology and Cultural Heritage

718. This section of the Scoping Report identifies the onshore archaeology and cultural heritage receptors relevant to the Projects. The potential effects of construction, operation and maintenance, and decommissioning of the Projects on onshore archaeology and cultural heritage are considered throughout this section.

719. For purposes of establishing the existing environment within each onshore study area, designated assets and relevant heritage characterisation reports have been consulted and summarised.

The following questions are posed to consultees to help them frame and focus their response to the onshore archaeology and cultural heritage scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Do you agree with the approach to data collection, including the phased approach to baseline surveys?
- Have all the potential impacts on onshore archaeology and cultural heritage resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

Registered office:
RWE Renewables UK Limited, Windmill Hill Business Park, Whitehill Way, Swindon, Wiltshire, SN5 6PB

3.6.1 Existing Environment

3.6.1.1 Hawthorn Pit

720. This onshore study area extends approximately 18km along the coast from the outskirts of Sunderland to the outskirts of Hartlepool.

721. The heritage of this region has a unique and chequered history that has shaped the identity of local communities (Heritage Coast Partnership, 2016). Evidence indicates that this region was an especially significant centre of activity and occupation during the Mesolithic, Neolithic, Bronze Age, Iron Age and Roman periods, particularly in the coastal areas.

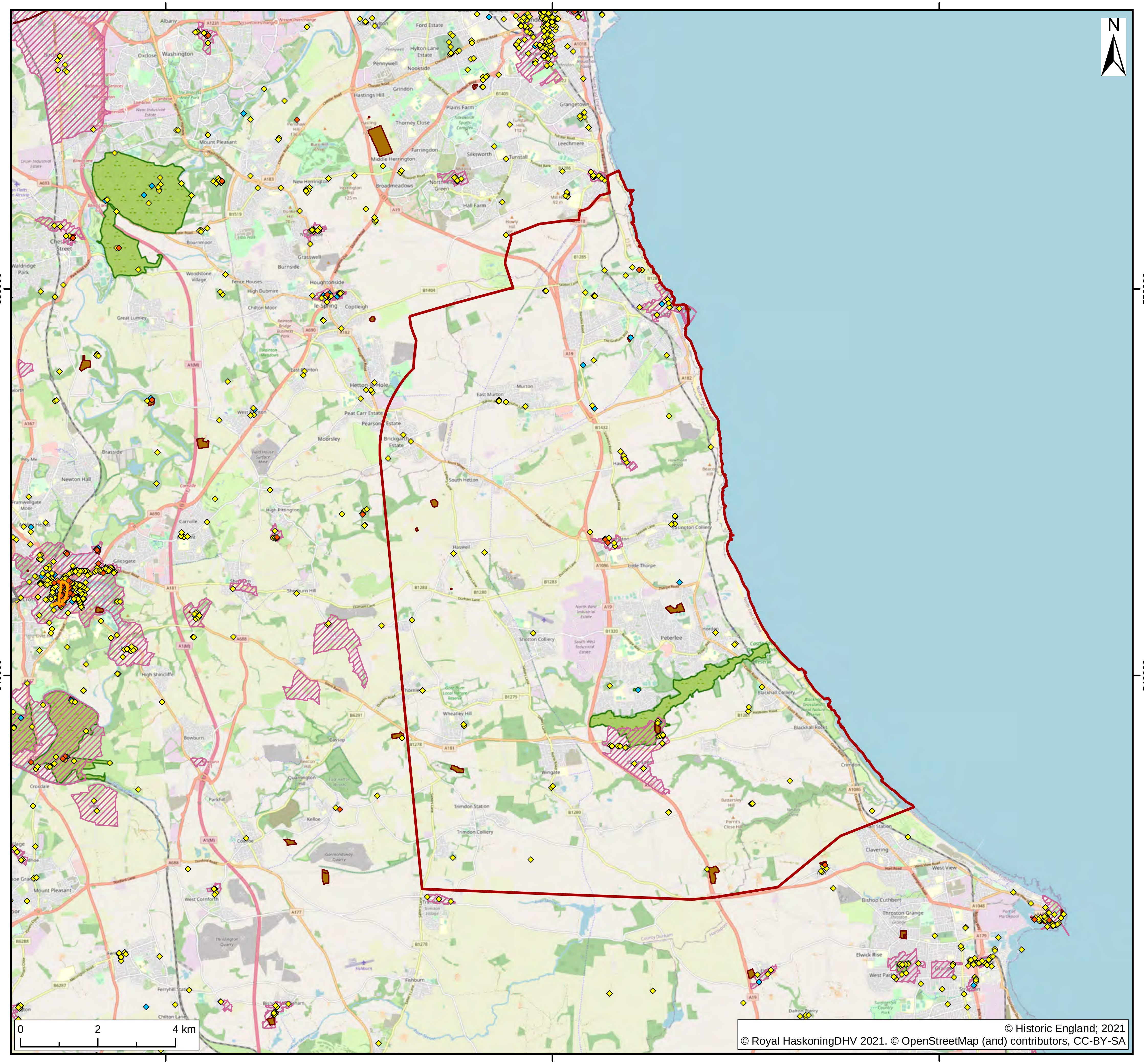
722. This is evidenced by:

- the large collections of Mesolithic flints identified in County Durham;
- a Mesolithic hearth identified at Crimdon Dene;
- finds of Bronze Age pottery and burial barrows between Seaham and Sunderland;
- the Iron Enclosed hilltop settlement on Pig Hill; and
- the numerous Roman forts located across county occupation (Heritage Coastal Partnership, 2016).

723. Extensive medieval occupation is recorded throughout the area with six medieval Scheduled Monuments recorded throughout this onshore study area. These are largely deserted medieval settlements.

724. There are 121 designated assets within this onshore study area (**Figure 3-25**), comprising:

- 9 Scheduled Monuments;
- 105 Listed Buildings;
- 2 Registered Parks and Gardens; and
- 5 Conservation Areas.



Legend:

- Onshore Study Area
- Battlefield
- Conservation Area
- Registered Park & Garden
- Scheduled Monument
- World Heritage Site

Listed Building

- Grade I
- Grade II
- Grade II*

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A1	C01	03/11/2021	Authorized	LB	FS	HC

Title:

Designated Heritage Assets:
Hawthorn Pit

Figure: 3-25 | Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0038

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:100,000

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3.6.1.2 Creyke Beck

725. This onshore study area extends approximately 50km along the East Riding coast from Bridlington to Easington.

726. The region has a rich and varied history of archaeological and geological interest, providing local distinctiveness and contributing to the area's character, culture and economy (East Riding of Yorkshire Council, 2005).

727. The secure hill-tops, fertile floodplains, mineral resources and navigable rivers have all contributed to the Region's historic environment (Government Office for Yorkshire and The Humber, 2008).

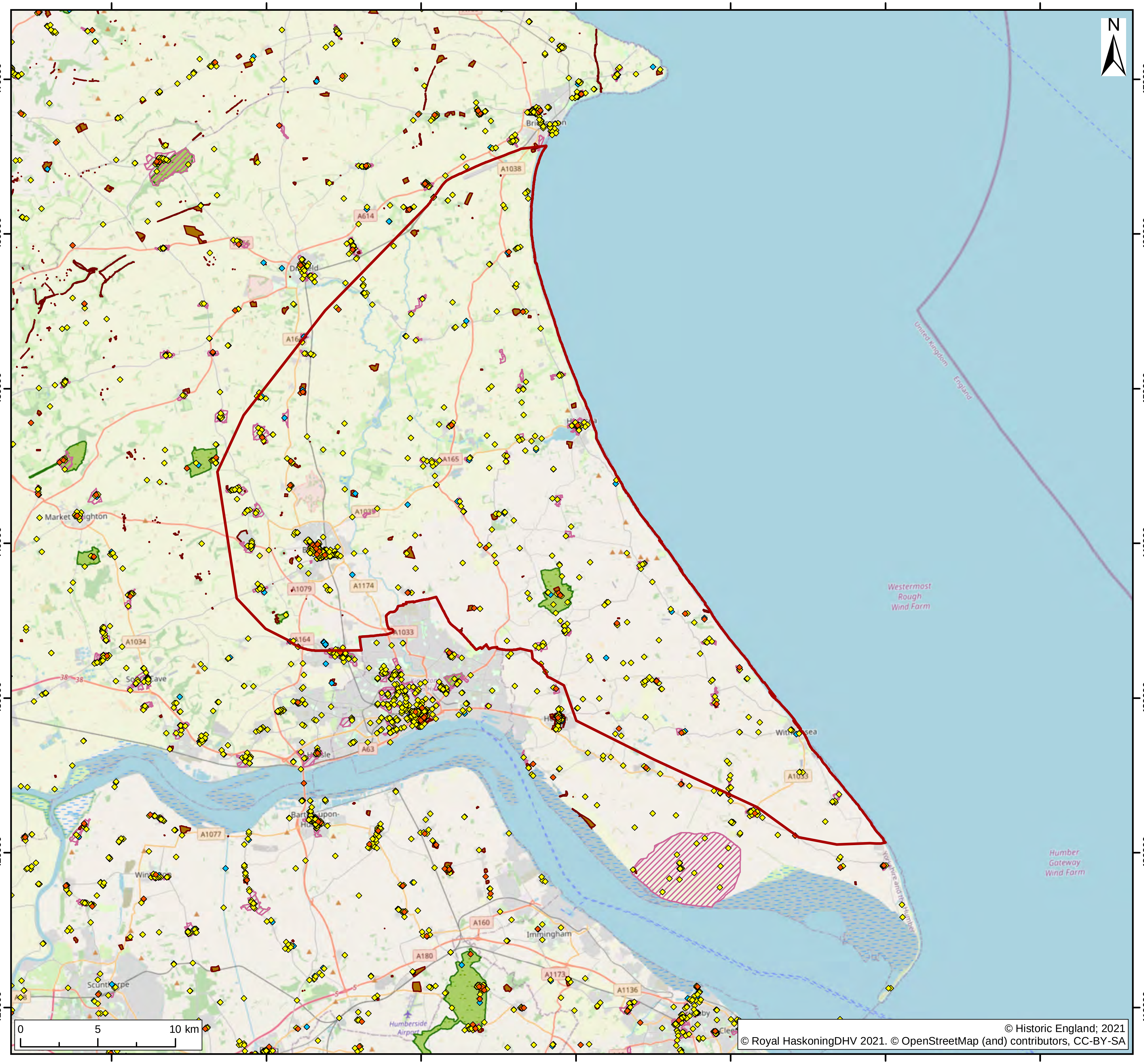
728. There are also several historic towns, e.g. Beverley, and numerous medieval villages and hamlets.

729. Nationally significant archaeological remains have been identified in the region and include, but are not limited to:

- prehistoric settlement sites;
- medieval deserted villages; and
- post-medieval manorial and ecclesiastical sites.

730. There are 993 designated assets within this onshore study area (**Figure 3-26**), comprising:

- 74 Scheduled Monument;
- 876 Listed Buildings;
- 2 Registered Parks and Gardens; and
- 41 Conservation Areas.



Legend:

- Onshore Study Area
- Conservation Area
- Registered Park & Garden
- Scheduled Monument

Listed Building

- Grade I
- Grade II
- Grade II*

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A1	C01	03/11/2021	Authorized	LB	FS	HC

Title:

Designated Heritage Assets:
Creyke Beck

Figure: 3-26 | Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0039

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:250,000

Project:
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3.6.1.3 South of Humber

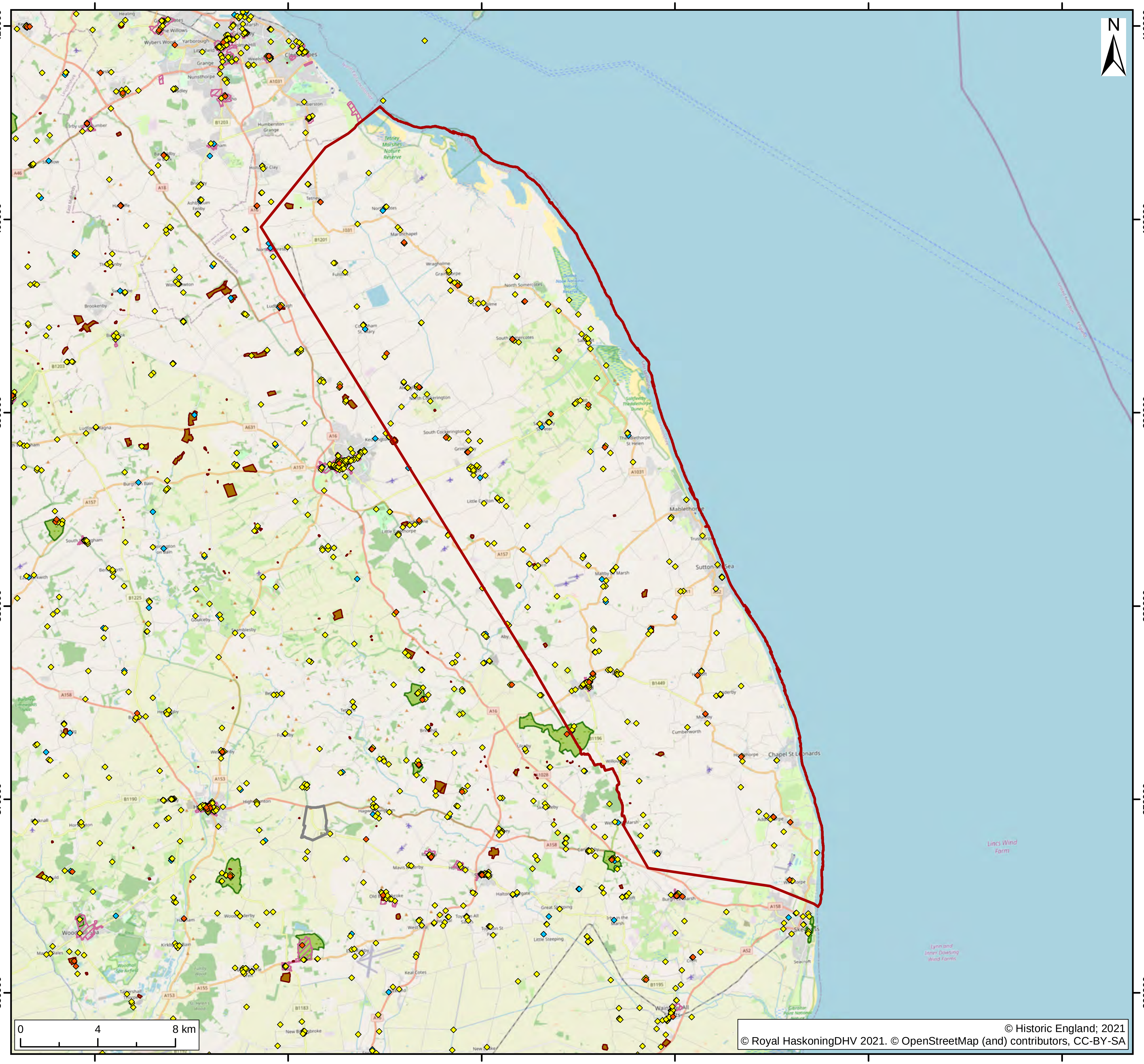
731. This onshore study area stretches approximately 45km along the Lincolnshire coast from the edge of Grimsby to the edge of Skegness.

732. The region contains evidence dating from the Neolithic to the modern era, with the majority of Prehistoric sites located in the Lincolnshire Wolds. The area contains a wealth of historic features including medieval villages, medieval production sites, earth works old churches and redbrick chapels, old windmills, historic halls and parkland landscapes such as at Gunby Hall.

733. More recent reminders of twentieth century events include disused WWII airfields and pill boxes.

734. There are 327 designated assets within this onshore study area (**Figure 3-27**), comprising:

- 27 Scheduled Monument;
- 297 Listed Buildings;
- 1 Registered Parks and Gardens; and
- 2 Conservation Areas.



Legend:

- Onshore Study Area
- Battlefield
- Conservation Area
- Registered Park & Garden
- Scheduled Monument

Listed Building

- Grade I
- Grade II
- Grade II*

A1	C01	03/11/2021	Authorized	LB	FS	HC
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Designated Heritage Assets:
South of Humber

Figure: 3-27 Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0040

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:200,000

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735. At this scoping stage, data for non-designated heritage assets from the relevant HERs has not been acquired. These are envisaged to be: Durham County Council HER, The Humber HER and Lincolnshire HER. This information will be obtained during the next stages and used to inform the subsequent EIA process (see section 3.6.4).

736. Within the wider landscape there is anticipated to be a high potential for buried archaeological remains dating from the prehistoric to modern periods. This has been evidenced by archaeological works undertaken for the many other windfarm projects within these wider regions.

737. A summary of likely onshore archaeology and cultural heritage receptors (assets) requiring consideration in the assessment process are presented below:

- Listed Buildings;
- Locally Listed Buildings;
- Conservation Areas;
- Registered Parks and Gardens;
- Registered Battlefields;
- Scheduled Monuments;
- Buried and above ground heritage assets with archaeological interest; and
- Geoarchaeological and Palaeoenvironmental remains.

3.6.2 Approach to Data Collection

738. The following information has been considered during the production of this Scoping Report and will be considered further within the PEIR/ES where relevant matters are scoped in to the EIA process.

3.6.2.1 Data sources

739. The data sources that will be accessed to characterise the existing historic environment with respect to onshore archaeology and cultural heritage are presented in **Table 3-20**.

Table 3-20 Existing Datasets

Data Source	Data contents
BGS	Historic borehole logs and the wider geological background for the region.
NHLE	Data on all designated heritage assets within England, maintained by Historic England. GIS data for all Scheduled Monuments, Listed Buildings, Registered Parks and Gardens and Registered Battlefields.
Relevant Historic Environment Record (Durham HER, The Humber HER, Lincolnshire HER or North East Lincolnshire HER)	Contains data on all recorded non-designated heritage assets, held by Durham County Council, the Humber Archaeology Partnership, Lincolnshire County Council and North East Lincolnshire County Council. The data includes archaeological, historic landscape character and historic building information. Information on previous events (archaeological surveys and investigations) will also be obtained.
Heritage records maintained by Historic England	Maintained by Historic England and contains information derived from the former National Buildings Record and National Archaeological Record.
[Heritage] Conservation Areas	Various local authorities.
Walkover Surveys and Site Visits	Data from walkover surveys and site visits will be used, identifying current land use and any potential unrecorded assets. Refer to **Table 3-21** for more information.
Zone of Theoretical Visibility (ZTV) Model	Any ZTV produced by the LVIA team will be assessed to help inform settings assessment.

Data Source	Data contents
Existing archaeological studies and published sources	Background information on the archaeology of the regions/areas under consideration, including the results of previous archaeological assessments, evaluation and investigations, where available.
Durham County Council HER, Humber HER and Lincolnshire HER Historic England Archive, other regional and local records offices.	Aerial Photographs, LiDAR data and historic maps to assist in the detection and assessment of archaeological remains.

740. **Table 3-21** presents the surveys that will be undertaken to inform the assessment in accordance with industry guidelines and agreed in advance with the relevant historic environment stakeholders.

Table 3-21 Proposed Baseline Surveys Onshore Archaeology and Cultural Heritage

Survey/study	Timing	Spatial coverage
Walkover Surveys	2022	Targeted areas of the refined onshore search area(s) will be visited to identify current land use and any potential unrecorded non-designated heritage assets, as well as ground truthing of certain designated and non-designated assets.
Setting Assessment Site Visits	2022/2023	Heritage assets identified as potentially being affected by the Projects (through a change in their setting) will be visited to inform the setting assessment.
Priority Geophysical Survey	2022/2023	Targeted areas for geophysical survey, identified through desk-based baseline collation, e.g. Aerial photographic and LiDAR analysis. These are to include areas of 'blank' land, if/where no features were identified in the desk-based assessment. Techniques proposed for this survey include magnetometry, and any other techniques deemed as required (appropriate and proportionate) following the findings of the desk-based assessment.

Survey/study	Timing	Spatial coverage
		Within the onshore study areas there are several areas of fen land. In these areas it will be difficult to obtain effective magnetometry geophysical survey data so bespoke methodologies and alternative geophysical survey techniques (e.g. resistivity) may need to be considered.
Archaeological and Geoarchaeological elements to any engineering-led site/ground investigation work	2022/2023	Bespoke approaches, including the possibility of onsite monitoring and watching brief associated with any engineering-led site/ground investigation work (SI/GI or equivalent), if/when applicable. E.g. test pits, boreholes etc.

741. Following these initial baseline surveys, the requirement for any initial targeted archaeological evaluation (e.g. trial trenching) will be considered and discussed with stakeholders as part of the EPP. If targeted trial trenching is required it will be undertaken at areas where the baseline surveys and geophysical surveys have identified a high potential for buried archaeological remains to be present, and / or at project related ‘pinch points’.

742. Any initial phase of targeted trial trenching would, however, be highly dependent on landowner access permissions being agreed. A more comprehensive approach to trial trenching (covering all onshore transmission works) is anticipated to take place in the post-consent stages.

3.6.3 Potential Impacts

743. Potential impacts to heritage assets include both direct and indirect impacts, as well as changes in the setting of heritage assets, which could affect heritage significance.

744. A direct physical impact is one in which construction works involved with the Projects (e.g. excavations, and groundworks) result in a direct physical change to the fabric of a heritage asset (e.g. partial or complete removal).

745. Direct impacts also include hydrological changes which may cause desiccation and drying out of wetland deposits and associated preserved waterlogged archaeological / geoarchaeological remains. Similarly, should an area become inundated, this too can impact heritage assets.

746. An indirect physical impact is one that results from the Projects but is not caused by direct (planned) intervention from the Projects construction (e.g. vibration from groundworks/construction traffic affecting the fabric of a heritage asset or changes in ground conditions resulting in an effect on preservation conditions beyond the Project's parameters).

747. Impacts to the significance of a heritage asset may also occur if a development changes the surroundings in which a heritage asset is located, experienced, and appreciated (i.e., its setting). Similarly, historic character may also be affected if the Projects results in a change to the prevailing character of the area.

748. The Onshore Archaeology and Cultural Heritage assessment is likely to have key inter-relationships with Offshore and Intertidal Archaeology, Flood Risk and Hydrology, Noise and Vibration, Traffic and Transport, and SLVIA. These will be considered where relevant.

3.6.3.1 Potential impacts during construction

749. Construction activities which could affect the onshore archaeology and cultural heritage resource include:

- any intrusive groundworks, including trenchless cable installation, piling, draining, and open cut trench excavation;
- construction of any temporary works areas or permanent above ground infrastructure; and
- general construction activities such as plant movement or increased traffic movements due to construction.

750. The potential impacts during construction that will be assessed and are scoped in are:

- direct, physical impacts to designated heritage assets;
- direct, physical impacts to non-designated heritage assets;
- indirect, physical impacts to designated heritage assets;
- indirect, physical impacts to non-designated heritage assets;
- temporary change to the setting of designated heritage asset, which could affect their heritage significance; and
- temporary change to the setting of non-designated heritage assets, which could affect their heritage significance.

3.6.3.2 Potential impacts during operation

751. As most of the Projects' onshore infrastructure is buried sub-surface (i.e. infrastructure associated with the buried cable systems), the operational phase will have limited potential to further impact the onshore archaeology and cultural heritage resource.

752. Activity which could have an ongoing impact to onshore archaeology and cultural heritage will be the presence of the onshore substation(s). Any permanent above ground infrastructure has the potential to result in a change to the setting of heritage assets, which could affect heritage significance.

753. The potential impacts during operation are:

- permanent change to the setting of designated heritage assets, which could affect their heritage significance; and
- permanent change to the setting of non-designated heritage assets, which could affect their heritage significance.

754. As the operational phase will have limited potential to further impact the onshore archaeology and cultural heritage resource, it is proposed to scope out direct physical impacts to designated and non-designated heritage assets during operation.

3.6.3.3 Potential impacts during decommissioning

755. No decision has been made regarding the final decommissioning policy for the substation(s), as it is recognised that industry best practice, rules and legislation change over time. However, the substation equipment will likely be removed and reused or recycled. It is expected the onshore cables will be removed from ducts and recycled, with the TJB and ducts left *in situ*.

756. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan would be provided.

757. It is anticipated that the decommissioning impacts will be similar in nature to those of construction.

758. As a result of the above, impacts caused by decommissioning are being scoped in at this stage and will be further considered at EIA.

3.6.3.4 Potential cumulative impacts

759. The Projects could interact cumulatively with other projects, which also have the potential for impacts associated with the onshore archaeology and cultural heritage resource. These cumulative impacts are considered primarily as:

- direct, physical impact to the archaeological resource of the immediate and wider region; and
- change in the setting of designated and/or non-designated heritage assets which could affect their heritage significance.

760. Where these impacts occur because of the Projects, in combination with other developments within the area with similar associated impacts, there is the potential for the impacts to be of greater significance than when assessed individually.

3.6.3.5 Summary of potential impacts

761. **Table 3-22** outlines the summary of the impacts proposed to be scoped into the EIA relating to onshore archaeology and cultural heritage.

Table 3-22 Summary of Impacts Relating to Onshore Archaeology and Cultural Heritage. Topics to be Scoped In (✓) and Out (x)

Potential Impact	Construction	Operation	Decommissioning
Direct, physical, impacts to designated heritage assets.	✓	×	✓
Direct, physical, impacts to non-designated heritage assets.	✓	×	✓
Indirect, physical, impacts to designated heritage assets.	✓	✓	✓
Indirect, physical, impacts to non-designated heritage assets.	✓	✓	✓
Changes to the setting of designated heritage assets, which could affect their heritage significance.	✓	✓	✓
Changes to the setting of non-designated heritage assets, which could affect their heritage significance.	✓	✓	✓
Cumulative impacts	✓	✓	✓

3.6.4 Approach to Impact Assessment

762. Assessment of the onshore archaeology and cultural heritage resource will be an iterative and ongoing process that will be combined with ongoing site selection work to refine the Projects' potential cable route(s) and substation location(s).

763. The existing baseline and proposed assessment methodologies of potential impacts below MHWS (including the intertidal zone) are set out in the offshore archaeology and cultural heritage assessment (see section 2.13).

764. The impact assessment upon the onshore archaeology and cultural heritage resource will follow a heritage significance-based approach to historic environment decision-making, as set out in the NPPF, Section 16: conserving and enhancing the historic environment (MHCLG, 2021).

765. The assessment will also follow all relevant and appropriate guidance as produced by Historic England (e.g. Historic England, 2015a, 2015b and 2017).

766. As part of the EIA a commercial search of the Durham County Council HER, Humber HER and Lincolnshire HER will be undertaken or the remaining relevant authority areas if options have been refined down by PEIR preparation stage, to provide the dataset on previously recorded non-designated heritage assets and events. Further research will also be undertaken to inform the baseline data, including assessment of archaeological archive reports, published archaeological articles, monographs and other sources.

767. As part of the EIA process the existing historic environment with respect to onshore archaeology and cultural heritage will be described, including, but not limited to the following:

- Designated heritage assets within 1km of the refined onshore search area and 3km of the onshore substation(s), as a starting point.
    - This will inform a setting assessment of heritage assets identified as potentially being affected by the Projects through changes to their setting.
- Known non-designated heritage assets within 1km of the refined onshore search area(s).

768. Identification of heritage assets potentially affected by the Projects will be undertaken through spatial analysis of the heritage data within a GIS framework.

769. Initial consideration of the setting of heritage assets and any potential for impact upon heritage significance will be undertaken as part of the setting assessment. This will be informed by walkover surveys and site visits. A full consideration of, and conclusions regarding, setting impacts will be made in the final ES, following finalisation of the Projects design.

770. Identification of any areas which will potentially be subject to intrusive archaeological evaluation (as set out in section 3.6.2) as part of the DCO application, would be decided through consideration of the baseline data and non-intrusive surveys and would be discussed and agreed in consultation with the relevant Historic Environment Service as part of the EPP.

771. The EIA will be undertaken with reference to and / or in accordance with following primary legislation, policy, standards and guidance:

- Ancient Monuments and Archaeological Areas Act 1979. (c.46).
- Planning (Listed Buildings and Conservations Areas) Act (1990). (c.9).
- NPPF Conserving and enhancing the historic environment. (Ministry of Housing, Communities & Local Government (2021)).
- Planning Practice Guidance (PPG): Historic Environment (Ministry of Housing, Communities & Local Government (2019).
- The Historic Environment in Local Plans: Historic Environment Good Practice Advice in Planning 1 (Historic England, 2015a).
- Managing Significance in Decision-Taking in the Historic Environment: Historic Environment Good Practice Advice in Planning 2 (Historic England, 2015b).
- The Setting of Heritage Assets: Historic Environment Good Practice Advice in Planning 3 (Historic England, 2017).
- Standard and guidance for historic environment desk-based assessment (CIfA, 2020).
- Code of Conduct (CIfA, 2019).

772. The assessment will be supported by a series of related technical reports, annexes and appendices. As a minimum these will include an archaeological desk-based assessment (ADBA), undertaken to identify the currently recorded designated and non-designated heritage assets within defined study areas.

773. The ADBA will include assessment of aerial photography, LiDAR analysis and review of cartographic sources. This will include a historic map regression exercise of the onshore search area(s) and/or targeted parts of the landfall(s), onshore cable corridor(s) and onshore substation location(s).

774. The map regression exercise will be undertaken to identify changes in land use throughout history and will provide further information on potential heritage assets.

775. Other technical reports to be produced which will inform the baseline environment, and ultimately inform assessment (see **Table 3-22**), are:

- priority geophysical survey(s).
- initial targeted intrusive evaluation (trial trenching), if required, relevant and undertaken pre-application.
    - This will be confirmed through progression of the iterative approach to survey work and ongoing consultation with the relevant Historic Environment Service.
- Any archaeological and geoarchaeological approaches to be applied to engineering-led ground/site investigation, if/when applicable and undertaken.
    - For example: monitoring and/or watching briefs.

776. An initial settings assessment will also be undertaken as part of the ADBA, which will identify heritage assets and their associated heritage significance which could be affected by change in setting due to the Projects. This will follow the Historic England five-step approach (Historic England, 2017).

777. Following this scoping stage technical-level consultation with Historic England and the relevant Historic Environment Service will begin. This will help to further identify and agree the primary methodologies, present initial findings and ensure potential historic environment issues are identified and considered during the EIA.

3.7 Landscape and Visual Impact

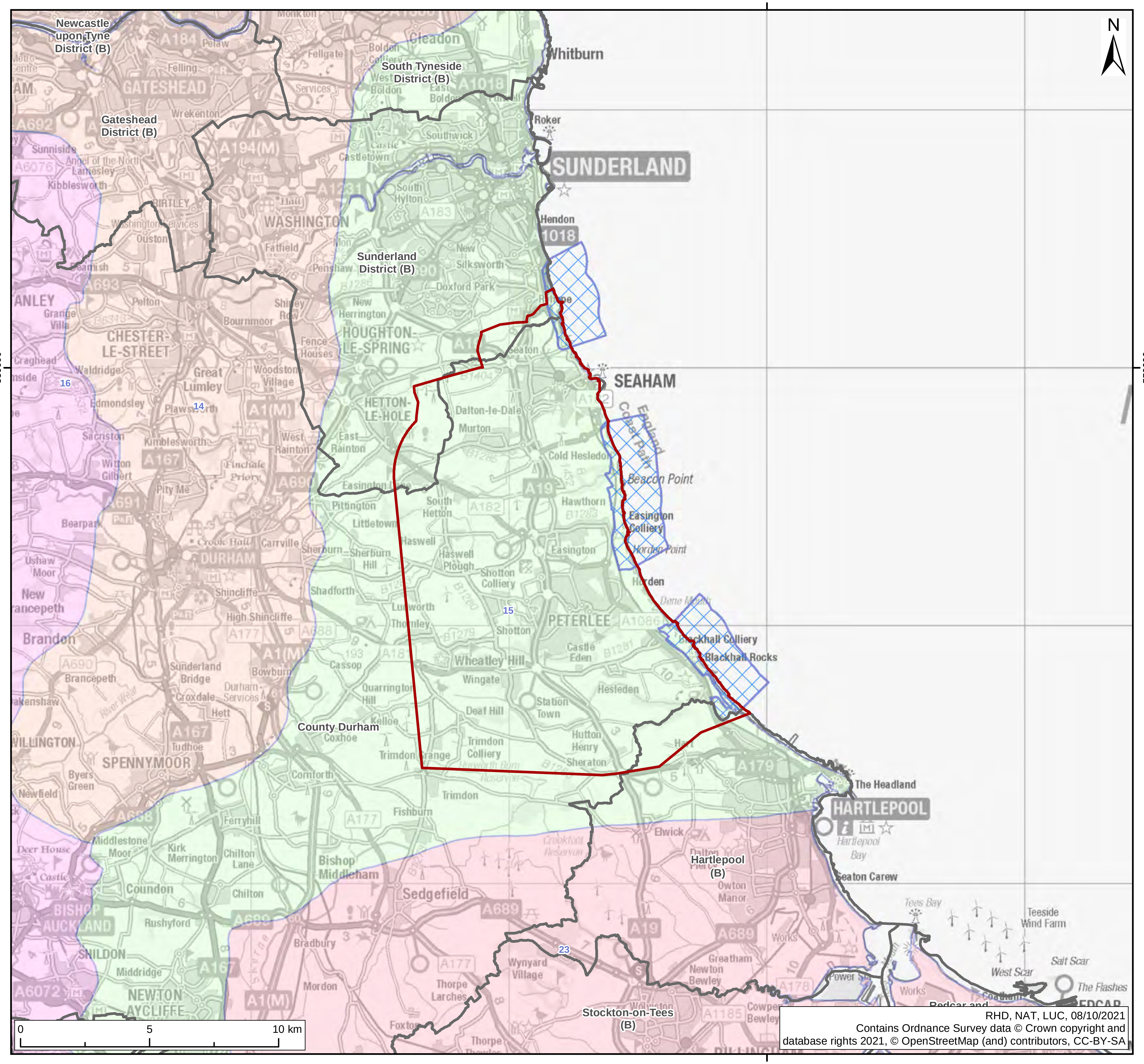
778. This section considers the impacts of the Projects' onshore elements (onshore construction, onshore export cables and onshore substation(s)) on landscape and visual amenity. The SLVIA impacts of the offshore infrastructure is discussed in section 2.14.

The following questions are posed to consultees to help them frame and focus their response to the LVIA scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Do you agree with the approach to data collection?
- Have all the potential impacts on LVIA quality resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

3.7.1 Existing Environment

779. The onshore existing environment is described for three onshore study areas at Hawthorn Pit, Creyke Beck and South of Humber (see **Figure 3-28, Figure 3-29** and **Figure 3-30**). The onshore study area(s) will be refined through the site selection, consultation and engineering review process, prior to the LVIA.



Local Authority boundary
Hawthorn Pit onshore study area
Heritage Coast

National Character Area

14: Tyne and Wear Lowlands
15: Durham Magnesian Limestone Plateau
16: Durham Coalfield Pennine Fringe
23: Tees Lowlands

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
EL	01	31/08/2021	Scoping	EL	DF	PM

Title:

LVIA for Hawthorn Pit

Figure: 3-28 Drawing No: PC2340-LUC-ON-ZZ-DR-Z-0002

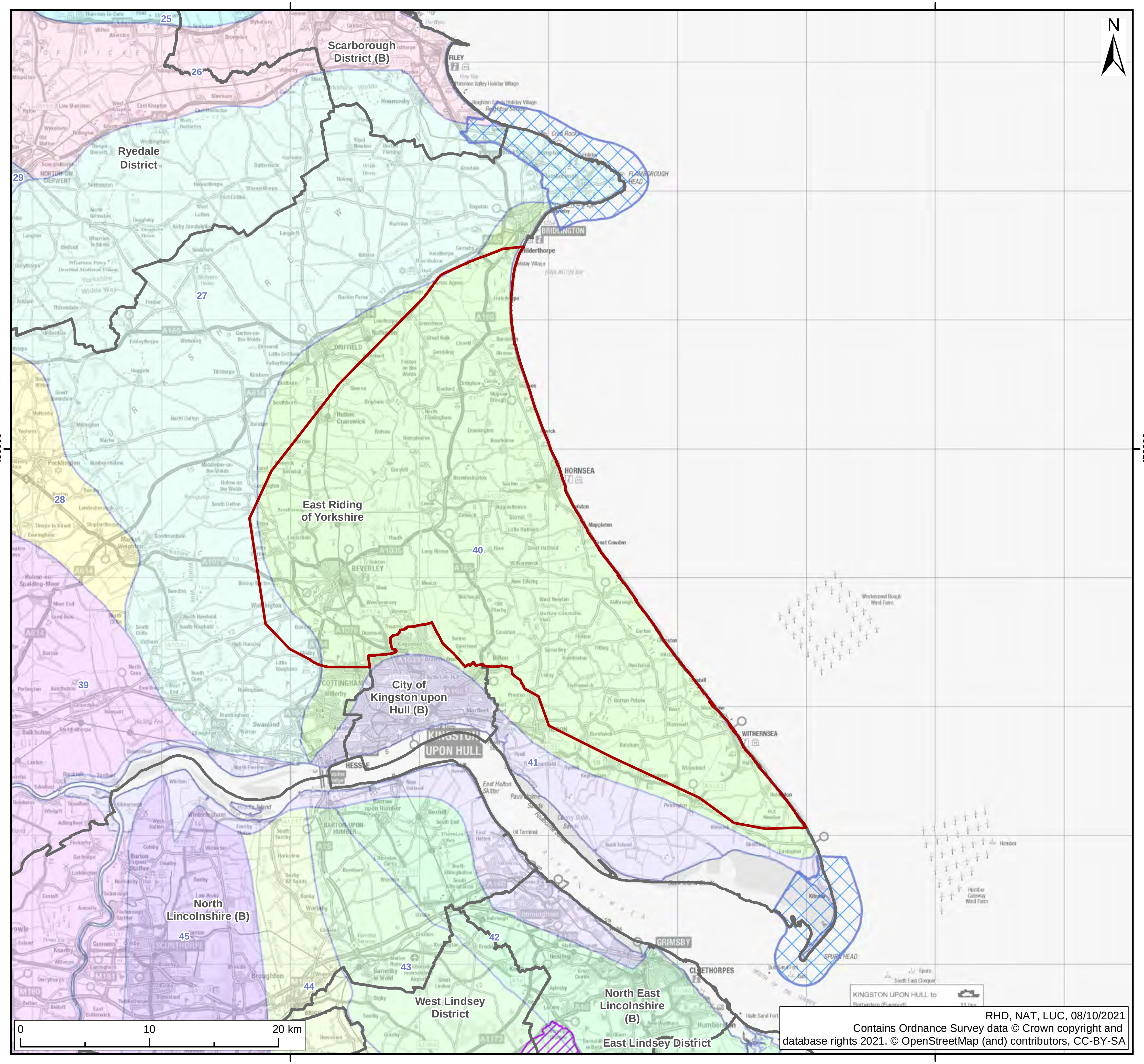
Co-ordinate system: British National Grid
Page Size: A3
Scale: 1:150,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

LUC

RWE



Local Authority boundary
Creyke Beck onshore study area
Areas of Outstanding Natural Beauty
Heritage Coast

National Character Area

- 25: North York Moors and Cleveland Hills
- 26: Vale of Pickering
- 27: Yorkshire Wolds
- 28: Vale of York
- 29: Howardian Hills
- 39: Humberhead Levels
- 40: Holderness
- 41: Humber Estuary
- 42: Lincolnshire Coast and Marshes
- 43: Lincolnshire Wolds
- 44: Central Lincolnshire Vale
- 45: Northern Lincolnshire Edge with Coversands

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
EL	01	31/08/2021	Scoping	EL	DF	PM

Title:

LVIA for Creyke Beck

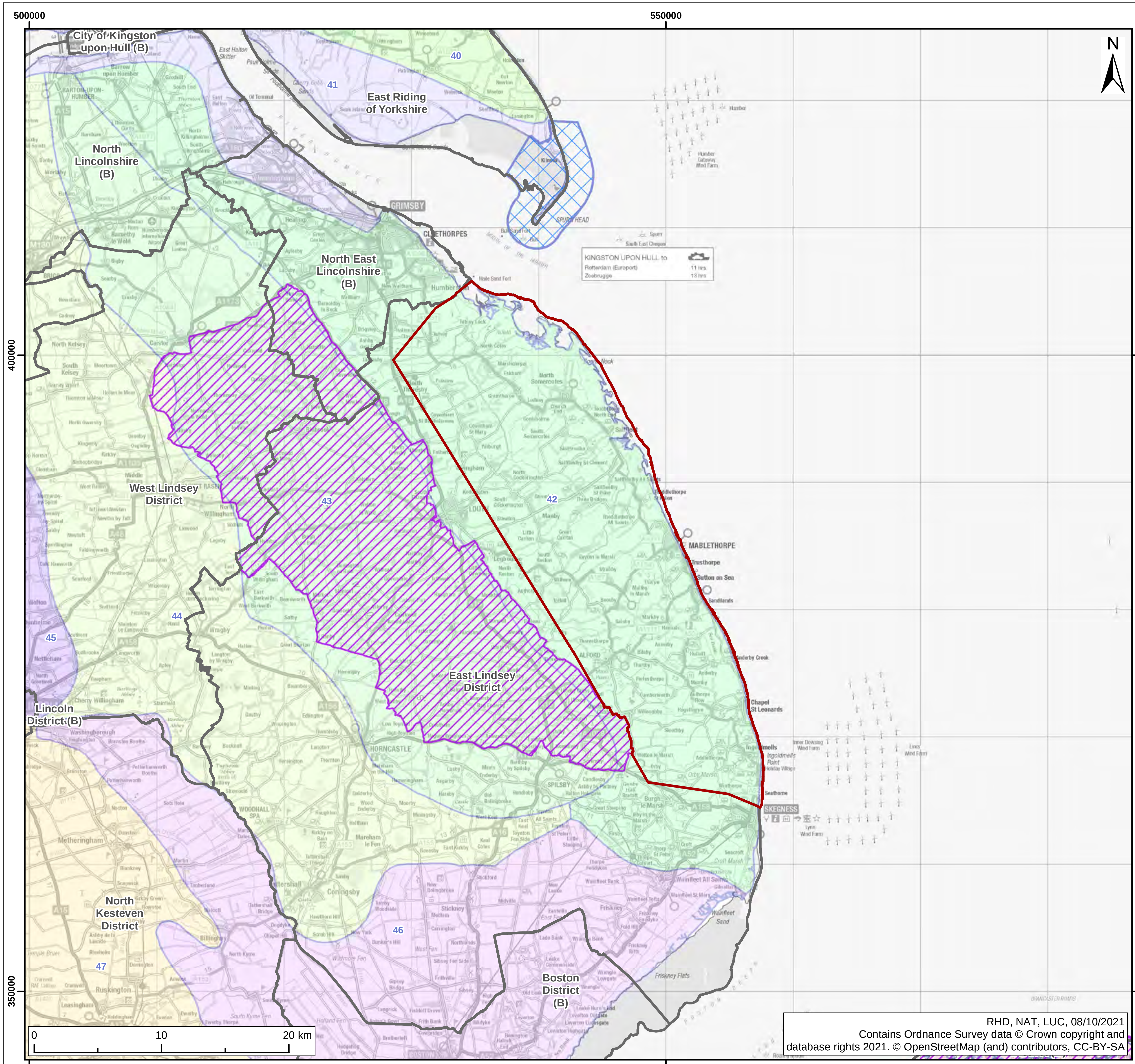
Figure: 3-29 Drawing No: PC2340-LUC-ON-ZZ-DR-Z-0003

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:300,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

RHD, NAT, LUC, 08/10/2021



- Local Authority boundary
- South of Humber onshore study area
- Areas of Outstanding Natural Beauty
- Heritage Coast

National Character Area

- 27: Yorkshire Wolds
- 40: Holderness
- 41: Humber Estuary
- 42: Lincolnshire Coast and Marshes
- 43: Lincolnshire Wolds
- 44: Central Lincolnshire Vale
- 45: Northern Lincolnshire Edge with Coversands
- 46: The Fens
- 47: Southern Lincolnshire Edge
- 77: North Norfolk Coast

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
EL	01	31/08/2021	Scoping	EL	DF	PM

Title:

LVIA for South of Humber

Figure: 3-30 | Drawing No: PC2340-LUC-ON-ZZ-DR-Z-0004

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:300,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

LUC RWE

3.7.1.1 Onshore landscape character and designations

780. The onshore study area for Hawthorn Pit (**Figure 3-28**) extends along the coast from Ryhope to Hartlepool and approximately 10km inland. The majority of the onshore study area is in the Durham County Council area, although the north extent is partly within the Sunderland City Council area and the southern extent is partly within the Hartlepool Borough Council area.

781. The Hawthorn Pit onshore study area is part of the Durham Magnesian Limestone Plateau National Character Area (NCA). In terms of national-level landscape designations, there are no National Parks or AONBs within the Hawthorn Pit onshore study area. Although not a formal designation, there are areas of defined Heritage Coast (which are protected by agreement) adjacent to the Hawthorn Pit onshore study area. Durham County Council has identified Areas of Higher Landscape Value in their Local Plan[5]. A relatively large proportion of the Hawthorn Pit onshore study area is covered by this local-level designation.

782. The Creyke Beck onshore study area (see **Figure 3-29**) extends along the coast from Bridlington to Easington and inland to Walkington. It is part of the East Riding of Yorkshire Council area.

783. The majority of the onshore study area for Creyke Beck is in the Holderness NCA. There are no national-level designations within, or adjacent to, the onshore study area. There are areas of Heritage Coast approximately 3.1km north-east and 2.5km south-east of the onshore study area. East Riding of Yorkshire Council has identified Important Landscape Areas[6] and part of the onshore study area overlaps with these. The Yorkshire Wolds, on the edge of the Creyke Beck onshore study area, is to be considered by Natural England for designation as an AONB.

784. The South of Humber onshore study area (see **Figure 3-30**) extends from Humberston to Skegness and approximately 12km inland. It is in the East Lindsey District Council area and adjacent to the North East Lincolnshire Council area.

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[5]https://www.durham.gov.uk/media/34069/County-Durham-Plan-adopted-2020-/pdf/CountyDurhamPlanAdopted2020vDec2020.pdf?m=637424969331400000

[6] https://www.eastriding.gov.uk/planning-permission-and-building-control/planning-policy-and-the-local-plan/landscape-character-assessment/

785. The Lincolnshire Coast and Marshes NCA covers the whole of the South of Humber onshore study area. The Lincolnshire Wolds AONB is adjacent to the south-western edge of the onshore study area.

3.7.2 Approach to Data Collection

786. The following information has been considered during the production of this Scoping Report and will be considered further within the PEIR/ES where relevant matters are scoped in to the EIA process.

787. The following data sources will be used to inform the LVIA:

- Natural England (2014) National Character Area Profiles;
- relevant county or district scale landscape character assessments for the selected onshore study area(s);
- relevant landscape planning policies for the selected onshore study area(s);
- the Lincolnshire Wolds Countryside Service and Lincolnshire Wolds Joint Advisory Committee (AONB Partnership) (2018) Lincolnshire Wolds Area of Outstanding Natural Beauty Management Plan 2018-2023 (for the South of Humber onshore study area);
- OS maps at a range of scales;
- OS digital terrain model datasets;
- field survey; and
- aerial and street-level photography available online.

3.7.3 Potential Impacts

788. The LVIA is likely to have key inter-relationships with Onshore Archaeology and Cultural Heritage, Traffic and Transport and Socio-economics, Tourism, and Recreation. These will be considered where relevant.

3.7.3.1 Potential impacts during construction

789. During construction of the onshore infrastructure (onshore substation(s), onshore export cable(s) and landfall(s)) the presence of construction activity and partially completed structures has the potential to locally impact designated landscapes and protected coastline, landscape character and visual receptors. Impacts, whilst temporary and localised, have the potential for direct and significant impacts on landscape and visual amenity arising from loss of landscape features and temporary disturbance. Onshore construction impacts are scoped in to the LVIA.

3.7.3.2 Potential impacts during operation

790. Following installation and restoration of ground, underground cables which are part of the onshore infrastructure would not significantly impact landscape or visual receptors. Operational impacts resulting from the landfall(s) and onshore cable(s) are therefore scoped out of the LVIA.

791. The potential for the operation of the onshore substation(s) to significantly impact designated landscapes and protected coastline, landscape character and visual amenity varies dependent on locational choice and design development. However, it is proposed that impacts associated with operation of onshore substation(s) within any of the three onshore study areas are scoped in to the LVIA.

792. Views of the onshore substation(s) may affect visual receptors (people) at locations within the ZTV of the substation buildings. Receptors will include static and moving receptors, and some, such as residents and recreational users, will be of high susceptibility to changes. Effects on visual receptors are proposed to be scoped in to the LVIA. A list of assessment viewpoints identifying representative views towards the onshore substation(s) will be developed and agreed as the basis for examination of visual effects.

3.7.3.3 Potential impacts during decommissioning

793. The presence of activity and partially dismantled structures during decommissioning has the potential to impact coastal and landscape character, designated landscapes and visual receptors. It is assumed that, at decommissioning, the substation equipment will be removed, and the onshore cables will be removed from ducts, with the TJB and ducts left in situ. On this basis, impacts during the temporary decommissioning phase are scoped in to the LVIA.

3.7.3.4 Potential cumulative impacts

794. The potential for cumulative impacts in relation to the onshore infrastructure, with other similar types of projects such as underground cables and substations, cannot be determined until the location of the onshore transmission works is known. The potential for other projects to give rise to cumulative effects has therefore been scoped in at this stage and will be. The scope of the cumulative LVIA will be agreed with stakeholders at a later date through the EPP.

3.7.3.5 Summary of potential impacts

795. **Table 3-23** shows a summary of potential impacts during different phases of the Projects

Table 3-23 Summary of Impacts Relating to Landscape and Visual Impact. Topics to be Scoped In (✓) and Out (x)

Potential Impact	Construction	Operation	Decommissioning
Those on designated landscapes and protected coastline, landscape character and visual receptors (resulting from the landfall(s))	✓	×	✓
Those on designated landscapes and protected coastline, landscape character and visual receptors (resulting from onshore export cables)	✓	×	✓
Those on designated landscapes and protected coastline, landscape character and visual receptors (resulting from the onshore substation(s))	✓	✓	✓
Cumulative landscape and visual impacts (resulting from onshore infrastructure)	✓	✓	✓

3.7.4 Approach to Impact Assessment

796. The approach to impact assessment will be based on the principles set out in the guidance listed below, primarily GLVIA3:

- Landscape Institute and Institute of Environmental Management and Assessment (2013) Guidelines for Landscape and Visual Impact Assessment. 3rd edition. Routledge. (GLVIA3);
- Landscape Institute (2019) Visual Representation of Development Proposals. Technical Guidance Note 06/19; and
- Scottish Natural Heritage (2017) Visual Representation of Wind Farms: Good Practice Guidance. Version 2.2.

3.7.4.1 Impact Assessment Methodology

797. Onshore substation(s) and landfall(s) locations are currently unknown. Effects of the onshore infrastructure will be examined across a landscape and visual study area of 5km radius around the proposed substation location(s), and around 1km along the onshore export cable route(s) and landfall(s). Following identification of the onshore substation and landfall site(s), an appropriate study area will be agreed for each during consultation through the EPP.

798. The approach to impact assessment will be based on the principles set out in the guidance listed above, primarily GLVIA3. Preparation of the LVIA will involve the following key steps:

- the 'worst case' development parameters will be identified, and the study areas described above will be determined and agreed through consultation;
- ZTVs for the onshore substation(s) will be generated across these study areas;
- the landscapes of the study areas will be analysed to identify landscape receptors, drawing on published landscape character assessments;
- the visual baseline will be recorded in terms of the different groups of people who may experience views of the onshore components, the places where they will be affected and the nature of their views and visual amenity;
- a series of assessment viewpoints will be selected in consultation with Natural England and local authorities;

- visualisations (wirelines and photomontages) will be generated based on 3D modelling and will be produced to standards agreed with Natural England and local planning authorities - the viewpoints to be illustrated with photomontages;
- potentially significant effects on landscape character will be identified, including implications for designated landscapes and protected coastline;
- potentially significant effects on visual amenity will be identified; and
- the level and significance of residual landscape and visual effects will be judged with reference to the sensitivity of the resource/receptor (its susceptibility and value) and magnitude of change (a combination of the scale of change, geographical extent and duration/reversibility).

799. Mitigation proposals will be developed in response to any potentially significant impacts that are identified in the LVIA. This will include landscape restoration along the onshore export cable routes and landfall areas, and mitigation by design of the substation buildings and landscape treatments.

3.8 Traffic and Transport

800. This section of the Scoping Report identifies the traffic and transport receptors relevant to the Projects. The potential effects of construction, operation and maintenance and decommissioning of the Projects on traffic and transport are considered throughout this section.

The following questions are posed to consultees to help them frame and focus their response to the traffic and transport scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Do you agree with the approach to data collection?
- Have all the potential impacts on traffic and transport resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) for further assessment?
- Do you agree with the proposed approach to assessment?

3.8.1 Existing Environment

801. At this scoping stage, the site selection process for the onshore elements of the Projects is at an early stage, with the onshore grid connection location(s) yet to be confirmed by National Grid ESO. As such, three geographically broad onshore study areas have been established.

802. The following section provides a review of the existing environment in relation to each of the three onshore study areas. The onshore study areas are shown in **Figure 1-1**.

803. Further evaluation of the existing environment will be undertaken once the location of the onshore transmission works is finalised, and traffic demand is known. Section 3.8.4 includes details of the approach to that would be adopted to defining a traffic and transport study area.

3.8.1.1 Hawthorn Pit

3.8.1.1.1 Road Network

804. The Hawthorn Pit onshore study area is located between the settlements of Sunderland to the north and Peterlee and Seaham to the east and Hartlepool, Middlesbrough and Redcar to the south.

805. The A19 provides the main north south route linking these main settlements and forms part of the Strategic Road Network (SRN) managed by National Highways. Within this onshore study area, the A19 comprises of a dual carriageway.

806. To the north of Peterlee, the A1086 provides a link from the A19 east towards the coast, connecting the towns of Peterlee and Hartlepool. The A1086 forms part of the local highway network managed by Durham County Council and Hartlepool Borough Council and comprises of a single carriageway road.

807. To the north of the A19 junction with the A1086, the A182 provides a north west link inland, linking to the A690 to the north. The A182 also has a spur that heads east towards the coast at Seaham from the A19.

808. The A182 forms part of the local highway network and comprises of a single carriageway road to the north west. To the east, the A182 includes two lanes out of Seaham and one lane in.

809. To the south of Peterlee, the A181 provides an east west link between the A19 and Durham. The A181 forms part of the local highway network and is predominantly a single carriageway road.

810. **Table 3-24** provides a summary of the 2019 background traffic flows (prior to the impact of COVID-19 on traffic) on the main highway links within the Hawthorn Pit onshore study area.

Table 3-24 Hawthorn Pit Background Traffic Flows

Road	Daily Traffic Flows	
	All vehicles	Percentage of HGVs
A19	61,547	6.0%
A1086	9,118	1.8%
A182 (west of the A19)	7,775	2.2%
A182 (east of the A19)	10,265	4.9%
A181	14,564	2.7%
Notes: Data sourced from the Department for Transport road traffic statistics - https://roadtraffic.dft.gov.uk		

3.8.1.1.2 Walking and Cycling

811. Within this onshore study area there is an extensive network of walking and cycling routes within the main towns and cities. In addition, National Cycle Route (NCR) 1 also runs north south between Sunderland and Redcar, Middlesbrough, and Stockton on Tees to the south. NCR1 also has spurs which link to Peterlee and Seaham. NCR14 provides a link from Hartlepool to Durham and intersects with NRC1 to the west of Peterlee.

3.8.1.1.3 Rail and Sea

812. Within this onshore study area, there are ports and rail freight terminals at Sunderland and Seaham to the north and Hartlepool and Redcar to the south. These facilities could provide the potential for the import of project cargoes to the wider onshore study area by road.

813. No other suitable ports or rail freight facilities have been identified within the study area.

3.8.1.2 Creyke Beck

3.8.1.2.1 Road Network

814. The town of Beverley is located within the Creyke Beck onshore study area, the City of Hull is located to the south of this onshore study area.

815. The A63 provides the main route towards the city of Hull from the east (via the M62) as well as providing a strategic link between the ports of Hull and the wider region/UK. The A63 forms part of the SRN managed by National Highways and is provided as a dual carriageway.

816. The A164 intersects with the A63 to the west of Hull and provides the main north south link towards Beverley where it intersects with the A1079. The A164 forms part of the local highway network managed by the East Riding of Yorkshire Council and comprises of both single and dual carriageway.

817. East Riding of Yorkshire Council is proposing improvements to the A164 as part of the 'Jocks Lodge Improvement Scheme' that will widen the A164 to the south of its junction with the A1079 and improve capacity at this junction.

818. The A1079 provides a route to the south of Beverly that connects to the A164 (to the south of Beverley) and A1033 to the north of Hull. The A1079 also provides a wider regional link west towards York. The A1079 is managed by East Riding of Yorkshire Council and comprises of both single and dual carriageway sections.

819. The A1079 links with the A1035 to the west of Beverley. The A1035 provides a generally north easterly route from Beverley towards Leven where it intersects with the A165. The A1035 is managed by East Riding of Yorkshire Council and is a single carriageway road, except for a short section of dual carriageway to the east of Leven.

820. The A165 intersects with the A1035 to the south of Leven before continuing north towards Bridlington. The A165 also heads south from Leven to Hull where it links to the A1033 and A63. To the north of the A1033 the A165 is a single carriageway road managed by East Riding of Yorkshire Council.

821. To the south of the A1035 the A165 is a single carriageway road and is managed by the East Riding of Yorkshire Council until it reaches the outskirts of Hull, the road then becomes a dual carriageway and is managed by Hull City Council.

822. The A1033 provides a main link through the centre of Hull heading north from its junctions with the A63 and the ports of Hull towards the A1079 to the south of Beverley. The A1033 is managed by Hull City Council and comprises of both single and dual carriageway.

823. **Table 3-25** provides a summary of the 2019 background traffic flows (prior to the impact of COVID-19 of traffic) on the main highway links within the Creyke Beck onshore study area.

Table 3-25 Creyke Beck Background Traffic Flows

Road	Daily Traffic Flows	
	All vehicles	Percentage of HGVs
A63 (east of the A164)	62,151	9.7%
A164 (south of the A1079)	32,822	3.9%
A1079 (west of the A164)	19,516	5.5%
A1035 (west of the A165)	19,389	4.7%
A165 (north of the A1033	8,305	6.1%
A165 (within East Riding of Yorkshire Council administration area)	9,461	5.4%
A165 (within Hull City Council administration area)	14,653	2.1%
A1033	24,145	6.6%
Notes: Data sourced from the Department for Transport road traffic statistics - https://roadtraffic.dft.gov.uk		

3.8.1.2.2 Walking and Cycling

824. Within this onshore study area there is an extensive network of walking and cycling routes within Hull and Beverley. In addition, there is an extensive network of NCRs.

825. NCR1 runs north from Hull past the existing electricity transmission network substation at Creyke Beck to Beverley and then onwards towards Driffield.

826. NCR65 runs east to west through Hull, linking to NCR1 to the west of Hull and NCR66 to the east of Hull. NCR65 also heads north east from Hull to Hornsea.

827. NCR66 runs from Cottingham in the west (where it intersects with NCR1) east towards the centre of Hull where it connects to NCR65.

3.8.1.2.3 Rail and Sea

828. To the south of this study area, there are existing port and rail freight terminals alongside the River Humber that can be accessed from the A62 and A1033. These facilities could provide the potential for the import of project cargoes to the wider onshore study area by road.

829. No other suitable ports or rail freight facilities have been identified within the study area.

3.8.1.3 South of Humber

3.8.1.3.1 Road Network

830. The South of Humber onshore study area is located between Grimsby and Cleethorpes to the north and Skegness to the south. The town of Louth is located to the east.

831. The A16 provides a north south route from Grimsby and Cleethorpes in the north towards Louth and the A1028. At the Ulceby Cross junction with the A1028, the A16 continues south towards Boston. The A1028 provides a link from the A16 to the A158 (which goes on to Skegness).

832. Within the onshore study area, the A16 forms part of the local highway network managed by Lincolnshire County Council and comprises of a single carriageway.

833. The A1028 links to the A16 at Ulceby Cross and provides a south eastly link towards Skegness before intersecting with the A158 at Gunby Roundabout. The A1028 forms part of the local highway network and comprises of a single carriageway road.

834. To the east of the Gunby Roundabout, the A158 is a predominantly single carriageway road. To the west of Gunby Roundabout the A182 provides a wider regional link to Lincoln.

835. The A52 provides a route north from Skegness towards Mablethorpe alongside the coast. To the north of Mablethorpe, the A1031 provides a route north along the coast towards Grimsby and Cleethorpes.

836. To the west of Mablethorpe, the A1104 provides a link from the coast inland in a south westerly direction towards the A16 at Ulceby Cross. The A1104 also intersects with the A157 near Maltby le Marsh which provides a north westly route inland from the coasts to the A16 near Kenwick.

837. The A1104 and A157 are both single carriageway roads managed by Lincolnshire County Council.

838. **Table 3-26** provides a summary of the 2019 background traffic flows (prior to the impact of COVID-19 of traffic) on the main highway links within the South of Humber onshore study area.

Table 3-26 South of Humber Background Traffic Flows

Road	Daily Traffic Flows	
	All vehicles	Percentage of HGVs
A16 (west of Louth)	13,364	9.3%
A1028	6,019	4.4%
A158	14,918	3.5%
A1031 (south of Cleethorpes)	10,214	1.0%
A52 (north of Skegness)	14,432	0.9%
A1104	3,412	3.9%
A157	7,256	4.8%
Notes: Data sourced from the Department for Transport road traffic statistics - https://roadtraffic.dft.gov.uk		

3.8.1.3.2 Walking and Cycling

839. There are no NCRs within this onshore study area, however, local walking and cycling routes are provided within the main towns.

3.8.1.3.3 Rail and Sea

840. To the north of the onshore study area, there are existing port and rail freight facilities at Grimsby that can be accessed from the A16. These facilities could provide the potential for import of project cargoes to the wider onshore study area by road.

841. No other ports or freight rail facilities have been identified within the study area that would be appropriate to accept project cargoes in their current form.

3.8.2 Approach to Data Collection

842. The following information has been considered during the production of this Scoping Report and will be considered further within the PEIR/ES where relevant matters are scoped in to the EIA process.

843. To date, the existing environment has been characterised using the data sources set out in **Table 3-27.**

Table 3-27 Data Sources Used to Define the Traffic and Transport Existing Environment

Data Source	Data Contents
Department for Transport road traffic statistics - https://roadtraffic.dft.gov.uk	Annual average 2019 traffic counts for all main ‘A’ roads
Google Maps, Bing Maps, etc.	Online mapping
Sustrans – https://www.sustrans.org.uk/national-cycle-network	Details of national cycle routes

844. To facilitate the impact assessment, the following additional data will also be obtained:

- baseline traffic flow data for all roads within the refined onshore study area;
- details of sensitive receptors (as defined within **Table 3-31**);
- collision data for the latest five year period for all roads within the refined onshore study area;
- existing pedestrian/ cycle/ bus routes; and
- trip generation, including number and type of construction vehicles and employee trips.

845. The impacts of COVID-19 on background traffic conditions were discussed with both Lincolnshire County Council and National Highways at an ETG meeting on the 10 September 2021.

846. It is proposed that new baseline traffic flow surveys be undertaken post September 2021 and that these would be representative of future baseline conditions, as long as COVID-19 restrictions are not re-introduced.

847. It is also proposed that collision data should be sourced for the latest five-year period, i.e. inclusive of the period where traffic flows were lower due to COVID-19 restrictions.

3.8.3 Potential Impacts

848. The principal guidelines for the assessment of the environmental impacts of road traffic associated with new developments are the 'Guidelines for the Environmental Assessment of Road Traffic' (GEART) published by the Institute of Environmental Assessment in January 1993.

849. The Traffic and Transport assessment is likely to have key inter-relationships with Land Use, Noise and Vibration, Air Quality and Human Health. These would be considered where relevant.

3.8.3.1 Potential impacts during construction

850. The construction phase will result in a requirement for the import/export of materials and plant. However, at this stage, no information is available for construction traffic demand or intermodal delivery strategies. In order to consider a worst case, it would be assumed that the majority of construction traffic would be by road, albeit, potentially originating from one of the existing ports or rail freight facilities (identified in section 3.8.1).

851. **Table 3-28** sets out the potential construction traffic impacts and the likely user groups that would be affected.

Table 3-28 Potential Construction Traffic Impacts

Potential Impact	Potential Impact of Construction Traffic	Affected user groups
Driver delay	Increases in traffic leading to delays at junctions; and Construction traffic using narrow roads resulting in increased delays.	Commuters, visitors, and business users.
Road safety	Construction traffic impacting upon sites with a history of collisions and / or the introduction of new risks associated with the formation of new construction accesses.	Commuters, visitors, and business users.
Severance	Increases in traffic impacting upon non-motorised users of the public highway including users of the PRoW network.	Local communities and tourists in the area.
Amenity		
Abnormal loads	Increases in large vehicle movements leading to delays to traffic and the suitability of the delivery routes to accommodate abnormal load deliveries.	Commuters, visitors, and business users.

852. Traffic borne impacts upon noise and vibration and air quality are considered separately in section 3.9 and section 3.10 respectively. The cumulative interactions of all transport effects will be considered within the Human Health chapter (section 3.5).

853. The preferred base port (or ports) for the offshore construction of the Projects is not known and any decision would not be expected until post-consent.

854. Such facilities would typically be provided or brought into operation by means of one or more planning applications or as port operations with permitted development rights. To ensure that any potential impacts associated with the Projects' offshore construction and operational phases (including cumulative impacts) are assessed and mitigated, RWE Renewables will consider a Requirement to produce a Port Traffic Management Plan once the final location of the preferred base port (or ports) is known.

855. Recognising that RWE Renewables will consider producing a Port Traffic Management Plan, it is proposed to scope out of the assessment the onshore impacts of the traffic and transport impacts associated with offshore construction activities.

856. The use of a Port Traffic Management Plan has been accepted for other recently consented nationally significant offshore wind farm projects, e.g. East Anglia Three and Hornsea Three.

857. GEART identifies that some developments may involve the transportation of dangerous or hazardous loads by road and that the ES should clearly outline the estimated number and composition of such loads.

858. GEART states that where the number of movements is considered to be significant, the ES should include a risk or catastrophe analysis to illustrate the potential for an accident to happen and the likely effect of such an event.

859. It is not envisaged that there would be a significant number of movements of hazardous loads and that such loads would likely comprise of fuel (petroleum) deliveries during the construction phase only. GEART notes that the extent of the risk analysis should reflect the nature of the product being distributed, noting that for instance, much more detail would be required for a scheme that involved the transportation of nuclear products than for one that involved the delivery of petroleum.

860. In order to present a proportionate assessment, it is proposed that rather than undertaking a separate assessment of hazardous loads, the road safety assessment would include detailed analysis of the types of vehicles historically involved in collisions to understand if there are areas where vehicles transporting hazardous loads may be at greater risk, e.g. where there is a pattern of collisions involving HGVs. Therefore, it is proposed that a separate assessment of hazardous loads is scoped out of the assessment.

3.8.3.2 Potential impacts during operation

861. It is expected that the onshore substation(s) will not be permanently manned; however, staff will periodically visit to carry out routine checks and maintenance. Most annual maintenance will be short, but if necessary, some campaigns may be longer.

862. Any inspections/ maintenance of the onshore export cable route(s) will be infrequent and subject to very low vehicle demand.

863. Considering the activities above, no significant traffic and transport impacts are anticipated during the operational phase and it is therefore proposed that this phase will be scoped out of the assessment.

864. Similar to the construction phase, no decision has been made on a preferred base port for the offshore operation and maintenance of the Projects. Therefore, it is proposed to scope out of the assessment the onshore traffic and transport impacts of offshore operation and maintenance activities.

865. As set out for construction, to ensure that any potential impacts associated with the Projects offshore operational phase (including cumulative impacts) are assessed and mitigated, RWE Renewables will consider a Requirement to produce a Port Traffic Management Plan once the final location of the preferred base port (or ports) is known.

866. Recognising that RWE Renewables will consider producing a Port Traffic Management Plan, it is proposed to scope out of the assessment the onshore impacts of the traffic and transport impacts associated with offshore operational activities.

867. The use of a Port Traffic Management Plan has been accepted for other recently consented nationally significant offshore wind farm projects, e.g. East Anglia Three and Hornsea Three.

3.8.3.3 Potential impacts during decommissioning

868. No decision has been made regarding the final decommissioning policy for the substation(s), as it is recognised that industry best practice, rules and legislation change over time.

869. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan would be provided.

870. It is anticipated that decommissioning impacts would be similar in nature to those of construction. It is likely that the magnitude of the effects from decommissioning will be lower than that of construction impacts. Therefore, the same impacts as for construction have been scoped in for assessment.

3.8.3.4 Potential cumulative impacts

871. Onshore cumulative impacts will be considered as part of the EIA process. Any other project with the potential to result in impacts that may act cumulatively with the Projects will be identified. Consultation with the relevant highway authorities will seek to identify any significant developments that could have a cumulative impact with the construction phase, e.g. major road improvement schemes, other NSIPs, large residential development over 100 homes etc.

872. The assessment will consider the potential for significant cumulative impacts to arise because of the construction of the Projects in the context of other developments that are existing, consented or at the application stage.

3.8.3.5 Summary of potential impacts

873. Based on the information available to date, the potential traffic and transport impacts to be assessed are presented in **Table 3-29.**

Table 3-29 Summary of Impacts Relating to Traffic and Transport. Topics to be Scoped In (✓) and Out (x)

Potential Impact	Construction	Operation	Decommissioning
Driver delay	✓	✗	✓
Road safety	✓	✗	✓
Severance	✓	✗	✓
Amenity	✓	✗	✓
Abnormal loads	✓	✗	✓
Hazardous loads	✗	✗	✗
Cumulative impacts	✓	✗	✓

3.8.4 Approach to Impact Assessment

874. The GEART guidance provides a framework for the assessment of traffic borne environmental impacts and will be supplemented by the technical transport guidance outlined in **Table 3-30.**

Table 3-30 Supplementary Technical Transport Guidance

Document	Purpose/Application
PPG - Travel Plans, Transport Assessment and Statements (Ministry of Housing Communities and Local Government, March 2014)	Provides overarching guidance upon the structure of transport assessments and travel plans.
DMRB CD 123 - Geometric design of at grade priority and signal-controlled junctions (Highways England, August 2020)	Provides the standards for the design of new points of access.
Manual for Streets (Department for Transport, September 2007)	Guidance to inform the visibility requirements for junctions where measured speeds are below 40mph.
Manual for Streets 2 (Chartered Institute of Highways and Transportation September 2010)	
Traffic Signs Manual Chapter 8 Traffic Safety Measures and Signs for Road Works and Temporary Situations Part 1: Design (Department for Transport, 2009)	Provides guidance upon temporary traffic management that will be used to inform the assessment of driver delay impacts related to temporary traffic management/ road closures.

875. GEART suggests the following rules to define the extent and scale of the assessment required:

- Rule 1: Include highway links where traffic flows are predicted to increase by more than 30% (or where the number of HGVs is predicted to increase by more than 30%).
- Rule 2: Include any other specifically sensitive areas where traffic flows, or the number of HGVs are predicted to increase by 10% or more.

876. The above criteria applied to the Projects' traffic demand will dictate the extent of the 'traffic and transport study area' and the scale of the impact assessment. Changes in traffic flows below the GEART rules are assumed to result in negligible, environmental impacts and would not be assessed further.

877. The exception to GEART Rule 1 and 2, is the consideration of the impacts upon driver delay and road safety. These impacts can be potentially significant when high baseline traffic flows are evident, and a lower change in traffic flow can be potentially significant and therefore GEART rules would not be applied.

3.8.4.1 Identification of Sensitive Locations

878. The sensitivity of a road can be defined by the type of user groups who may use it. GEART identifies that it is useful to identify particular groups or locations which may be sensitive to changes in traffic conditions and provides a checklist of sensitive locations and groups; however, the list is not exhaustive and can be added to by the assessor.

879. Applying the GEART principles, **Table 3-31** provides broad definitions of the different sensitivity levels that would be adopted for the assessment.

Table 3-31 Example Definitions of the Different Sensitivity Levels

Sensitivity	Severance and amenity	Driver delay	Highway safety
High	High concentrations of sensitive receptors (e.g. hospitals, schools, areas with high footfall) and limited separation provided by the highway environment; or a low concentration of sensitive receptors and no separation from traffic provided by the highway environment.	Junctions operating at or over capacity and / or roads less than 5.5m wide with no passing places provided.	Links with collision rates above national averages and / or collisions clusters with emerging patterns of collisions.
Medium	A low concentration of sensitive receptors (e.g. residential dwellings, pedestrian desire lines, etc.) and some separation from traffic provided by the highway environment.	Junctions or links operating close to capacity and or roads less than 5.5m wide but with passing places provided.	Links with collision rates close to national averages and / or collision clusters.

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Sensitivity	Severance and amenity	Driver delay	Highway safety
Low	Few sensitive receptors and / or highway environment can accommodate changes in volumes of traffic.	Junctions or links with spare capacity and / or roads in excess of 5.5m in width.	Links with collision rates lower than national averages and / or no collision clusters.
Negligible	Links that fall below GEART Rule 1 and 2 screening thresholds and major ‘A’ roads or motorways with no pedestrian or cycle environment.		

3.8.4.2 Impact assessment process

880. Construction traffic demand will be derived by way of a ‘first principles’ approach whereby traffic generation is calculated from an understanding of likely material demand and resourcing requirements.

881. The Projects traffic demand would be assigned to the highway links within the traffic and transport study area and the increase in traffic flow to baseline conditions determined. This would facilitate an assessment of the magnitude of effect by applying the thresholds in **Table 3-32** to inform a detailed evaluation of potential impacts.

Table 3-32 Magnitude of Effect Thresholds

Impact	Negligible	Low	Medium	High
Severance	Change in total traffic flow of less than 30%	Change in total traffic flow of 30-60%	Change in total traffic flow of 60-90%	Change in total traffic flows of over 90%
Amenity	Change in traffic flow (or HGV component less than 100%)		Greater than 100% increase in traffic (or HGV component) and a review based upon the quantum of vehicles, vehicle speed and pedestrian footfall	
Driver delay	Informed by a review of the potential increase in peak hour traffic through sensitive junctions and links and pinch points on the local highway network.			
Highway Safety	Informed by a review of existing collision records from within the study areas and the forecast increase in traffic.			
Abnormal Loads	Informed by an assessment of the suitability of the access routes to accommodate abnormal loads.			

882. The magnitude of effect (**Table 3-32**) would then be combined with the receptor sensitivity (**Table 3-31**) to determine the overall impact of the Projects traffic in accordance with the impact assessment matrix (section 1.7).

3.9 Noise and Vibration

883. This section of the Scoping Report considers the assessment of onshore noise and vibration effects relating to the Projects. Consideration is given to the potential impacts and any significant effects from the construction, operation and maintenance and decommissioning of the onshore transmission works in terms of noise and vibration effects on identified receptors. The impacts of airborne noise on offshore receptors is assessed in section 2.4.

The following questions are posed to consultees to help them frame and focus their response to the noise and vibration scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Do you agree with the approach to data collection?
- Have all the potential impacts on noise and vibration resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

3.9.1 Existing Environment

884. Three onshore study areas are currently under consideration along the north east coast of England between County Durham and Lincolnshire, each of these areas is discussed separately in the sections below.

3.9.1.1 Hawthorn Pit

885. The Hawthorn Pit onshore study area is predominantly within the administrative area of County Durham, with the existing electricity transmission network substation located between the settlements of South Hetton (south), Murton (north), Easington Lane (west) and Hawthorn (east).

886. This onshore study area is a mix of rural land for agricultural use and settlements of various sizes.

887. The existing noise levels within this onshore study area are unlikely to be low over the majority of the area. Identified noise sources include, but are not limited to:

- A19 (north-south alignment);
- A182 (east-west alignment);
- aircraft using Peterlee (Shotton) Airfield;
- local roads;
- Durham Coast Line (Railway);
- Tuthill and Hawthorn quarries; and
- industrial area to the west of Peterlee.

888. Sensitive receptors with respect to noise within the onshore study area are typically residential premises. It is also necessary to consider a wider range of receptors including schools, places of worship, noise sensitive commercial/industrial premises, historic buildings, spaces used for recreation and ecological receptors.

889. The Hawthorn Pit onshore study area comprises of a variety of receptors, with the larger coastal town of Seaham to the north of the area and more inland, Peterlee to the south.

890. Inland, other smaller settlements include Murton, South Hetton, Shotton Colliery, Easington and Hawthorn, all of which are in located within this onshore study area.

891. Recreational and ecological receptors within/adjacent to the Hawthorn Pit onshore study area include:

- NNRs including Durham Coast and Castle Eden Dene;
- SSSIs including Hesledon Moor East, Hesledon Moor West, Pig Hill and Eppleton Grassland;
- SACs including Durham Coast and Castle Eden Dene;
- Ramsar sites including Northumbria Coast and Teesmouth and Cleveland Coast;
- SPAs including Northumbria Coast; and
- LNRs including Rockhouse Dene, Noses Point, Easington, Horden Grasslands, Limekiln Gill, Blackhall Grasslands, Hart to Haswell, Bracken Hill Wood and Gore Burn.

892. A number of potential receptors which will be considered within this onshore study area along with their classification and respective sensitivity is defined in **Table 3-33.**

3.9.1.2 Creyke Beck

893. The Creyke Beck onshore study area is within the administrative area of East Riding of Yorkshire.

894. This onshore study area is predominantly rural with the towns of Beverley, Hornsea and Withensea and a number of smaller settlements located within the boundary.

895. The existing noise levels within this onshore study area are unlikely to be low over the majority of the area. Identified noise sources include, but are not limited to:

- A165 (north-south alignment);
- A1035 (east-west alignment);
- aircraft using Linley Hill (Beverley) Airfield;
- local roads;
- mainline railway between Hull and Bridlington;
- Foss Hill and Beverley quarries; and
- industrial areas to the north west of Brandesburton (Cat Foss) and to the south-west of Bridlington (Carnaby).

896. Sensitive receptors with respect to noise within the onshore study area are typically residential premises. It is also necessary to consider a wider range of receptors including schools, places of worship, noise sensitive commercial/industrial premises, historic buildings, spaces used for recreation and ecological receptors.

897. The Creyke Beck study area comprises of a variety of receptors and includes the large inland town of Beverley.

898. Inland, other smaller settlements include Hornsea, Withernsea, Leconfield, Cherry Burton, Woodmansey, Coniston, Sproatley and Burton Pidsea all of which are located within this onshore study area.

899. Recreational and ecological receptors within/adjacent to this onshore study area include:

- SSSIs including Dimlington Cliffe, The Lagoons, Kelsey Hill Gravel Pits, Roos Bog, Lambwath Meadows, Hornsea Mere, Withow Gap (Skipsea), Skipsea Bail Mere, River Hull Headwaters, Tophill Low, Pulfin Bog, Burton Bushes, and Leven Canal;
- SPAs including Hornsea Mere; and
- LNRs including Beverley Parks, Southorpe, Sigglesthorne Station and Noddle Hill.

900. A number of potential receptors which will be considered within this onshore study area along with their classification and respective sensitivity is defined in **Table 3-33**.

3.9.1.3 South of Humber

901. The South of Humber onshore study area is within the administrative area of Lincolnshire County Council.

902. This onshore study area is predominantly rural with the towns of Mablethorpe, Sutton-on-Sea and Chapel St Leonards and a number of smaller settlements located within the boundary.

903. The existing noise levels within the onshore study area are likely to fluctuate over the daytime/night time periods, with each respective period having a different noise climate in response to the sources that are nearby. Daytime noise levels are unlikely to be low due to the presence of road/air and industrial/commercial noise sources, these noise levels are then anticipated to reduce at night as a result of the reduction of these (and other) sources of noise. Identified noise sources include, but are not limited to:

- A1031, A52 (north-south alignment);
- A157, A1104, A1111 (east-west alignment);
- aircraft using Skegness (Ingoldmells) Aerodrome, Ashley's Hill and Strubby airfield, North Coates airfield, and Strubby Glider field;
- local roads;
- industrial areas to the west of Manby (Manby Park) and Tetney Oil Terminal; and
- tourist attraction (recreation area) to the south of Chapel St Leonards.

904. Sensitive receptors with respect to noise within this onshore study area are typically residential premises. It is also necessary to consider a wider range of receptors including schools, places of worship, noise sensitive commercial/industrial premises, historic buildings, spaces used for recreation and ecological receptors.

905. The South of Humber study area comprises of a variety of receptors across the onshore study area, and includes the coastal towns of Mablethorpe, Sutton-on-Sea and Chapel St Leonards as well as the inland town of Alford.

906. Inland, other smaller settlements include Hogsthorpe, Maltby Le Marsh, Grimoldby and Manby all of which are in located within the onshore study area.

907. Recreational and ecological receptors within/adjacent to this onshore study area include:

- SSSIs including Humber Estuary, Saltfleetby – Theddlethorpe Dunes, Sea Bank Clay Pits, Chapel Point to Wolla Bank, Willoughby Meadow and Tetney Blow Wells;
- SPAs including the Humber Estuary;
- SACs including Humber Estuary, Saltfleetby – Theddlethorpe Dunes, Gibraltar Point;
- Ramsar sites including the Humber Estuary;
- NNRs including Saltfleetby – Theddlethorpe Dunes; and
- LNRs including the Willoughby Branch Line.

908. The South of Humber study area is also adjacent to the following:

- Lincolnshire Wolds AONB; and
- SSSIs including Hoplands Wood.

909. A number of potential receptors which will be considered within the onshore study area along with their classification and respective sensitivity is defined in **Table 3-33.**

Table 3-33 Definitions of the Different Types and Sensitivity Levels for Noise

Assigned Sensitivity	Definitions and Classification Type
High	Noise receptors have been categorised as high sensitivity where noise may be detrimental to vulnerable receptors. Such receptors include: Certain hospital wards (e.g. operating theatres or high dependency units) or care homes at night
Medium	Noise receptors have been categorised as medium sensitivity where noise may cause disturbance and a level of protection is required but a level of tolerance is expected. Such subgroups include: • Residential accommodation • Private gardens • Hospital wards • Care homes (during the day) • Schools • Universities • Research facilities • National parks (during the day) Temporary holiday accommodation (including holiday lets)
Low	Noise receptors have been categorised as low sensitivity where noise may cause short duration effects in a recreational setting although particularly high noise levels may cause a moderate effect. Such subgroups include: • Offices • Shops (including cafes) • Outdoor amenity areas during the day (including recreation, public amenity space/play areas), long distance footpaths (including PRoW, dog walking routes, bird watching areas, footpaths and other walking routes, visitor attractions, cycling routes including rural roads) • Doctors‘ surgeries • Sports facilities • Places of worship

Assigned Sensitivity	Definitions and Classification Type
Negligible	Noise receptors have been categorised as negligible sensitivity where noise is not expected to be detrimental. Such subgroups include: • Warehouses • Light industry • Car parks • Agricultural land

3.9.2 Approach to Data Collection

910. The following information has been considered during the production of this Scoping Report and will be considered further within the PEIR/ES where relevant matters are scoped in to the EIA process.

911. The approach to assessment and data gathering will be discussed and agreed as part of the EPP prior to commencement.

912. Identification of potential sensitive receptors and for the purposes of the characterisation of the existing environment will be undertaken using a range of data sources.

913. The existing environment will be characterised using the data sources set out in **Table 3-34.**

Table 3-34 Existing Datasets

Data Source	Data Contents
Google Maps Aerial Photography Local Authority Local Plans	Location of noise sources and sensitive receptors within the onshore study area
Environment Agency LIDAR Data (Open Licence)	Topographical data
OS Mapping	Vector mapping
Existing and proposed baseline noise surveys	Baseline noise data

914. No baseline noise monitoring has been undertaken to date. Once the noise and vibration onshore study area has been refined, a baseline noise survey will be undertaken to inform the assessment.

915. The baseline survey methodology and geographical extent will be agreed in advance with the relevant local authority stakeholder who is responsible for the administrative district in which the onshore study area is located.

916. Measurements will be undertaken in accordance with guidance detailed within British Standard (BS) 7445:1991 'Description and measurement of environmental noise Part 2: Guide to the acquisition of data pertinent to land use' and BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'. Survey locations would be representative of the potentially most affected noise sensitive receptors.

917. Data collection will likely comprise a combination of short term attended and longer term (up to a week) unattended measurement. A weather station would also be deployed to identify site-specific meteorological conditions during the surveys.

918. A review of baseline data contained within published ESs and planning documents within the public domain for other developments would also be undertaken where data is available and relevant.

3.9.3 Potential Impacts

919. The Noise and Vibration assessment is likely to have key inter-relationships with Landscape and Visual, Air Quality, Terrestrial Ecology, Tourism and Recreation and Traffic and Transport. These will be considered where relevant.

3.9.3.1 Potential impacts during construction

920. Noise and vibration issues associated with the onshore elements of the Project's construction works will be assessed using the guidance contained in BS 5228:2009+A1:2014 'Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise' and Part 2: Vibration.

921. This guidance defines the accepted prediction methods and source data for various construction plant and activities.

922. Typically, noise and vibration generating activities are associated with, but not limited to:

- earthworks;
- directional drilling;
- surface excavation and earth moving during cable laying and site preparation for the landfall(s), onshore substation(s) and other onshore infrastructure;
- piling, or use of other foundation stabilising techniques, for the onshore substation(s);
- temporary increases in HGVs delivering to site, operating in designated works areas and using haul routes;
- nearshore vessels and offshore cable laying activities; and
- other general onshore construction activities.

923. Piling may also be used (if necessary) to provide a stable temporary platform for the drilling rigs at landfall(s) and along the onshore export cable route(s) at potential trenchless crossings.

924. Construction effects will be temporary and will vary both spatially and temporally in nature across the onshore study area. The magnitude of impact is likely to be based on the proximity of the proposed construction activities within the onshore study area to noise and vibration sensitive receptors.

925. The closest sensitive human and ecological receptors have the potential to be impacted by noise from these temporary works activities. Vibration impacts could occur from temporary heavy construction works, at residential, commercial, industrial and historical buildings and monuments. Therefore, all potential impacts are scoped in for the construction phase.

3.9.3.2 Potential impacts during operation and maintenance

926. There are no operational noise impacts from the buried infrastructure at the landfall site(s) and along the onshore export cable route(s) and therefore they have been scoped out from further assessment.

927. An assessment would be undertaken to determine the likely impacts due to operational noise emissions from the onshore substation(s) on identified sensitive receptors. The magnitude of impact is likely to be based on the proximity of the proposed onshore substation infrastructure to noise and vibration sensitive receptors within the onshore study area. Examples include:

- the proximity of the onshore substation(s) to noise sensitive premises (including residential properties);
- the proximity of onshore substation(s) to noise sensitive locations that are particularly valued for their acoustic environment or landscape quality including AONBs and PRoWs; and
- the proximity of the onshore substation(s) to designated sites for nature conservation where noise may have an adverse impact on protected species or other wildlife, including SPAs, SACs, Ramsar, SSSIs, LNRs.

928. The potential permanent impacts of operational noise from the Project's onshore substation(s) may arise from:

- the inherent operational noise generated by the Project's onshore substation(s), and any associated characteristics (tonality, intermittency, impulsivity, other acoustic characteristics); and
- noise from onshore substation maintenance activities, including emergency switchgear and back-up generators.

929. There are unlikely to be any noise and vibration impacts relating to operational or maintenance vehicular traffic, but operational noise impacts may arise from the operation of equipment within the onshore substation(s) (e.g. reactors, filters, and transformers).

930. Operational onshore substation plant such as transformers and other wind power equipment vibrate at twice the power frequency i.e. 100Hz and associated harmonic frequencies e.g. 200Hz, 300Hz.

931. The operational vibration effects are considered negligible as industry standard requires the use of vibration isolation pads/mounts to prevent transmission of ground borne vibration. The onshore substation(s) will be designed to achieve negligible levels of ground-borne vibration.

932. Therefore, it is considered there will be no significant sources of vibration associated with the operation of the Projects and operational vibration impacts have therefore been scoped out of further assessment.

3.9.3.3 Potential impacts during decommissioning

933. It is anticipated that impacts associated with decommissioning would be similar in nature to those experienced during construction, although it is likely that there would be a lower magnitude of effect, particularly if some subsurface infrastructure is left in-situ.

3.9.3.4 Potential cumulative impacts

934. Onshore cumulative impacts will be considered as part of the EIA process. Any other project with the potential to result in impacts that may act cumulatively with the Projects will be identified during consultation as part of the EPP and following a review of available information. These projects will then be included in the CIA and therefore are scoped into the assessment.

935. There is potential for cumulative effects at sensitive receptors where other schemes or activities within the Projects onshore study area occur at the same time as a result of:

- construction activities for the Projects occurring at the same time as those associated with other plans or projects;
- from construction phase road traffic noise and vibration on highway links used by the Projects and other schemes;
- site construction noise from other major infrastructure or road and rail projects in close proximity; and
- construction phase impacts at newly formed residential, commercial or industrial projects.

3.9.3.5 Summary of potential impacts

936. Noise and vibration impacts are summarised in **Table 3-35**.

Table 3-35 Summary of Impacts Relating to Noise and Vibration. Topics to be Scoped In (✓) and Out (x)

Potential Impact	Construction	Operation (Onshore substation(s) only)	Decommissioning
Noise affecting human receptors	✓	✓	✓
Vibration affecting human receptors	✓	×	✓
Road traffic impacts	✓	×	✓
Nearshore airborne noise	✓	×	✓
Cumulative impacts	✓	✓	✓

3.9.4 Approach to Impact Assessment

937. The assessment of construction noise and vibration impacts will refer to the guidance detailed in BS 5228:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites' Part 1: Noise, Part 2: Vibration. The assessment will be based on the proposed construction phasing and associated activities, for example, cable installation, directional drilling works and piling.

938. The spatial scope of the construction and decommissioning noise assessment would include the following:

- Landfall(s), onshore export cable route(s), onshore substation(s) and offshore airborne noise where activities could affect noise sensitive receptors; and
- Traffic routes and routes subject to significant changes in traffic flows (and / or percentage HGV) associated with the construction of the Projects.

939. Construction phase traffic noise impacts will be calculated as a Basic Noise Level (BNL) using the methodology detailed in Calculation of Road Traffic Noise (CRTN) (HMSO, 1988), and using criteria from the DMRB, LA111 Noise and Vibration, Revision 2 (Highways England, 2020).

940. Operational impacts will include noise associated with the onshore substation(s). The assessment will be based on the guidance and methodology detailed in BS 4142:2014+A1:2019 – Method for Rating and Assessing Industrial and Commercial Sound.

941. The noise and vibration assessment will be undertaken in accordance with following standards and guidance (or the latest published version thereof):

- Overarching NPS for Energy (EN-1) (DECC, 2011a);
- NPS for Renewable Energy Infrastructure (EN-3) (DECC, 2011b);
- NPS for Electricity Networks Infrastructure (EN-5) (DECC, 2011c);
- BS 4142:2014+A1:2019 – Method for Rating and Assessing Industrial and Commercial Sound;
- BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings;
- BS 7445-1:2003 Description and measurement of environmental noise. Guide to quantities and procedures;
- BS 7445-2:1991 Description and measurement of environmental noise. Guide to the acquisition of data pertinent to land use;

- BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise;
- BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 2: Vibration;
- BS 6472-1:2008 Guide to Evaluation of Human Exposure to Vibration in Buildings;
- Calculation of Road Traffic Noise 1988;
- DMRB, LA111 Noise and Vibration, Revision 2;
- WHO (1999) Guidelines for Community Noise;
- WHO (2009) Night Noise Guidelines for Europe; and
- WHO (2018) Environmental Noise Guidelines for the European Region.

942. Following the refinement of the onshore study area, further liaison with the relevant local authority and other relevant stakeholders (where necessary) will be undertaken to agree the approach and methodology to data collection for EIA purposes and the specific assessment methodology.

3.10 Air Quality

943. This section of the Scoping Report considers the assessment of onshore air quality effects relating to the Projects. Consideration is given to the potential impacts and any significant effects from the construction, operation and decommissioning of the onshore components in terms of air quality effects on identified receptors.

The following questions are posed to consultees to help them frame and focus their response to the air quality scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Do you agree with the approach to data collection?
- Have all the potential impacts on air quality resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) for further assessment?
- Do you agree with the proposed approach to assessment?

3.10.1 Existing Environment

944. Air quality impacts arising from projects of this nature are typically associated with the effects of dust generation and road traffic emissions. The spatial extent of the road network which is utilised by the Projects is not yet defined and may extend beyond the onshore study areas at Hawthorn Pit, Creyke Beck and South of Humber. As such, at this stage, baseline air quality conditions have been considered within the onshore study areas only, as described in the following sections.

3.10.1.1 Hawthorn Pit

945. The Hawthorn Pit onshore study area is located predominantly within the jurisdiction of Durham County Council. The latest air quality Annual Status Report published by Durham County Council (Durham County Council, 2019) was reviewed to establish baseline conditions in the area. The report notes that the main pollutant of concern in the area is nitrogen dioxide (NO_2) emitted by road vehicles. Durham County Council has declared two statutory Air Quality Management Areas (AQMAs) in Chester-le-Street and Durham City due to exceedances of the annual mean NO_2 air quality Objective; however, these are outside of the onshore study area. The onshore study area is predominantly rural and therefore, in these areas, air quality is expected to be relatively good due to few sources of pollution. As road traffic is the dominant pollution source within the area, it is anticipated that areas in proximity to the main road network within the onshore study area would experience higher levels of pollution.

3.10.1.2 Creyke Beck

946. The Creyke Beck onshore study area is located within East Riding of Yorkshire Council’s area of jurisdiction. The latest air quality Annual Status Report (East Riding of Yorkshire Council, 2021) notes that air quality within the area is good, and no statutory AQMAs have been declared. The Creyke Beck onshore study area is predominantly rural in nature and, as noted above, higher levels of pollutants are likely to occur in closer proximity to major roads or within more densely populated areas such as Beverley.

3.10.1.3 South of Humber

947. The South of Humber onshore study area is located within the jurisdiction of East Lindsey District Council. A review of monitoring data collected by the Council (Defra, 2021a) showed that air quality monitoring is focused around the areas of Skegness, Louth and Horncastle, which are all outside the onshore study area. A review of Defra’s AQMAs Interactive Map (Defra, 2021b) reveals that East Lindsey District Council has not declared any statutory AQMAs within its area of jurisdiction and, as such, air quality can be expected to be good within the onshore study area, primarily due to its rural nature and few sources of pollution other than the main road network.

3.10.1.4 Sensitive Receptors

948. The following receptors may be sensitive to changes in air quality:

- human receptors, present within scattered settlements across the onshore study areas, and more isolated residential properties; and
- designated ecological sites (including SPAs, SACs, SSSIs, Ramsar sites, NNRs, LNRs and ancient woodlands), where these sites contain habitats or features which are sensitive to changes in airborne pollutant concentrations or nitrogen and/or acid deposition.

3.10.2 Approach to Data Collection

949. The following information has been considered during the production of this Scoping Report and will be considered further within the PEIR/ES where relevant matters are scoped in to the EIA process.

950. It is expected that there will be sufficient data available from monitoring undertaken by the relevant local authorities as part of their statutory duties for use in the air quality assessment. As such, it is not proposed to collect any primary datasets (i.e. a project-specific air quality survey) for the assessment. However, this will be reviewed once the onshore study area, and air quality study area, are refined to ensure that appropriate data are available. This will be discussed and agreed with stakeholders though the EPP.

951. It is anticipated that, due to COVID-19, baseline air quality data collected during 2020 and 2021 would not be representative due to changes in traffic flows. As such, it is expected that 2019 monitoring data would be used in the assessment to characterise baseline conditions.

952. With regard to secondary datasets, the following sources would be used:

- air quality monitoring data collected by the local authorities;
- Defra mapped background pollutant concentrations for 1 km x 1 km grid squares across the UK (Defra, 2020); and
- the Air Pollution Information System (APIS) website (Centre for Ecology and Hydrology, 2021) would be used to obtain background pollution concentrations and deposition rates at designated ecological sites.

3.10.3 Potential Impacts

953. The Air Quality assessment is likely to have key inter-relationships with Terrestrial Ecology, Traffic and Transport and Human Health. These topics will be considered as appropriate.

3.10.3.1 Potential impacts during construction

954. Impacts during construction may occur at human and ecological receptors as a result of the generation of dust and particulate matter during onshore construction works, e.g. from earthworks and stockpiling of soils. Impacts may also occur as a result of exhaust emissions from construction phase plant and road vehicle movements generated during construction. These emissions will add to existing pollutant concentrations at human receptors and pollutant concentrations and deposition levels at designated ecological sites. As such, air quality impacts during construction have been scoped in to the assessment.

3.10.3.2 Potential impacts during operation and maintenance

955. It is expected that air quality impacts during the operational phase would be negligible. During operation, the surface infrastructure would not generate any emissions to air and maintenance activities would generate a nominal amount of additional road vehicles on an infrequent basis, which would not give rise to any significant air quality effects. It is therefore proposed to scope operational phase air quality impacts out of the ES.

3.10.3.3 Potential impacts during decommissioning

956. It is anticipated that air quality impacts associated with decommissioning would be similar in nature to those experienced during construction, although it is likely that impacts would be of a lower magnitude, particularly if some subsurface infrastructure is left in-situ. Impacts associated with decommissioning have been scoped in to the assessment.

3.10.3.4 Potential cumulative impacts

957. Cumulative effects of dust and construction plant emissions may occur as a result of concurrent construction activities associated with other plans or projects within the onshore study area, where they interact spatially with the Projects. Cumulative effects may also arise as a result of traffic generated by other plans and projects which uses the road network along which Project-generated vehicles are expected to travel. These cumulative impacts may affect both human and ecological receptors. Cumulative impacts have therefore been scoped into the assessment for construction and decommissioning.

3.10.3.5 Summary of potential impacts

958. A summary of the potential impacts in relation to air quality is provided in **Table 3-36.**

Table 3-36 Summary of Impacts Relating to Air Quality. Topics to be Scoped In (✓) and Out (x)

Potential Impact	Construction	Operation	Decommissioning
Impacts of emissions of dust on human and ecological receptors	✓	×	✓
Impacts of emissions from plant and machinery on human health and ecological sites	✓	×	✓
Impacts of emissions from road traffic on human health and ecological sites	✓	×	✓
Cumulative impacts on human health and ecological sites	✓	×	✓

3.10.4 Approach to Impact Assessment

959. Existing air quality conditions within the air quality study area will be characterised using the data sources as identified in section 3.10.1.Receptors will be identified using OS mapping data for human receptors and the Defra MAGIC website for designated ecological sites.

960. The air quality assessment will be undertaken in accordance with the following guidance documents:

- Defra (2018) Local Air Quality Management Technical Guidance LAQM.TG(16);
- Institute of Air Quality Management (IAQM) (2016) Guidance on the Assessment of Dust from Demolition and Construction;
- IAQM and Environmental Protection UK (EPUK) (2017) Land-Use Planning and Development Control: Planning for Air Quality;
- IAQM (2020) A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites; and
- Natural England (2018) Natural England's Approach to Advising Competent Authorities on the Assessment of Road Traffic Emissions under the Habitats Regulations.

961. An assessment of dust generated during construction will be undertaken in accordance with IAQM guidance (IAQM, 2016). The assessment is risk-based and the risk of dust impacts will be determined for both human and ecological receptors in proximity to the construction works. Mitigation measures will be recommended which are commensurate with the identified risk, to ensure that significant impacts would not occur.

962. During construction, Non-Road Mobile Machinery (NRMM) and plant can increase air emissions which may impact upon human and ecological receptors. Technical guidance provided by Defra (Defra, 2018) states that emissions from NRMM on construction sites are typically unlikely to lead to significant air quality impacts. However, intensive construction activities, for example HDD works, may temporarily increase pollutant concentrations in the vicinity of receptors. The location of human and ecological receptors in relation to construction works will be reviewed to determine whether any further assessment of emissions from NRMM is required. If required, this assessment may be qualitative or quantitative depending on the scale and nature of activities, their duration and existing air quality conditions.

963. The increase in construction traffic flows generated by the Projects will be screened using criteria in IAQM and EPUK (IAQM and EPUK 2017) and Natural England (Natural England 2018) guidance. Where traffic flows exceed the screening criteria and there are relevant human or ecological receptors located within 200m of the road, a detailed dispersion modelling assessment will be undertaken to consider impacts at these locations. Concentrations of NO_2 and particulate matter with an aerodynamic diameter of 10µm or less (PM_{10}) and 2.5µm or less ($PM_{2.5}$) will be predicted at human receptors, and concentrations of NOx, ammonia and associated nutrient nitrogen and / or acid deposition will be calculated at ecological receptors. The significance of effects at human receptors will be determined in accordance with IAQM and EPUK guidance (IAQM and EPUK, 2017). The significance of impacts on ecological receptors will be considered by the Project ecologists.

964. The approach would be discussed and agreed with stakeholders prior to undertaking the assessment.

4 PROJECT WIDE ASPECTS

965. This section presents the main baseline characteristics of the environment associated with project wide aspects, i.e. those which can be affected by the offshore and onshore elements of the Projects. Unless otherwise stated, the potential impacts of the Projects during construction, operation and decommissioning are considered in line with the methodology presented in section 1.7. Each section outlines which impacts are proposed to be scoped in to the EIA and which will be scoped out.

4.1 Socio-economics, Tourism and Recreation

966. This section of the Scoping Report identifies the socio-economic, tourism and recreation receptors relevant to the Projects. The potential effects of construction, operation and maintenance, and decommissioning of the Projects on socio-economics, tourism and recreation are considered throughout this section.

The following questions are posed to consultees to help them frame and focus their response to the socio-economics, tourism and recreation scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Do you agree with the approach to data collection?
- Have all the potential impacts on socio-economics, tourism and recreation resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

4.1.1 Existing Environment

967. The existing environment relevant to the EIA will consider two receptor groups:

- economic receptors, i.e. people or businesses that would benefit from or be adversely affected by the Projects and associated development; and
- social receptors, which are the social infrastructure relevant to a community, that would benefit from or be adversely affected by the Projects. Impacts on social receptors subsequently impact on the population and its health and wellbeing.

4.1.1.1 Offshore

968. The offshore study area covers part of the southern North Sea, which is a busy shipping area, used by commercial shipping vessels, fishing vessels and dredging operators. Impacts to shipping and navigation are considered in section 2.10, impacts to commercial fishing is considered in section 2.9 and impacts to other users including dredging is considered in section 2.12.

4.1.1.2 Onshore

969. Socio-economic data is reported at a local authority level by the Office for National Statistics through Nomis. The following sections describe the baseline socio-economic conditions within the relevant local authorities.

4.1.1.3 Hawthorn Pit

970. The Hawthorn Pit onshore study area is located predominantly within County Durham which has a population of 530,094 people and is administered by County Durham Council.

971. Of the population in County Durham, 62.0% are aged between 16 and 64 (in line with the UK average of 62.4%) and of those 71.4% are employed and 6% are unemployed (compared to the UK average of 75.4% and 4.6.%) (ONS, 2020). Professional occupations account for 20% of employment (ONS, 2020). The biggest employment sectors are manufacturing and wholesale and retail trade (together accounting for 29.3% of employees).

972. Businesses within the Hawthorn Pit onshore study area include, but are not limited to, agriculture, retail, light industry, tourist attractions, tourist accommodation, including caravan parks, cafes and restaurants, and recreational activities (e.g. golf courses, fishing lakes).

4.1.1.3.1 Creyke Beck

973. The Creyke Beck onshore study area is located within the East Riding of Yorkshire which has a population of 343,200 people and is administered by East Riding of Yorkshire Council.

974. Of the population in East Riding of Yorkshire, 57.3% are aged between 16 and 64 (compared to the UK average of 62.4%) and of those 75.1% are employed and 3.4% are unemployed (compared to the UK average of 75.4% and 4.6.%) (ONS, 2020). Professional and technical occupations account for 39.8% of employment (ONS, 2020). The biggest employment sectors are wholesale and retail trade, manufacturing and human health and social work activities (together accounting for 43.5% of employees).

975. Businesses within the Creyke Beck onshore study area include, but are not limited to, agriculture, retail, light industry, tourist attractions, tourist accommodation, including caravan parks, cafes and restaurants, and recreational activities (e.g. golf courses, fishing lakes).

4.1.1.3.2 South of Humber

976. The South of Humber onshore study area is located within East Lindsey, a local authority district within the county of Lincolnshire. It has a population of 142,000 people and is administered by East Lindsey District Council.

977. Of the population in East Lindsey, 54.4% are aged between 16 and 64 (compared to the UK average of 62.4%) and of those 70.3% are employed and 5.1% are unemployed (compared to the UK average of 75.4% and 4.6.%) (ONS, 2020). Professional and technical occupations account for 39% of employment (ONS, 2020). The biggest employment sectors are wholesale and retail trade and accommodation and food services activities (together accounting for 37.2% of employees).

978. Businesses within the South of Humber onshore study area include, but are not limited to, agriculture, retail, light industry, tourist attractions, tourist accommodation, including caravan parks, cafes and restaurants, and recreational activities (e.g. golf courses, fishing lakes).

4.1.2 Approach to Data Collection

979. The following information has been considered during the production of this Scoping Report and will be considered further within the PEIR/ES where relevant matters are scoped in to the EIA process.

980. The socio-economics assessment presented in the EIA will be informed by a desk-based assessment and will include collecting data on:

- regional and local labour market and trends;
- high level indication of temporary and rented accommodation supply and trends;
- current workforce;
- local and regional population and trends;
- local and regional employment and trends;
- education (including special educational needs and school standards); and
- skills within the onshore study area.

981. Social data relating to crime, health and leisure will also be considered where this is available, along with the identification of social infrastructure such as schools, nurseries, libraries, doctors, dentists, pharmacies, social care homes, post offices, pubs, community halls, churches and other places of worship. Data on health is presented in section 3.5.

4.1.3 Potential Impacts

4.1.3.1 Potential impacts during construction

982. The construction of offshore wind farm projects can have beneficial socio-economic effects in terms of providing employment and continuing to develop the wind energy market at a national level, i.e. encouraging wind energy manufacturers to be based in the UK. However, there are potential adverse impacts on social infrastructure where the projects components and activities to construct them impact on specific receptors, unless they are identified and avoided through micro-siting and mitigation measures.

983. The EIA will consider direct economic benefit through the supply chain required for the Projects, including spending on local goods and services supplied by local businesses such as security, catering and hotel facilities.

984. Increased employment as well as potential changes to demographics due to national migration and immigration will be assessed, considering likely recruitment strategies.

985. Loss of, or disruption to onshore and offshore activities which contribute to the existing social and economic characteristics of the onshore study area will also be considered and assessed. This may include disturbance as a result of potential air quality, noise, visual and traffic impacts on social infrastructure.

986. The magnitude of the impact to tourism and recreation is likely to differ between the three onshore study areas as the tourism industry supports a higher percentage of jobs in East Lindsey than it does in County Durham or East Riding of Yorkshire. Depending on the location of the onshore gird connection point(s) tourism and recreation will either be incorporated into the socio-economic assessment (Hawthorn Pit and Creyke Beck) or divided into a separate chapter where they will be given additional consideration (South of Humber).

987. All potential construction impacts are scoped in to the assessment.

4.1.3.2 Potential impacts during operation and maintenance

988. The impacts assessed for the operation and maintenance phase of the Projects will be as described above for construction. However, it is anticipated that any impacts to the local economy will be most significant during the construction phase, with fewer adverse impacts being predicted on the local economy during the operational phase.

989. The impact of economic benefits, increased employment and changes in demographic due to immigration during operation and maintenance are scoped in to the assessment.

990. The impacts associated with the loss of, disruption to or pressure on local services and offshore activities, disturbance to social infrastructure and disruption to tourism and recreation activities during operation and maintenance will be negligible and are therefore scoped out of the assessment.

4.1.3.3 Potential impacts during decommissioning

991. It is anticipated that the decommissioning impacts would be similar in nature to those of construction. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the relevant regulator.

992. It is anticipated that the decommissioning impacts will be similar in nature to those of construction and therefore they have been scoped in to the assessment.

4.1.3.4 Potential cumulative impacts

993. Cumulative impacts will be considered as set out in section 1.7. Potential cumulative impacts related to socio-economics include agglomerative effects with other offshore wind development in the region to potentially boost the local skill-base. Conversely, there is also potential to cumulatively impact on other industries negatively as a result of displacement of workers currently employed in other industries. This will be considered further in the EIA.

4.1.3.5 Summary of potential impacts

994. **Table 4-1** presents the impacts which are proposed to be scoped into the EIA. This may be refined through the EPP as additional information and data becomes available.

995. The socio-economic assessment is likely to have links with shipping, commercial fisheries, tourism and recreation and land use. These will be considered where relevant.

Table 4-1 Summary of Impacts Relating to Socio-Economics. Topics to be Scoped In (✓) and Out (x)

Potential Impact	Construction	Operation	Decommissioning
Direct economic benefit (supply chain)	✓	✓	✓
Increased employment	✓	✓	✓
Change in demographics due to immigration	✓	✓	✓
Loss of, disruption to or pressure on local infrastructure	✓	×	✓
Loss of, disruption to or pressure on offshore activities	✓	×	✓
Disturbance (noise, air, visual and traffic) to social infrastructure	✓	✓	✓
Disruption to recreational activities	✓	×	✓
Disruption to the tourism industry	✓	×	✓
Cumulative impacts	✓	✓	✓

4.1.4 Approach to Impact Assessment

996. The Overarching NPS for Energy (EN-1) states that where a project is likely to have an impact on socio-economics at a local or national scale the assessment should consider all relevant impacts.

997. There is no set of recognised standards for the assessment of socio-economic impacts. In light of this, the socio-economic assessment will present a qualitative assessment of the anticipated impacts and benefits, their extent and when they are expected to occur.

998. Economic impacts will be dependent on a range of factors which will be considered in the EIA where possible, such as:

- the technologies and infrastructure to be deployed onshore and offshore;
- construction, operation and maintenance and decommissioning methodologies;
- procurement/contracting strategy;
- availability and capacity of the supply chain;
- number of workers;
- where the workers come from; and
- the duration of employment.

999. The absolute scale of economic impacts, both beneficial (e.g. the number of jobs which construction, operation and maintenance, and decommissioning activity is expected to support) and adverse (e.g. disruption to activities) would be calculated based on a worst case scenario, using an approach consistent with methods for economic impact assessment set out in HM Treasury Green Book (2020). The socio-economic impact magnitude will be determined by consideration of the predicted deviation from baseline conditions.

4.2 Climate Change

1000. Climate change was included as a required topic as part of the EIA Directive 2014/52/EU, which was implemented into UK regulations in May 2017. The climate change chapter will include consideration of the effect of the Projects on climate change (net change in GHG emissions), and the impact of climate change on the Projects (vulnerability of infrastructure and assets).

1001. The climate change assessment will therefore comprise two separate assessments, an assessment which quantifies the GHG emissions released from activities associated with the Projects. This will also determine the 'net' effect of the provision of renewable energy to the UK grid. In addition, a climate resilience assessment of the infrastructure on the projected effects of climate change will be carried out.

The following questions are posed to consultees to help them frame and focus their response to the climate change scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Do you agree with the approach to data collection?
- Have all the potential climate change impacts resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

4.2.1 Existing Environment

4.2.1.1 GHG Emissions

1002. The onshore study area could be situated within a number of different local authorities, including:

- Hawthorn Pit – predominately County Durham (small areas of the onshore search area cover Sunderland District Council and Hartlepool Borough Council);
- Creyke Beck – East Riding of Yorkshire Council; and
- South of Humber – East Lindsey District Council and North East Lindsey Council.

1003. Existing GHG emissions for UK local authorities are available from BEIS (BEIS, 2021a). GHG emissions within the identified local authority regions currently arise from a number of different sectors, but are likely to be dominated by road transport, industrial installations and domestic sources such as electricity and gas consumption.

1004. The Climate Change Act 2008 provides a framework for the UK to meet its long-term goals of reducing GHG emissions to 'net-zero' (i.e., at least a 100% reduction) by 2050 ('climate mitigation'). This target was introduced by the Climate Change Act 2008 (2050 Target Amendment) Order 2019, which amended the previous 2050 GHG target of an 80% reduction compared to 1990 levels.

1005. The Climate Change Act 2008 was enacted as part of the UK's responsibility and obligations as a signatory of the Kyoto Protocol 1997 (which did not become binding until 2005). The UK target covers the six main GHGs referenced in the Kyoto Protocol.

1006. The Climate Change Act 2008 requires the Government to set 'Carbon Budgets' to provide a constraint of GHG emissions in a given time period. The Carbon Budgets are set by the Committee for Climate Change (CCC) and provide a legally binding five year limit for GHG emissions in the UK. The six Carbon Budgets that have been placed into legislation and will run up to 2037 and are identified in **Table 4-2.**

1007. The first Carbon Budget was met and the UK is set to outperform on the second and third budgets. However, current projections suggest that the fourth carbon budget will not be met.

1008. The sixth Carbon Budget was published by the CCC in December 2020, which set out the level of GHG emissions that the UK can release from 2033 to 2037 (CCC, 2020a). It was the first Carbon Budget to set out the path to the net-zero carbon emissions target.

Table 4-2 UK Carbon Budgets

Budget	Carbon Budget Level ($MtCO_2e$)	Reduction Below 1990 Levels
1st Carbon Budget (2008 to 2012)	3,018	25%
2nd Carbon Budget (2013 to 2017)	2,782	31%
3rd Carbon Budget (2018 to 2022)	2,544	37% by 2020
4th Carbon Budget (2023 to 2027)	1,950	51% by 2025
5th Carbon Budget (2028 to 2032)	1,725	57% by 2030
6th Carbon Budget (2033 to 2037)	965	78% by 2035

1009. Emissions from the energy sector have already decreased by 68% since 1990, the majority of which have happened in the last decade as a result of a move away from coal towards gas and low-carbon generation (CCC, 2020b). The sector was responsible for 65 $MtCO_2$ in 2018, 15% of the UK's emissions (CCC, 2020b).

1010. Offshore wind is considered to be able to meet a substantial share of future energy demand, and be an integral component for reaching close to zero GHG emissions for the sector in 2050 (CCC, 2020b).

4.2.1.2 Existing Climate

1011. The east coast of England currently experiences a 'maritime' climate which is typical of the UK. As the Projects will be situated off the eastern coast of the UK, the study areas are situated in a 'rain shadow' and therefore will have a drier climate than the UK average.

4.2.2 Approach to Data Collection

1012. The following information has been considered during the production of this Scoping Report and will be considered further within the PEIR/ES where relevant matters are scoped in to the EIA process.

1013. Activity data, including forecast construction and operational emissions data, will be used for the GHG assessment. Emission factors will be obtained from suitable sources, such as BEIS (2021b) and the Inventory of Carbon and Energy (ICE, 2019).

1014. The climate change resilience assessment will be informed by future climate projection data from the UK Climate Projection (UKCP18) database (Met Office, 2018). No surveys are proposed to inform the assessment of impacts related to climate change.

4.2.3 Potential Impacts

1015. As detailed above the Climate Change chapter will comprise two separate sub-assessments. Firstly, a GHG assessment will be carried out to determine the impact of the Projects to climate change. In addition, a climate resilience assessment will be undertaken to consider the potential impacts of climate change to the Projects.

4.2.3.1 Potential impacts during construction

1016. Net emissions arising from the Projects will be assessed across its full lifespan, encompassing construction (including fabrication), operation and decommissioning where information is available. It is expected that the Projects will result in a net positive impact on the UK's attempts to meet the targets set out in the 2008 Climate Change Act and the Sixth Carbon Budget (CCC, 2020a), however this will need to be demonstrated through the GHG assessment.

1017. As the construction phase is anticipated to occur within the next 10 years, the impact of effects arising from climate change on construction activities to the Projects is considered to be unlikely and is scoped out of the assessment.

4.2.3.2 Potential impacts during operation

1018. As noted above, operational activities associated with the Projects will be considered as part of a GHG assessment. The assessment will quantify emissions generated by operational activities and account for the emissions saving from the provision of renewable electricity to the electricity transmission network.

1019. Operational infrastructure associated with the Projects could be vulnerable to the projected effects of climate change, in particular in relation to flood risk and coastal erosion.

4.2.3.3 Potential impacts during decommissioning

1020. As noted above, decommissioning will be considered as part of the GHG assessment. To do this, information for likely emission sources during decommissioning of the Projects will be obtained from relevant literature.

4.2.3.4 Potential cumulative impacts

1021. Potential cumulative impacts on climate resilience may arise from other projects which have the potential to exacerbate the vulnerability of the Projects to the effects of climate change, for example other projects giving rise to increased flood risk or coastal erosion. These cumulative effects will be considered in the relevant EIA topic (for example Flood Risk and Hydrology) and summarised within the Climate Change chapter.

1022. As the Projects will be responsible for GHG emissions associated with its activities only, a cumulative assessment with other projects has been scoped out of this aspect of the assessment. This approach is in line with IEMA guidance ‘Assessing Greenhouse Gas Emissions and Evaluating their Significance’ (IEMA, 2017).

4.2.3.5 Potential transboundary impacts

1023. The effects of climate change are by definition transboundary, in that they are felt not in proximity to the sources of emission, and that all releases of GHG’s contribute to climate change. However, to proportionately frame the assessment, the GHG assessment will contextualise emissions from the Projects using the UK’s most recent Carbon Budget (CCC, 2020a). In this sense, the impacts will not be transboundary but national, in the degree to which they contribute to the UK climate targets. Transboundary impacts are therefore scoped out of this assessment.

4.2.3.6 Summary of potential impacts

1024. **Table 4-3** outlines the impacts which are proposed to be scoped into the EIA.

Table 4-3 Summary of Impacts Relating to Climate Change. Topics to be Scoped In (✓) and Out (x)

Potential Impact	Construction	Operation	Decommissioning
Net contribution to the UK's climate targets	✓	✓	✓
Vulnerability of infrastructure to climate change	✗	✓	✗

4.2.4 Approach to Impact Assessment

4.2.4.1 GHG Assessment

1025. The GHG emissions assessment will be carried out in accordance with the Greenhouse Gas Protocol (WBCSD and WRI, 2015), an international standard for corporate reporting. GHG emissions arising from activities associated with the construction, operation and decommissioning of the Projects will be quantified. In addition, the 'net' effect of the Projects will be determined, which will consider the effect of the provision of renewable energy onto the UK electricity grid against the Projects lifetime emissions.

1026. Significance criteria for the assessment will be utilised from IEMA guidance 'Assessing Greenhouse Gas Emissions and Evaluating their Significance' (IEMA, 2017).

4.2.4.2 Climate Resilience Assessment

1027. The climate resilience assessment will use sector-specific guidance and literature to determine the likely climate hazards, based on the UKCP18 climate database, that could affect the operation of the Projects. The climate resilience assessment will use the output of other work streams, such as the FRA, to provide an assessment of the vulnerability of the Projects' infrastructure to climate change.

1028. The methodology for the assessment will be informed by IEMA guidance, Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation (IEMA, 2020).

4.3 Major Accidents and Disasters

1029. Following guidance published by IEMA on Major Accidents and Disasters in EIA (IEMA, 2020), it is proposed that consideration of major accidents and disasters within the EIA process for the Projects is based on assessments conducted within individual technical chapters where this can be adequately covered by the scope of these chapters.

1030. Following a review of the potential major accidents and disasters which may interact with, or arise from the Projects, the following have been identified:

- coastal erosion and flood risk (considered within the 'Marine Physical Processes', 'Flood Risk and Hydrology' and 'Climate Change' EIA chapters);
- accidental spills of hazardous material (considered within the 'Marine Sediment and Water Quality', and 'Human Health' EIA chapters);
- vessel collision (considered within the 'Shipping and Navigation' EIA chapter); and
- exposed cables leading to vessel snagging (considered within the 'Shipping and Navigation' chapter and 'Commercial Fisheries' EIA chapters).

1031. As the impacts of these accidents / disasters are being considered individually within technical EIA chapters presentation of a separate Major Accidents and Disasters chapter is not considered to add to the EIA and such a chapter will not be included in the assessment.

5 CONCLUSIONS

1032. Sections 2, 3 and 4 of this Scoping Report identify potential impacts based upon an understanding of the environmental conditions likely to be encountered within the relevant study areas, utilising publicly available data sources. Due to the size of the study areas currently being considered the majority of potential impacts are scoped in for further assessment as part of the EIA process. Where potential impacts have been scoped out, justification has been provided within the relevant subsections of this report. Table 5-1 lists the impacts which have been completely (i.e. during construction, operation and decommissioning) scoped out from any further assessment.

Table 5-1 Impacts Scoped Out From Further Assessment

Topic	Potential Impact	Construction	Operation	Decommissioning
Marine Sediment and Water Quality	Pollution events resulting from the accidental release of pollutants.	×	×	×
Offshore Air Quality	All impacts	×	×	×
Offshore Airborne Noise	All impacts	×	×	×
Benthic and Intertidal Ecology	Pollution events resulting from the accidental release of pollutants.	×	×	×
Fish and Shellfish Ecology	Direct damage (e.g. crushing) and disturbance to fish and shellfish species during construction.	×	×	×
	Pollution events resulting from the accidental release of pollutants.	×	×	×
Marine Mammals	Barrier Effects from the Physical Presence of the Wind Farm	×	×	×
	Effects from EMFs	×	×	×

Topic	Potential Impact	Construction	Operation	Decommissioning
Offshore Ornithology	Indirect impacts through effects on prey species and habitats: Accidental pollution (will be mitigated via Environmental Management and Monitoring Plan).	×	×	×
	Indirect impacts through effects on prey species and habitats: Accidental pollution (will be mitigated via Environmental Management and Monitoring Plan).	×	×	×
Commercial Fisheries	Increased steaming times due to the presence of installation vessels / the Projects' infrastructure	×	×	×
Infrastructure and Other Users	Cumulative impacts	×	×	×
	Transboundary impacts	×	×	×
Seascape, Landscape and Visual Impacts	All impacts	×	×	×
Traffic and Transport	Hazardous loads	×	×	×
Major Accidents and Disasters	All impacts	×	×	×

1033. Consultees are invited to consider all of the information provided in this Scoping Report and provide comments on the proposed approach and in particular whether they agree with the conclusions. Topic specific questions for consultees are provided at the beginning of each technical section which have been designed to encourage reflection on the key elements of each technical topic in this Scoping Report.

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