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Moray Offshore Renewables Ltd

- KEY**
- Regional study area
 - Wind farm study area
 - Offshore Transmission Infrastructure study area
 - ICES rectangle
 - MacColl Windfarm
 - Stevenson Windfarm
 - Telford Windfarm
 - Offshore Export Cable Route
 - MORL Zone Boundary
 - SAC rivers

Horizontal Scale: 1:800,000 A3 Chart

0 20,000 40,000 Meters

Geodetic Parameters: WGS84 UTM Zone 30N

Produced: JW
 Reviewed: PJM
 Approved: PH

Date: 16/03/2012 Revision: A
 REF: 8460001-PPW0201-BAM-MAP-001

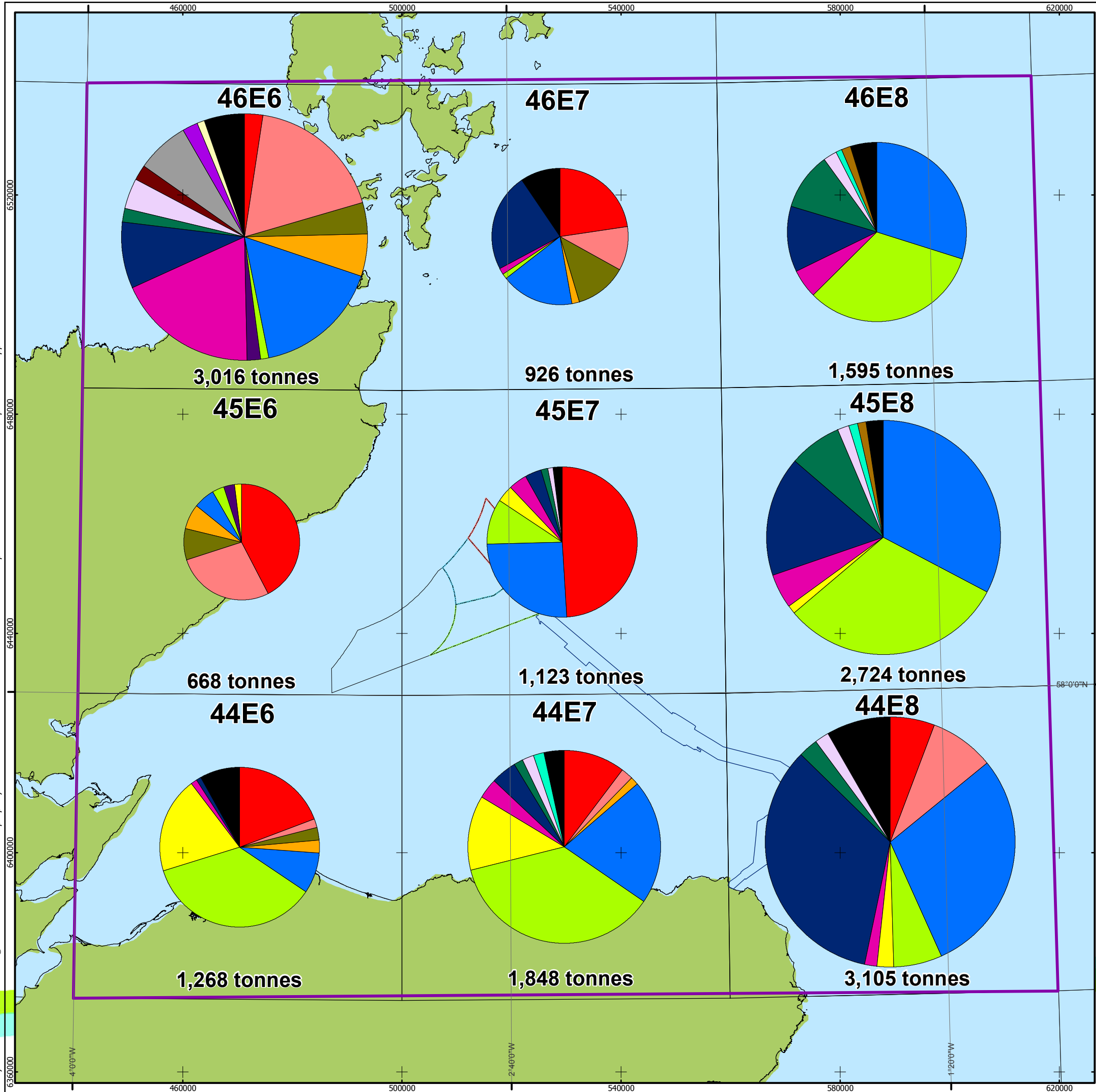
Fig 4.3-1 Study areas

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KEY

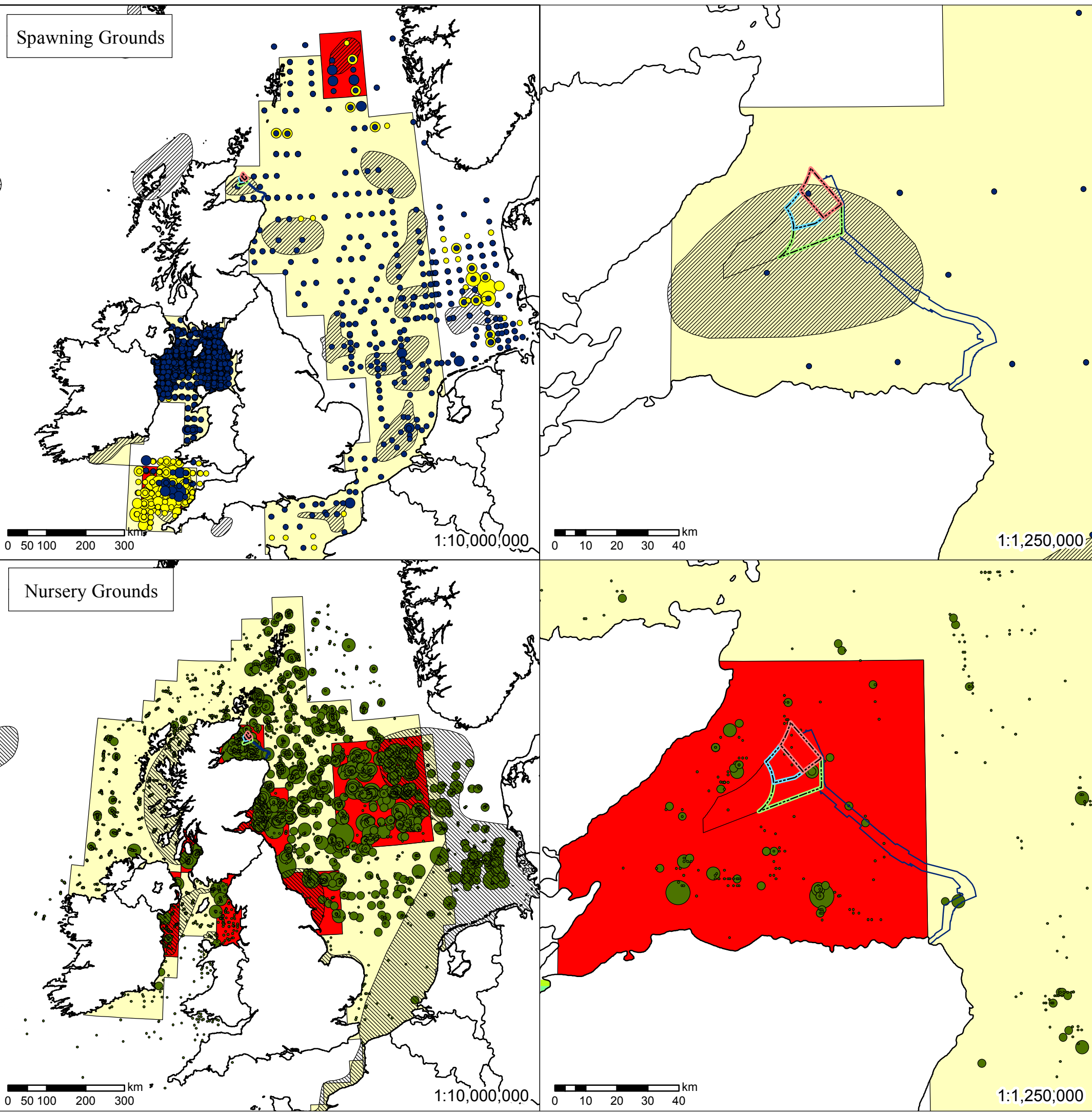
Regional study area	Lobsters
Telford Windfarm	Squid
Stevenson Windfarm	Monks or anglers
MacColl Windfarm	Herring
Offshore Transmission Infrastructure	Whiting
Western Development Zone	Cod
ICES rectangle	Green crab
Live weights (tonnes) by species	Megrim
17	Queen scallops
Scallops	Plaice
Edible crabs	Saithe
Whelks	Ling
Velvet crabs	Witch
Haddock	Periwinkles
Nephrops	Other

Horizontal Scale: 1:700,000
 A3 Chart

Geodetic Parameters: WGS84 UTM Zone 30N
 Produced: JW
 Reviewed: PJM
 Approved: PH
 Date: 16/03/2012
 Revision: A
 REF: 8460001-PPW0201-BAM-MAP-002

Fig 4.3-2 Relative live weight (tonnes) by species in the regional study area (average 2000-2009)

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KEY

- Telford Windfarm
- Stevenson Windfarm
- MacColl Windfarm
- MORL Zone Boundary
- Offshore Export Cable Route
- Spawning grounds (Coull et al., 1998)
- Spawning grounds (Ellis et al., 2010)
- High intensity
- Low intensity

Cod eggs

- > 0 - 10
- 11 - 30
- 31 - 68
- 69 - 186
- 187 - 377

Cod larvae

- > 0 - 5
- 6 - 17
- 18 - 47
- 48 - 100
- 101 - 159

- > 0 - 167
- 168 - 492
- 493 - 1,150
- 1,151 - 3,290
- 3,291 - 7,778

Nursery grounds

- High intensity
- Low intensity

A3 Chart
N

Geodetic Parameters: WGS84 UTM Zone 30N

Produced: JW
Reviewed: PJM
Approved: PH

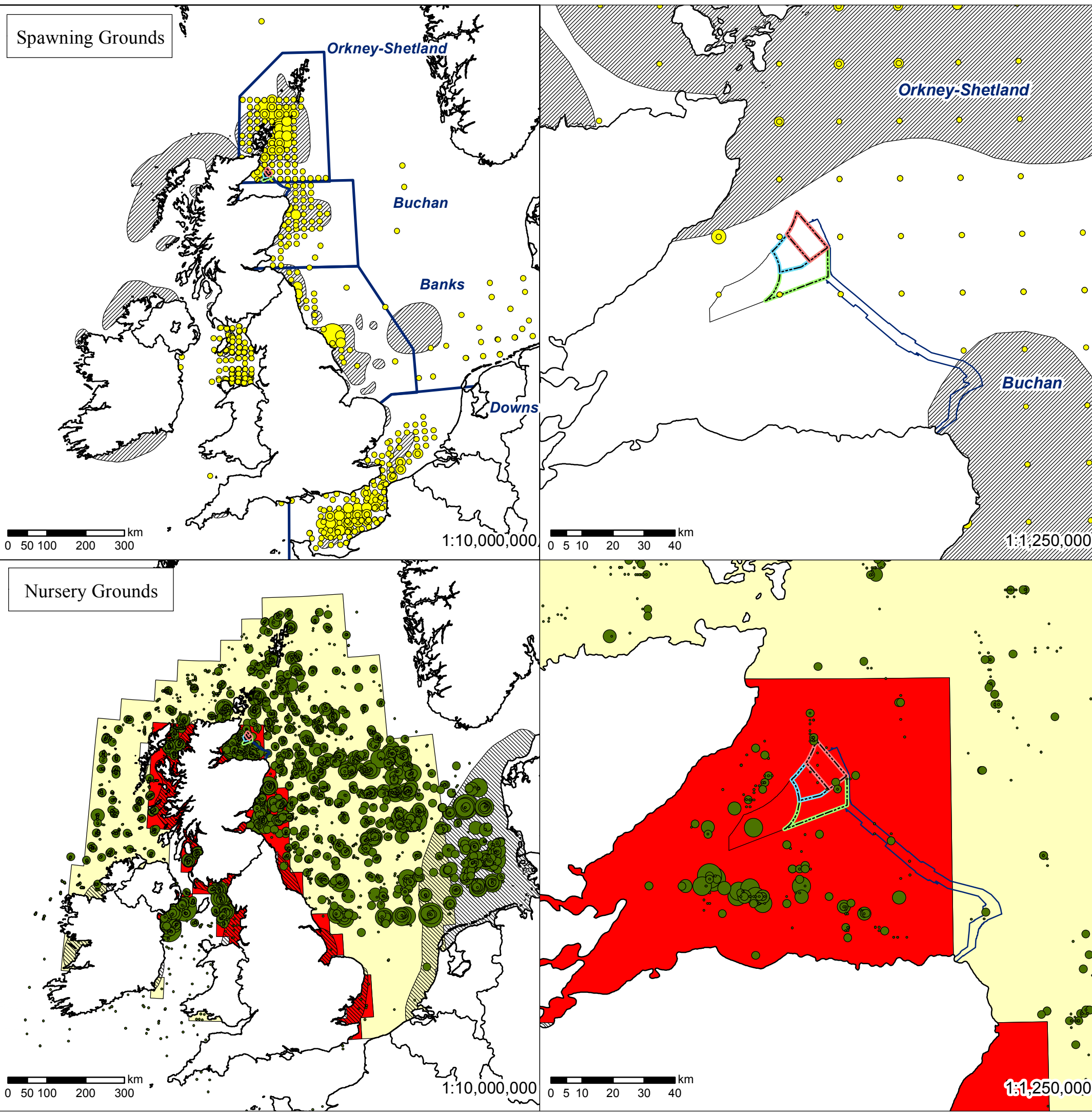
Date: 16/03/2012 Revision: A

REF: 8460001-PPW0201-BAM-MAP-003

Fig 4.3-3 Spawning and nursery grounds of cod (modified from Ellis et al, 2010), giving the original polygons provided in Coull et al (1998)

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Moray Offshore Renewables Ltd

KEY

- Telford Windfarm
- Stevenson Windfarm
- MacColl Windfarm
- MORL Zone Boundary
- Offshore Export Cable Route
- Boundary of North Sea herring sub-stocks
- Spawning grounds (Coull et al., 1998)

Herring larvae

- > 0 - 254
- 255 - 1,140
- 1,141 - 3,458
- 3,459 - 8,351
- 8,352 - 26,913

Nursery grounds (Coull et al., 1998)

Nursery grounds (Ellis et al., 2010)

- High intensity
- Low intensity

Maximum juvenile catch rate

- >0 - 17,916
- 17,917 - 66,105
- 66,106 - 176,310
- 176,311 - 418,093
- 418,094 - 986,520

A3 Chart

Geodetic Parameters: WGS84 UTM Zone 30N

Produced: JW
Reviewed: PJM
Approved: PH

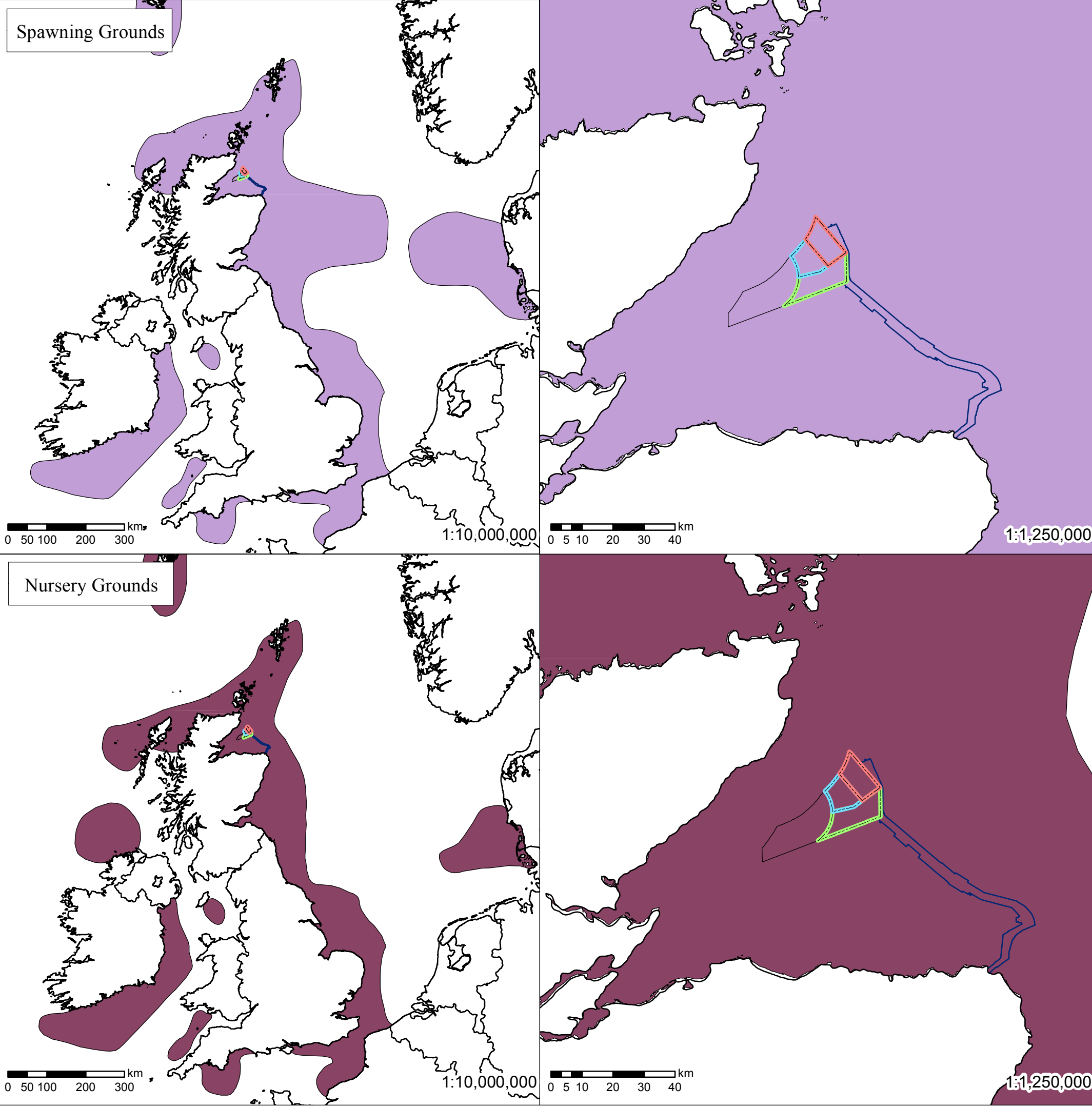
Date: 16/03/2012 Revision: A

REF: 8460001-PPW0201-BAM-MAP-004

Fig 4.3-4 Spawning and nursery grounds of herring (modified from Ellis et al, 2010), giving the original polygons provided in Coull et al (1998)








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KEY

-  Telford Windfarm
-  Stevenson Windfarm
-  MacColl Windfarm
-  MORL Zone Boundary
-  Offshore Export Cable Route
-  Lemon sole spawning grounds (Coull et al., 1998)
-  Lemon sole nursery grounds (Coull et al., 1998)



Geodetic Parameters: WGS84 UTM Zone 30N

Produced: JW
 Reviewed: PJM
 Approved: PH

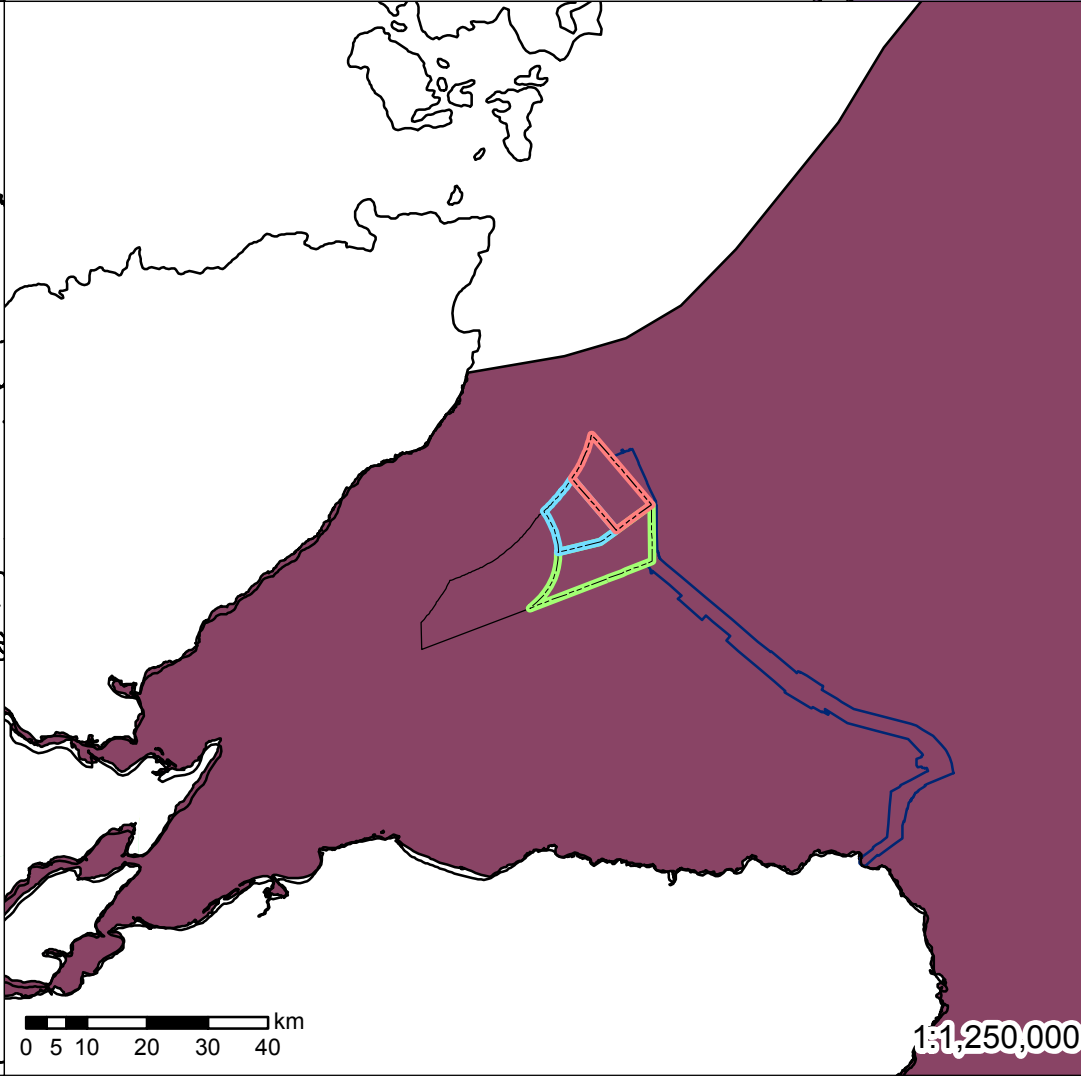
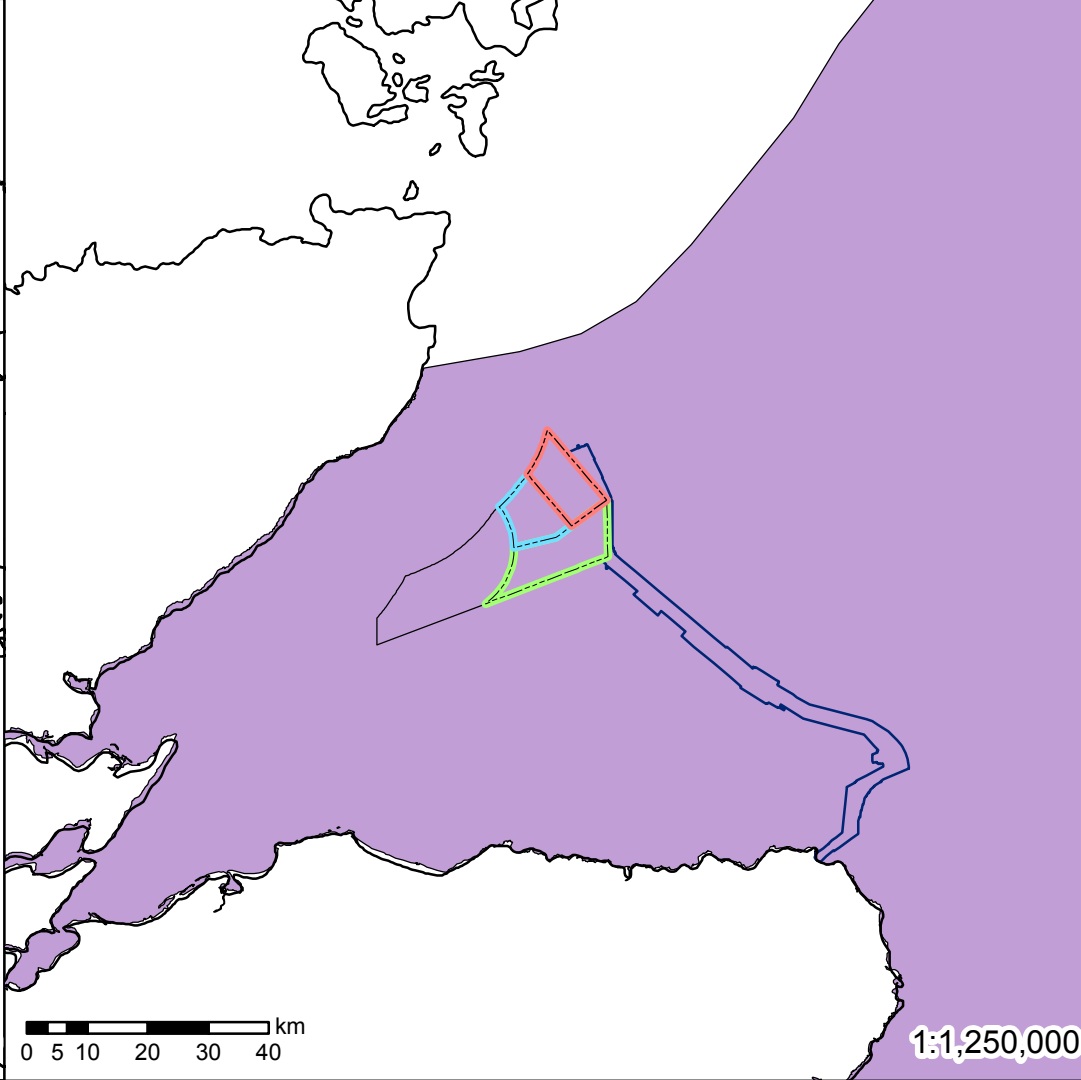
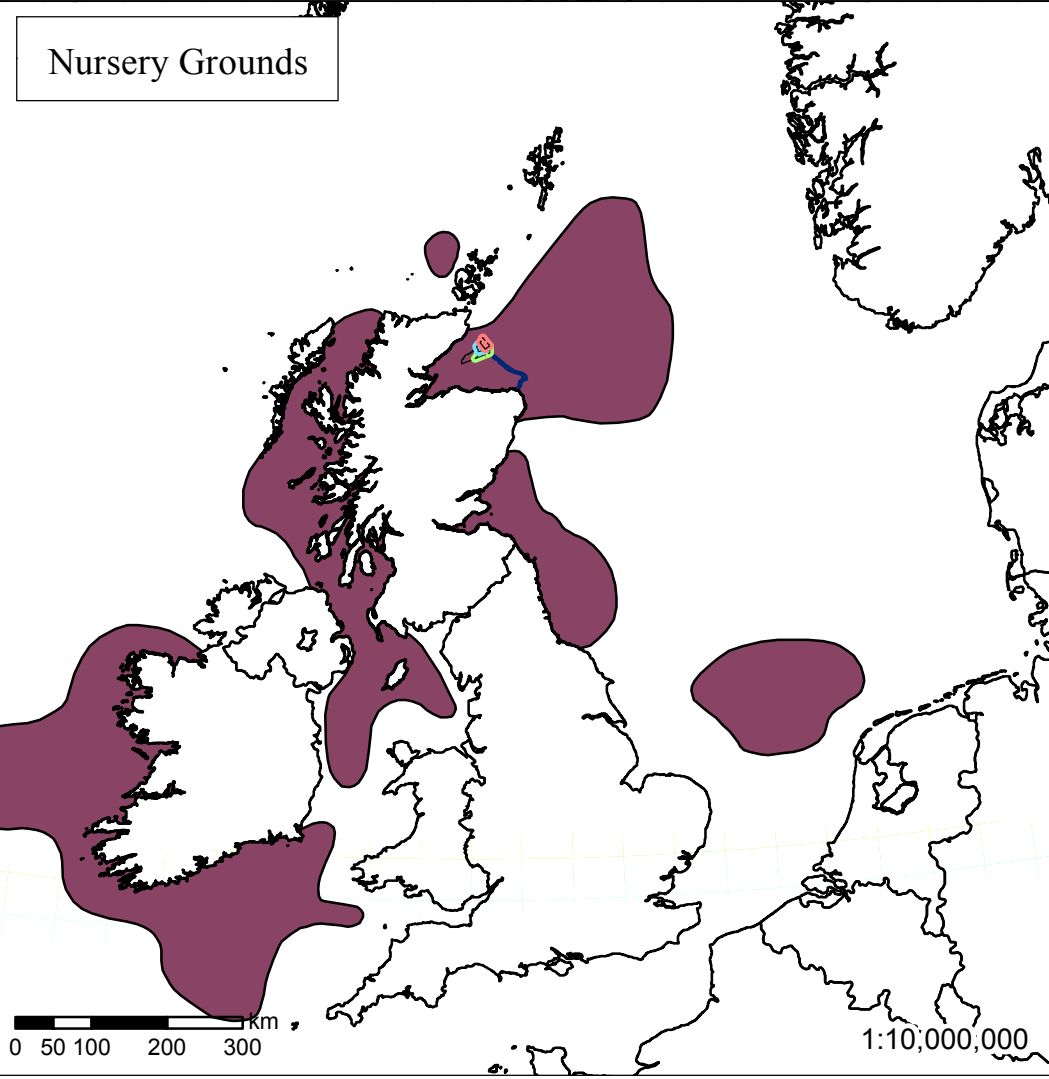
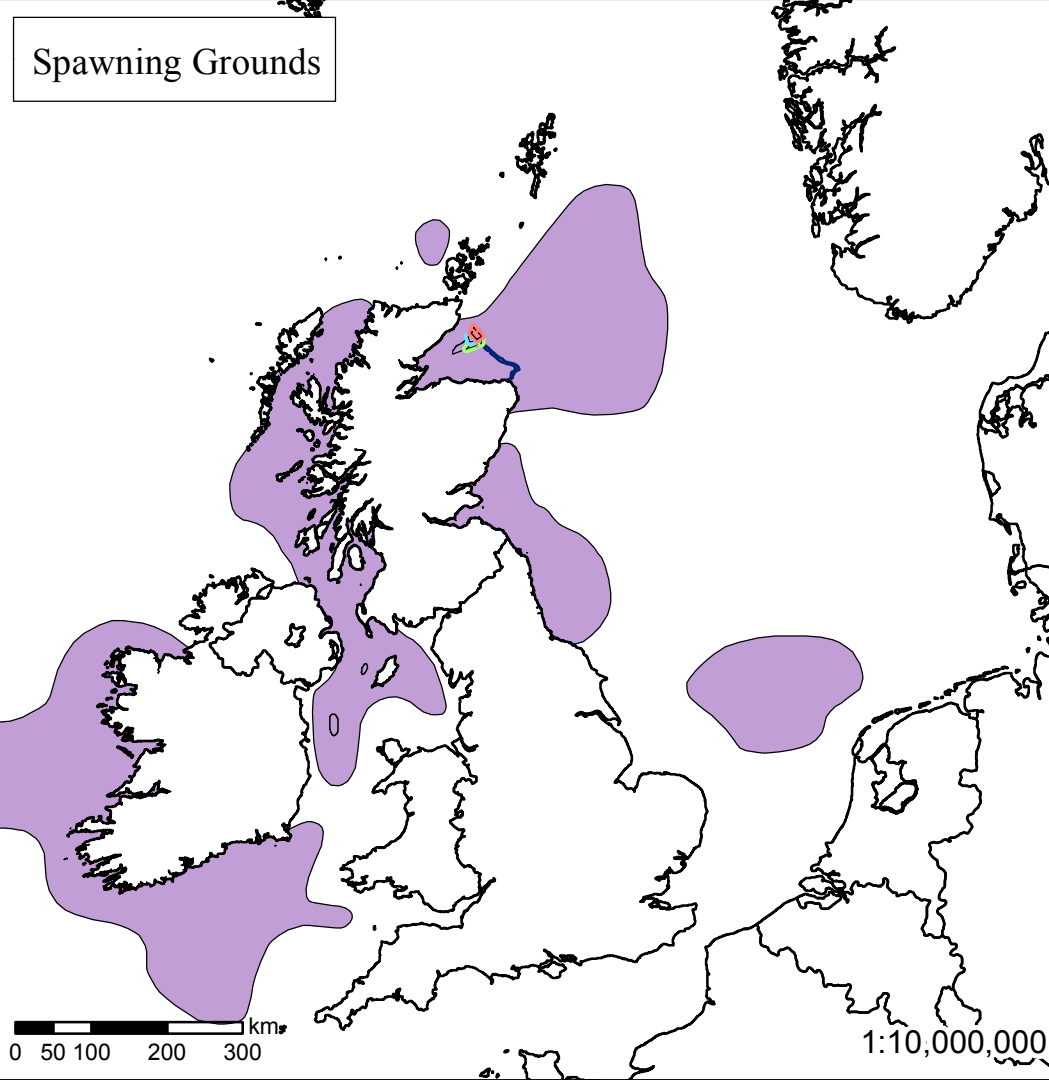
Date: 16/03/2012 Revision: A

REF: 8460001-PPW0201-BAM-MAP-005

Fig 4.3-5 Spawning and nursery grounds of lemon sole (modified from Coull et al, 1998)

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Moray Offshore Renewables Ltd

KEY

- Telford Windfarm
- Stevenson Windfarm
- MacColl Windfarm
- MORL Zone Boundary
- Offshore Export Cable Route
- Nephrops spawning grounds (Coull et al., 1998)
- Nephrops nursery grounds (Coull et al., 1998)

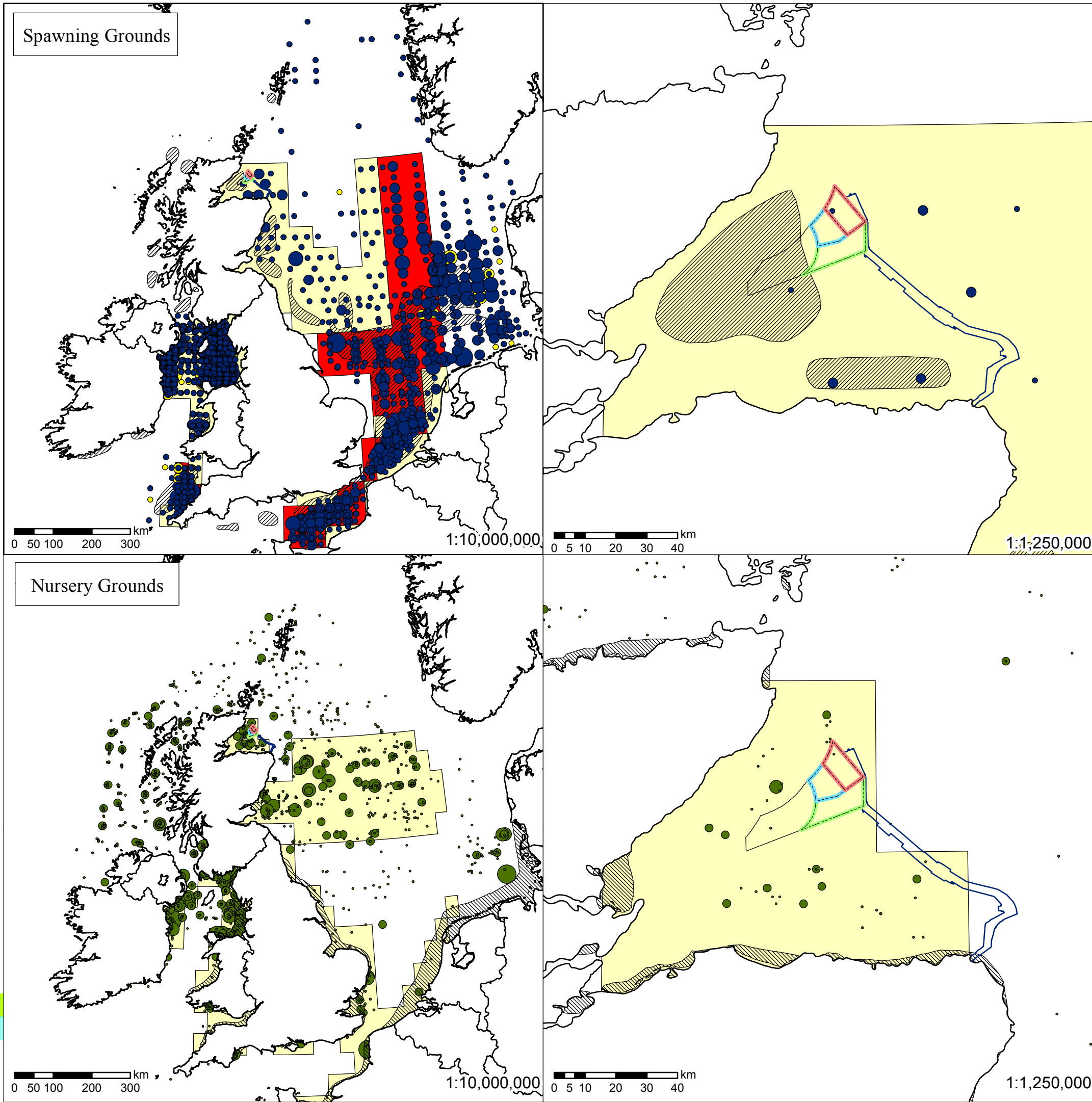


Geodetic Parameters: WGS84 UTM Zone 30N	
Produced: JW Reviewed: PJM Approved: PH	
Date: 16/03/2012	Revision: A
REF: 8460001-PPW0201-BAM-MAP-006	

Fig 4.3-6 Spawning and nursery grounds of Nephrops (modified from Coull et al., 1998)

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KEY

- Telford Windfarm
- Stevenson Windfarm
- MacColl Windfarm
- MORL Zone Boundary
- Offshore Export Cable Route
- Spawning grounds (Coull et al., 1998)
- Spawning grounds (Ellis et al., 2010)
- High intensity
- Low intensity
- Plaice eggs
- > 0 - 10
- 11 - 29
- 30 - 62
- 63 - 127
- 128 - 281
- 29 - 112
- 113 - 432
- 433 - 1,166
- 1,167 - 3,532
- Plaice larvae
- > 0 - 3
- 4 - 11
- 12 - 25
- 26 - 54
- 55 - 97
- Nursery grounds (Coull et al., 1998)
- Nursery grounds (Ellis et al., 2010)
- Low intensity
- Maximum juvenile catch rate
- >0 - 28
- 29 - 112
- 113 - 432
- 433 - 1,166
- 1,167 - 3,532

A3 Chart
N
▲

Geodetic Parameters: WGS84 UTM Zone 30N

Produced: JW
Reviewed: PJM
Approved: PH

Date: 16/03/2012

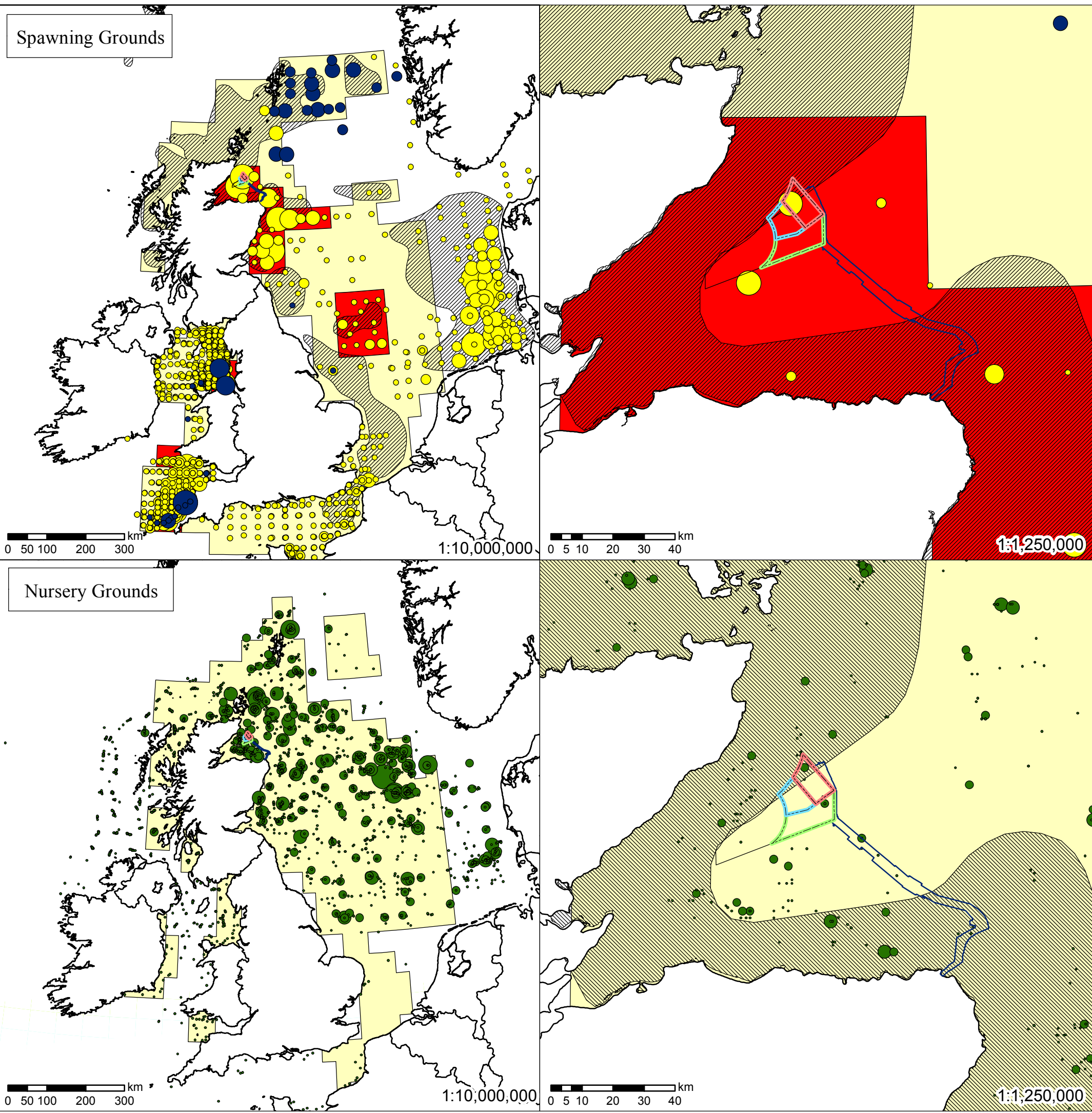
Revision: A

REF: 8460001-PPW0201-BAM-MAP-007

Fig 4.3-7 Spawning and nursery grounds of plaice (modified from Ellis et al, 2010), giving the original polygons provided in Coull et al (1998)

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KEY

- Telford Windfarm
- Stevenson Windfarm
- MacColl Windfarm
- MORL Zone Boundary
- Offshore Export Cable Route
- Spawning grounds (Coull et al., 1998)
- Spawning grounds (Ellis et al., 2010) High intensity
- Spawning grounds (Ellis et al., 2010) Low intensity
- Sandeel eggs Nursery grounds (Coull et al., 1998)
- Sandeel eggs > 0 - 1
- Sandeel eggs 2
- Sandeel eggs 3 - 7
- Sandeel eggs 8 - 15
- Sandeel eggs 16 - 60
- Sandeel eggs 61 - 230
- Sandeel eggs 231 - 937
- Sandeel eggs 938 - 3,160
- Sandeel eggs 3,161 - 10,621
- Sandeel eggs 10,622 - 20,224
- Sandeel larvae > 0 - 21
- Sandeel larvae 22 - 70
- Sandeel larvae 71 - 167
- Sandeel larvae 168 - 418
- Sandeel larvae 419 - 1,912
- Sandeel larvae 1,913 - 20,224

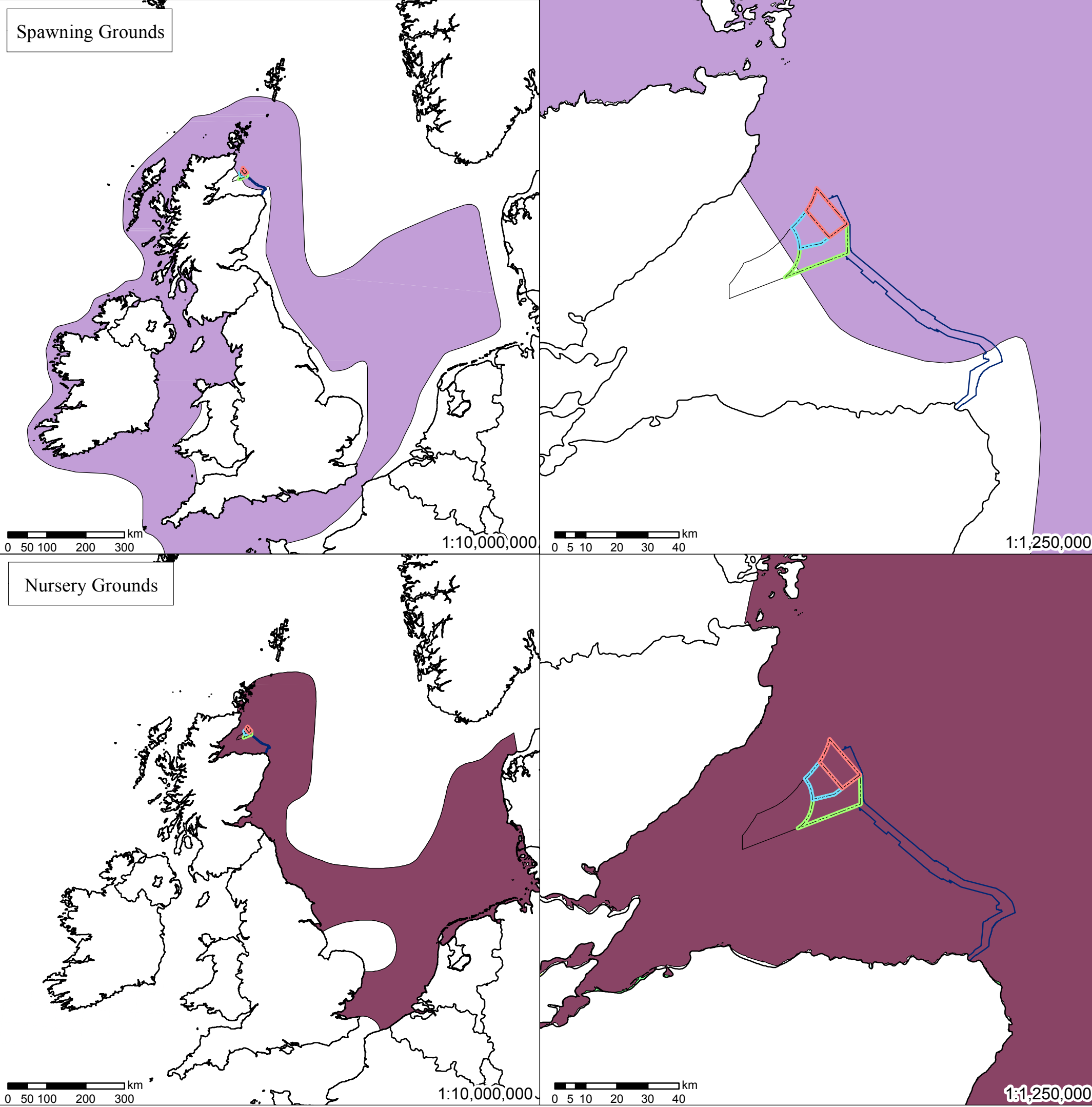
A3 Chart
N
▲

Geodetic Parameters: WGS84 UTM Zone 30N
 Produced: JW
 Reviewed: PJM
 Approved: PH
 Date: 16/03/2012
 Revision: A
 REF: 8460001-PPW0201-BAM-MAP-008

Fig 4.3-8 Spawning and nursery grounds of sandeel (modified from Ellis et al, 2010), giving the original polygons provided in Coull et al (1998)

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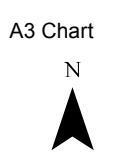
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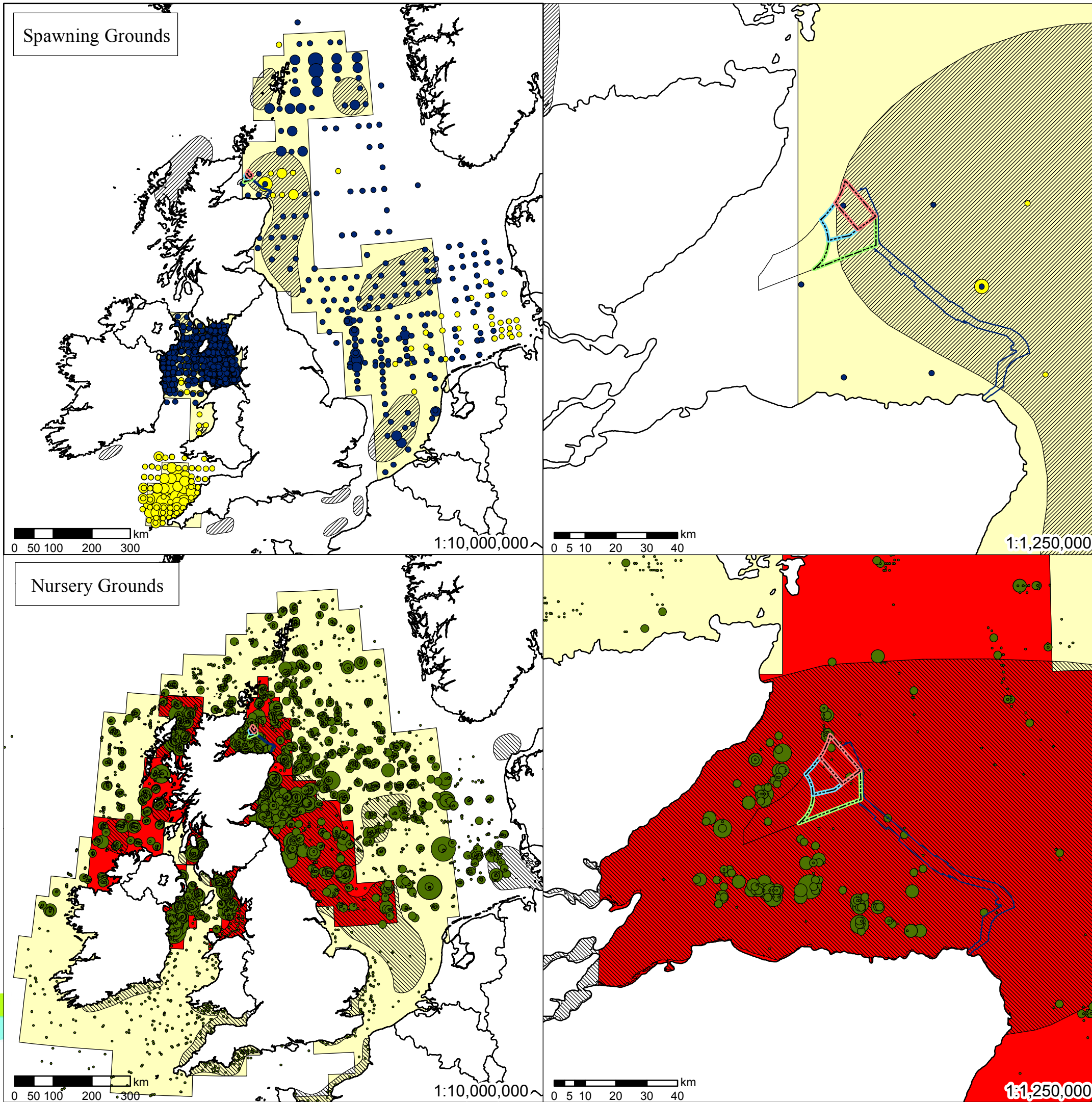
- Telford Windfarm
- Stevenson Windfarm
- MacColl Windfarm
- MORL Zone Boundary
- Offshore Export Cable Route
- Sprat spawning grounds (Coull et al., 1998)
- Sprat nursery grounds (Coull et al., 1998)



Geodetic Parameters: WGS84 UTM Zone 30N	
Produced: JW Reviewed: PJM Approved: PH	
Date: 16/03/2012	Revision: A
REF: 8460001-PPW0200-BAM-MAP-009	

Fig 4.3-9 Spawning and nursery grounds of sprat
(Modified from Coull et al (1998))

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KEY

- Telford Windfarm
- Stevenson Windfarm
- MacColl Windfarm
- MORL Zone Boundary
- Offshore Export Cable Route
- Spawning grounds (Coull et al., 1998)
- Spawning grounds (Ellis et al., 2010)
- Low intensity
- High intensity
- Low intensity
- Whiting nursery grounds
- Nursery grounds (Ellis et al., 2010)
- > 0 - 8
- 9 - 27
- 28 - 58
- 59 - 180
- 181 - 450
- > 0 - 25,810
- 25,811 - 79,874
- 79,875 - 195,442
- 195,443 - 428,918
- 428,919 - 849,494
- > 0 - 21
- 22 - 80
- 81 - 194
- 195 - 397
- 398 - 674

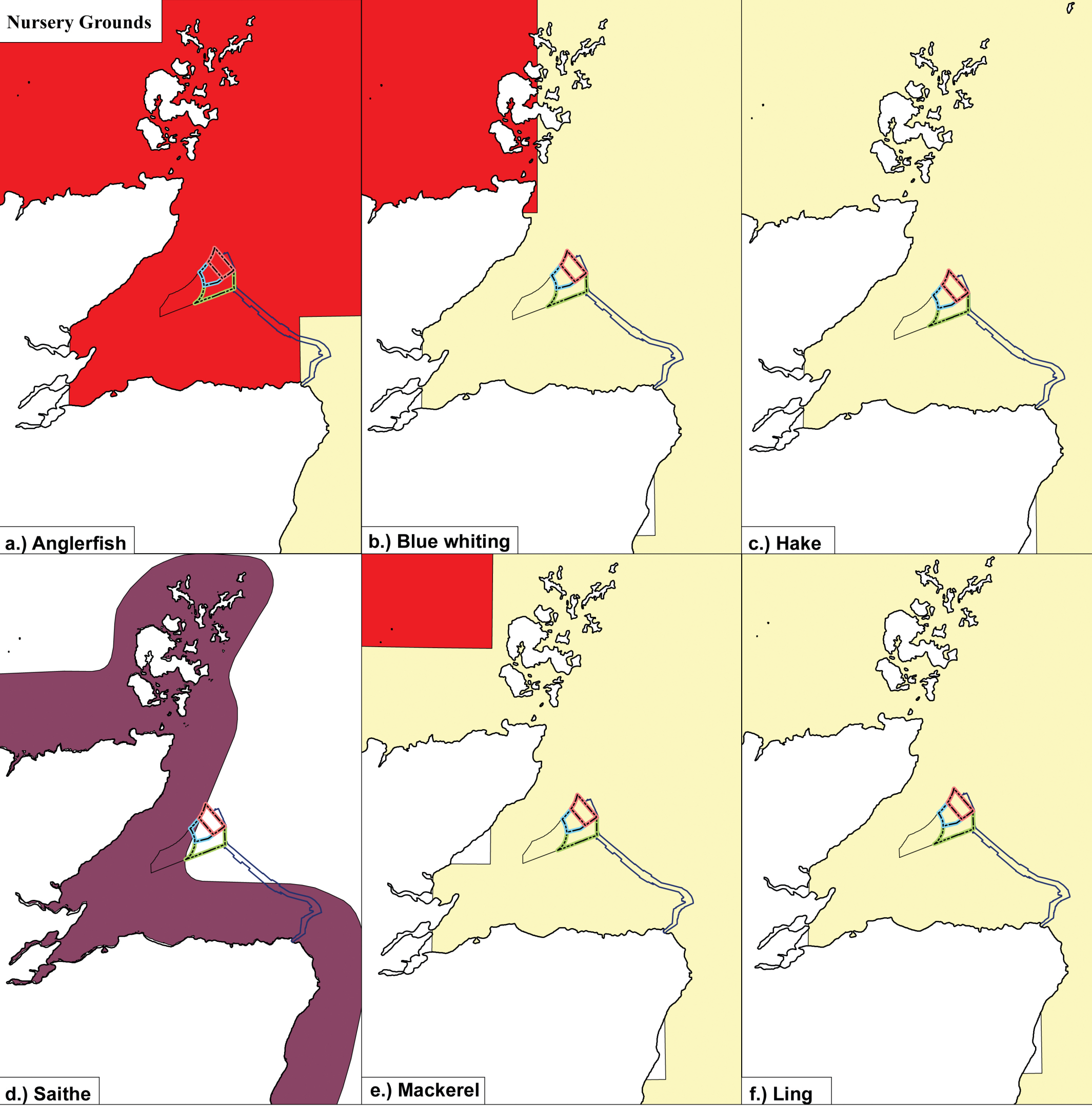


Geodetic Parameters: WGS84 UTM Zone 30N
 Produced: JW
 Reviewed: PJM
 Approved: PH
 Date: 16/03/2012
 Revision: A
 REF: 8460001-PPW0201-BAM-MAP-010

Fig 4.3-10 Spawning and nursery grounds of whiting (modified from Ellis et al, 2010), giving the original polygons provided in Coull et al (1998)

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Key

- Telford Windfarm
- Stevenson Windfarm
- MacColl Windfarm
- MORL Zone Boundary
- Offshore Export Cable Route
- Nursery Grounds (Ellis et al., 2010)
 - Low intensity
 - High intensity
 - Saithe nursery grounds (Coull et al., 1998)

Horizontal Scale: 1:2,000,000 A3 Chart
 0 50,000 100,000 Meters

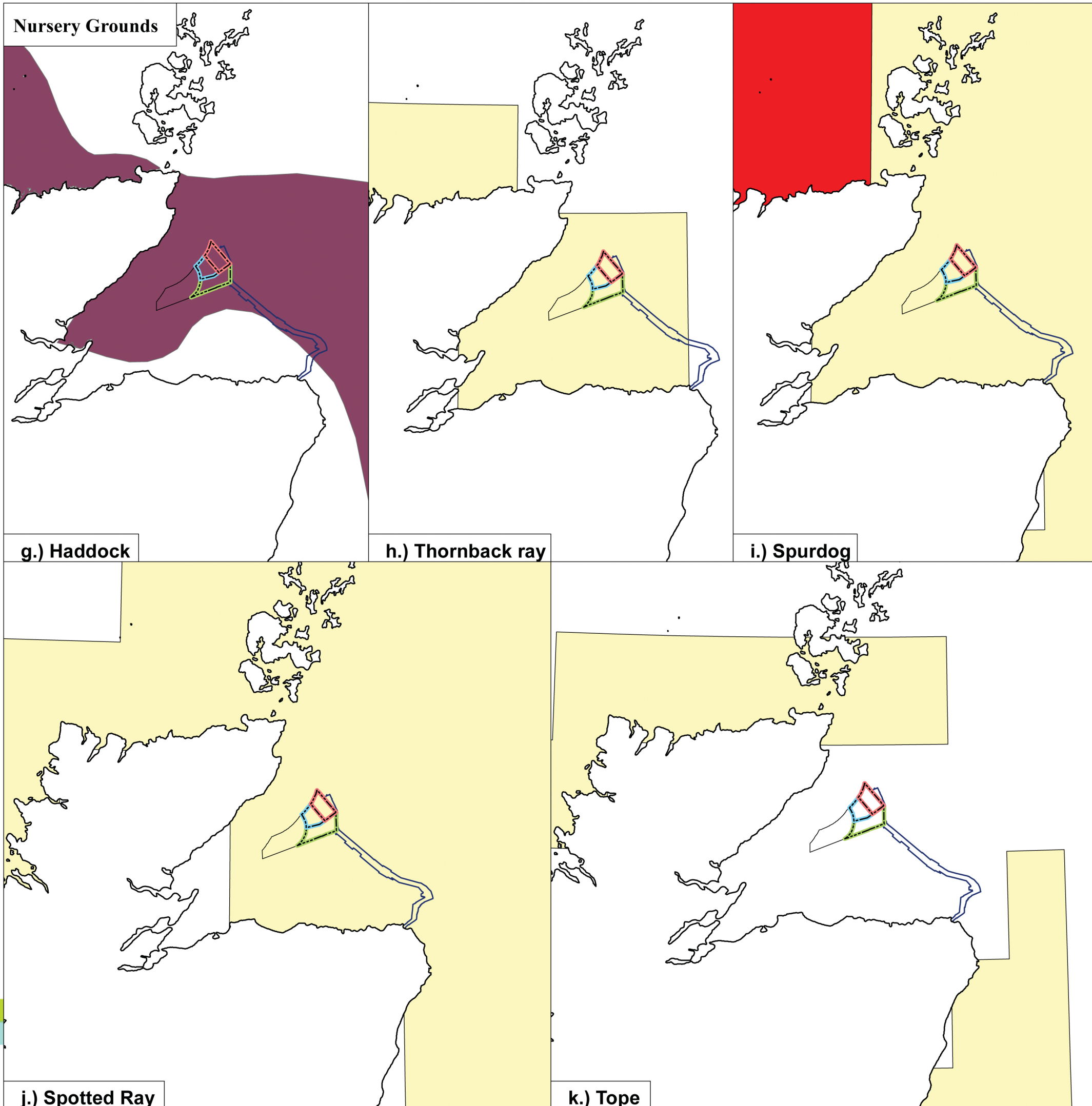


Geodetic Parameters:		WGS84 UTM Zone 30N
Produced: JW		
Reviewed: PJM		
Approved: PH		
16/03/2012	Revision: A	
REF: 8460001-PPW0201-BAM-MAP-011		

Fig 4.3-11 Nursery Grounds of Anglerfish, Blue Whiting, Hake, Saithe, Mackerel and Ling (Modified from Ellis et al 2010 and Coull et al 1998)

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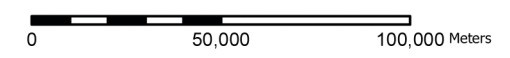


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KEY

- Telford Windfarm
- Stevenson Windfarm
- MacColl Windfarm
- MORL Zone Boundary
- Offshore Export Cable Route
- Nursery grounds (Ellis et al., 2010)
- High intensity
- Low intensity
- Haddock nursery grounds (Coull et al., 1998)

Horizontal Scale: 1:2,000,000 A3 Chart



Geodetic Parameters: WGS84 UTM Zone 30N

Produced: JW
Reviewed: PJM
Approved: PH

Date: 16/03/2012

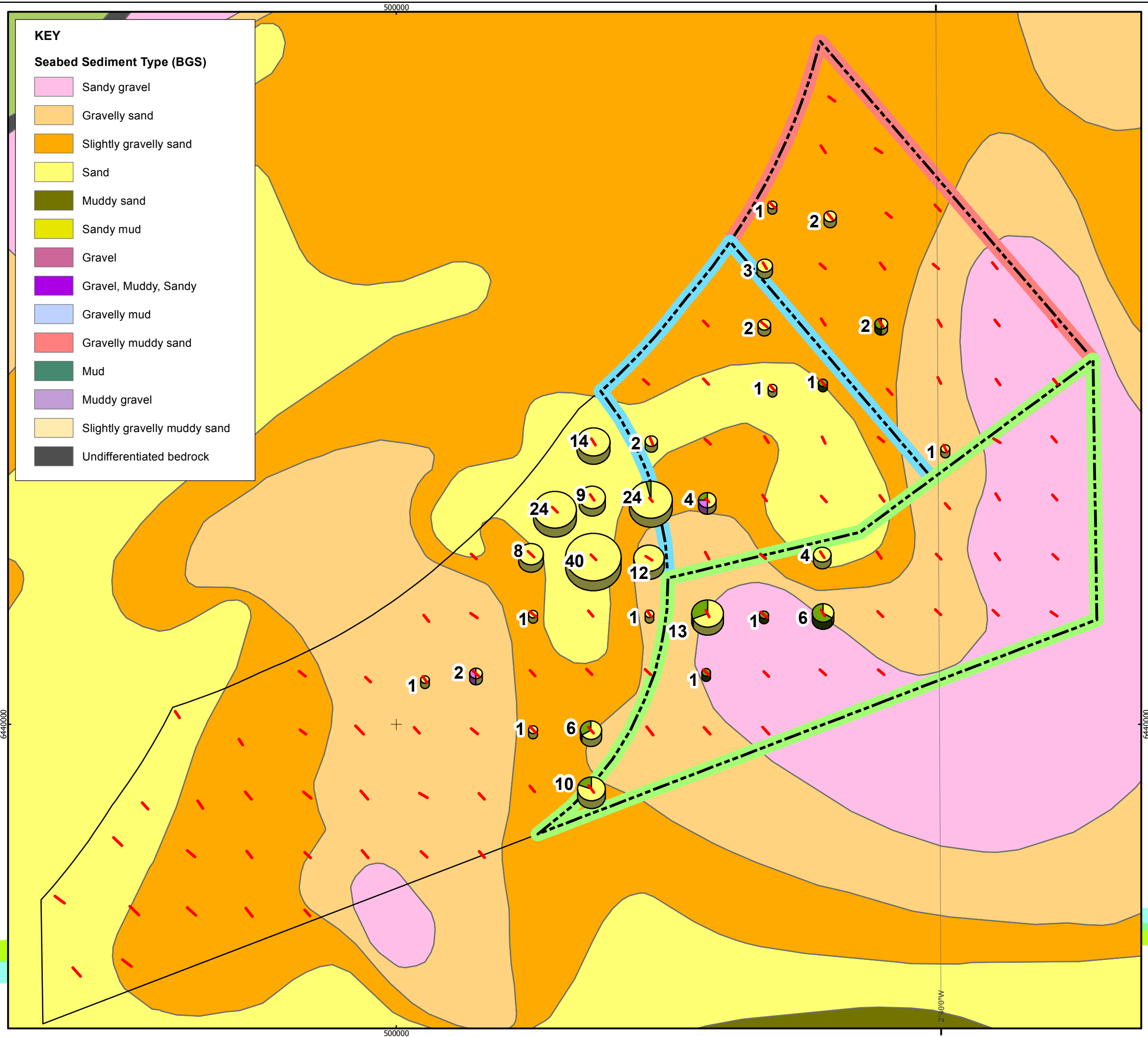
Revision: A

REF: 8460001-PPW0201-BAM-MAP-012

Fig 4.3-12 Nursery Grounds of Haddock, Thornback Ray, Spurdog, Spotted Ray and Tope (Modified from Ellis et al 2010 and Coull et al 1998)

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KEY

Seabed Sediment Type (BGS)

- Sandy gravel
- Gravelly sand
- Slightly gravelly sand
- Sand
- Muddy sand
- Sandy mud
- Gravel
- Gravel, Muddy, Sandy
- Gravelly mud
- Gravelly muddy sand
- Mud
- Muddy gravel
- Slightly gravelly muddy sand
- Undifferentiated bedrock



Moray Offshore Renewables Ltd

KEY

- MacColl Windfarm
- Stevenson Windfarm
- Telford Windfarm
- MORL Zone Boundary
- Offshore Export Cable Route
- Dredge locations

Type of sandeel caught

- Raitt's sandeel
- Raitt's sandeel
- Greater sandeel
- Smooth sandeel

Horizontal Scale: 1:131,769 A3 Chart
N

Geodetic Parameters: WGS84 UTM Zone 30N

Produced: JW
 Reviewed: PJM
 Approved: PH

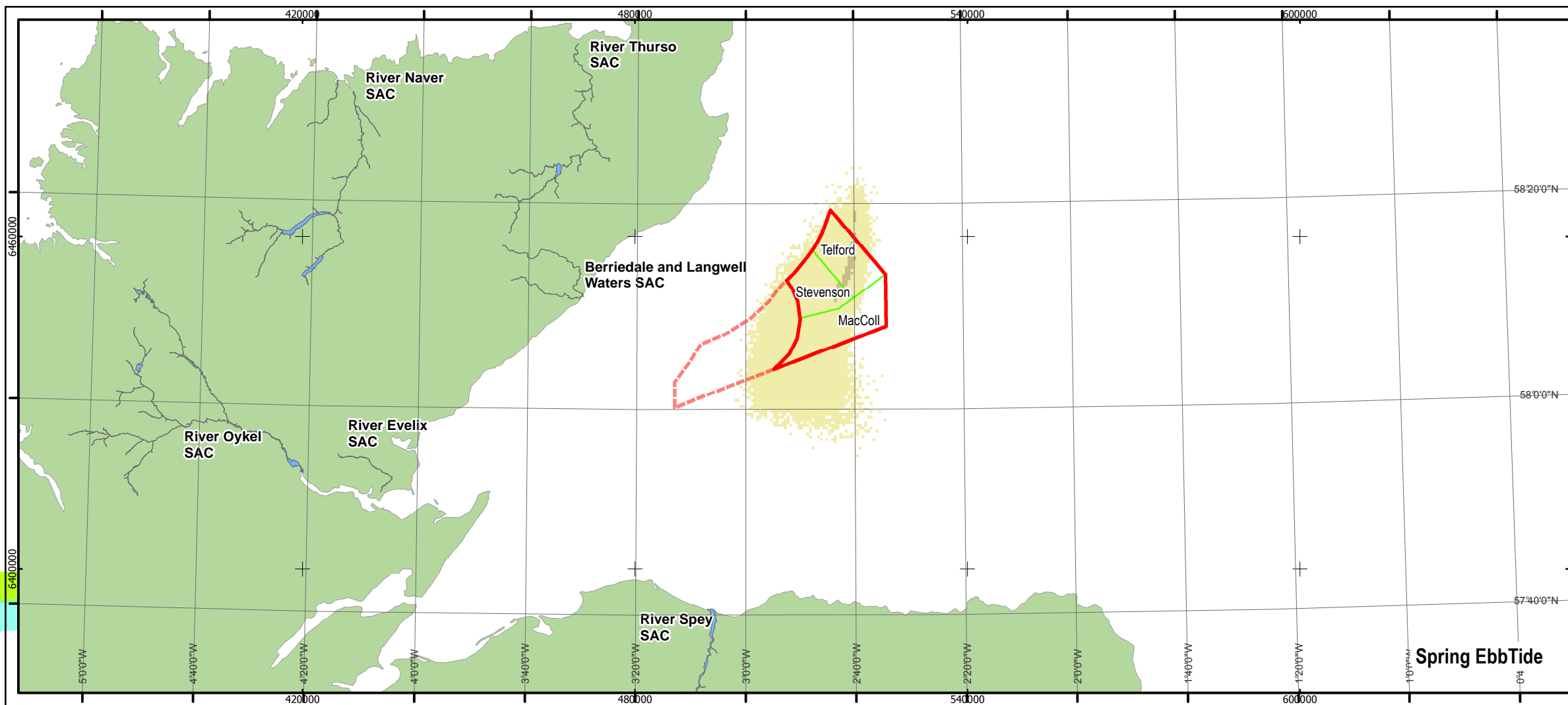
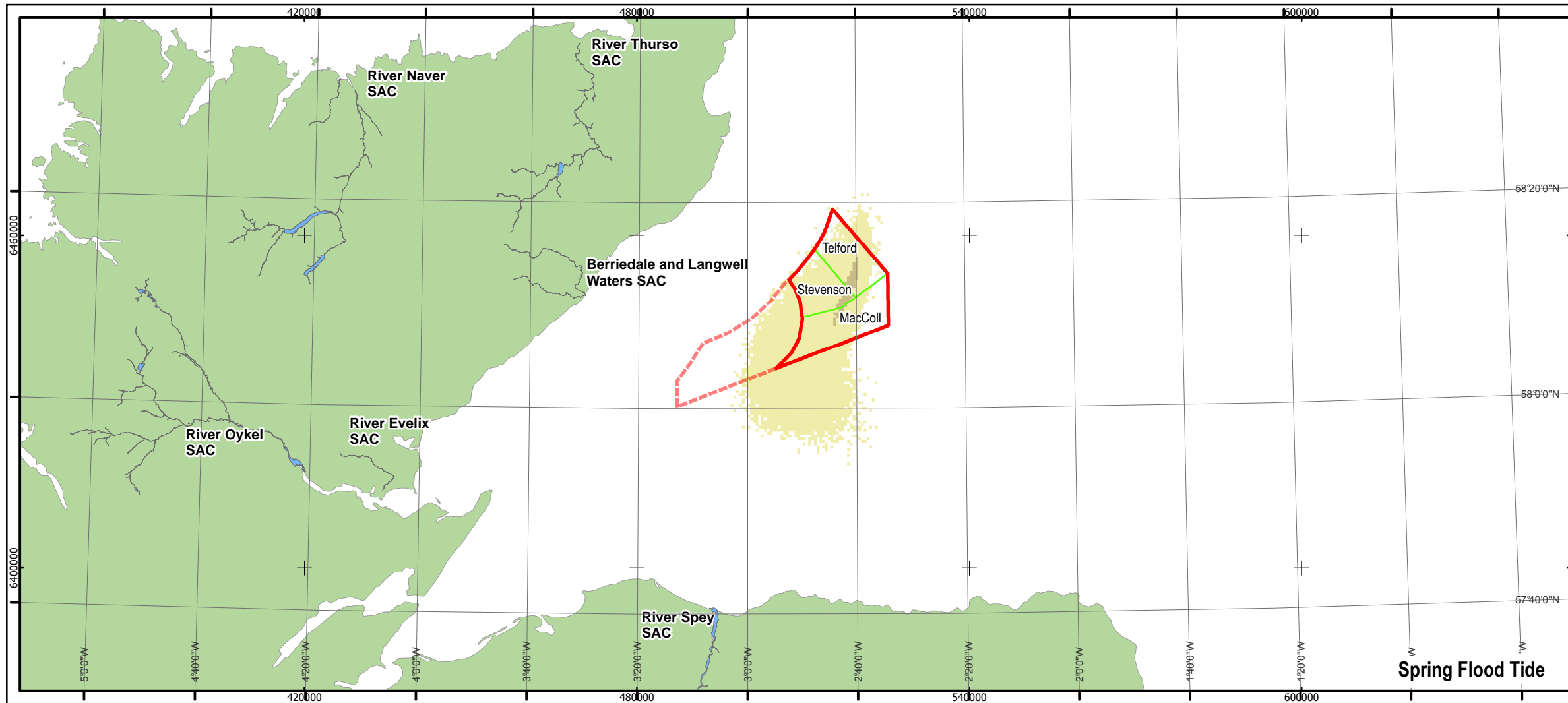
Date: 16/03/2012 Revision: A

REF: 8460001-PPW0201-BAM-MAP-013

Fig 4.3-13 Sandeel dredge survey: Distribution of sandeel abundance and sediment types (BGS)

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Moray Offshore Renewables Ltd

KEY

- Special Areas of Conservation Rivers
- Moray Offshore Windfarm - Eastern Development Area
- Moray Offshore Windfarm - Western Development Area
- Site Boundaries

SSC - mg/L

- < 1
- 1.1 - 2
- 2.1 - 4
- 4.1 - 6
- 6.1 - 8

Horizontal Scale: 1:900,000 A3 Chart

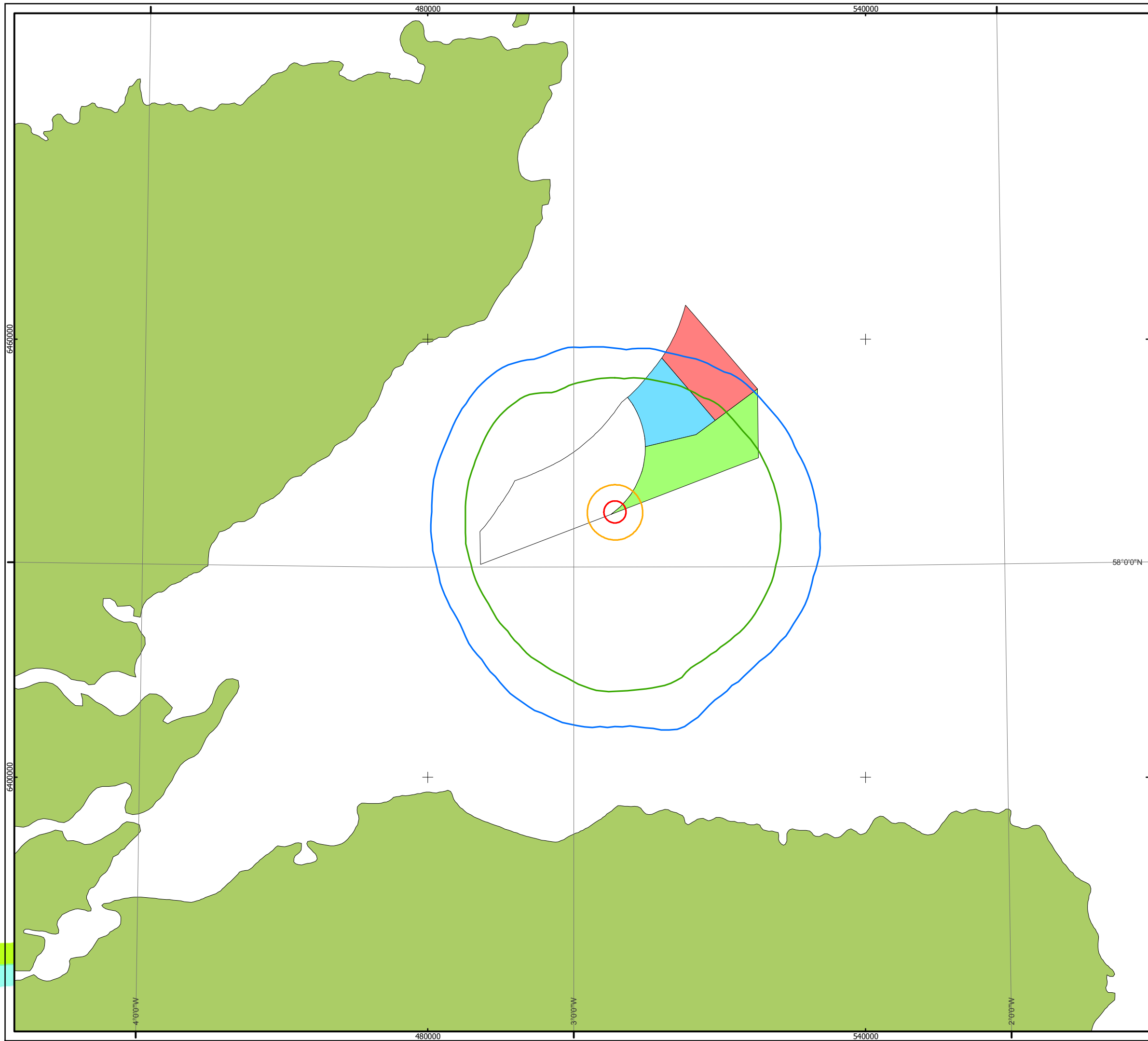
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Produced: MCE
 Reviewed: NMW
 Approved: DOL

Date: 04/05/2012 Revision: B
 REF: 8460001-PPW0200-ABP-MAP-007

Fig 7.2-1 Typical Sediment Plume Resulting from Dredging Overspill (Tenth Foundation in Sequence)

Moray Offshore Renewables Ltd



Moray Offshore Renewables Ltd

KEY

- Telford
- Stevenson
- MacColl
- MORL Western Development Zone
- Modelled 2.5 m pile (location 1)
- 90 dBht (salmon) contour
- 90 dBht (dab) contour
- 90 dBht (cod) contour
- 90 dBht (herring) contour

Horizontal Scale: 1:500,000 A3 Chart

Geodetic Parameters: WGS84 UTM Zone 30N

Produced: JW
 Reviewed: PMG
 Approved:

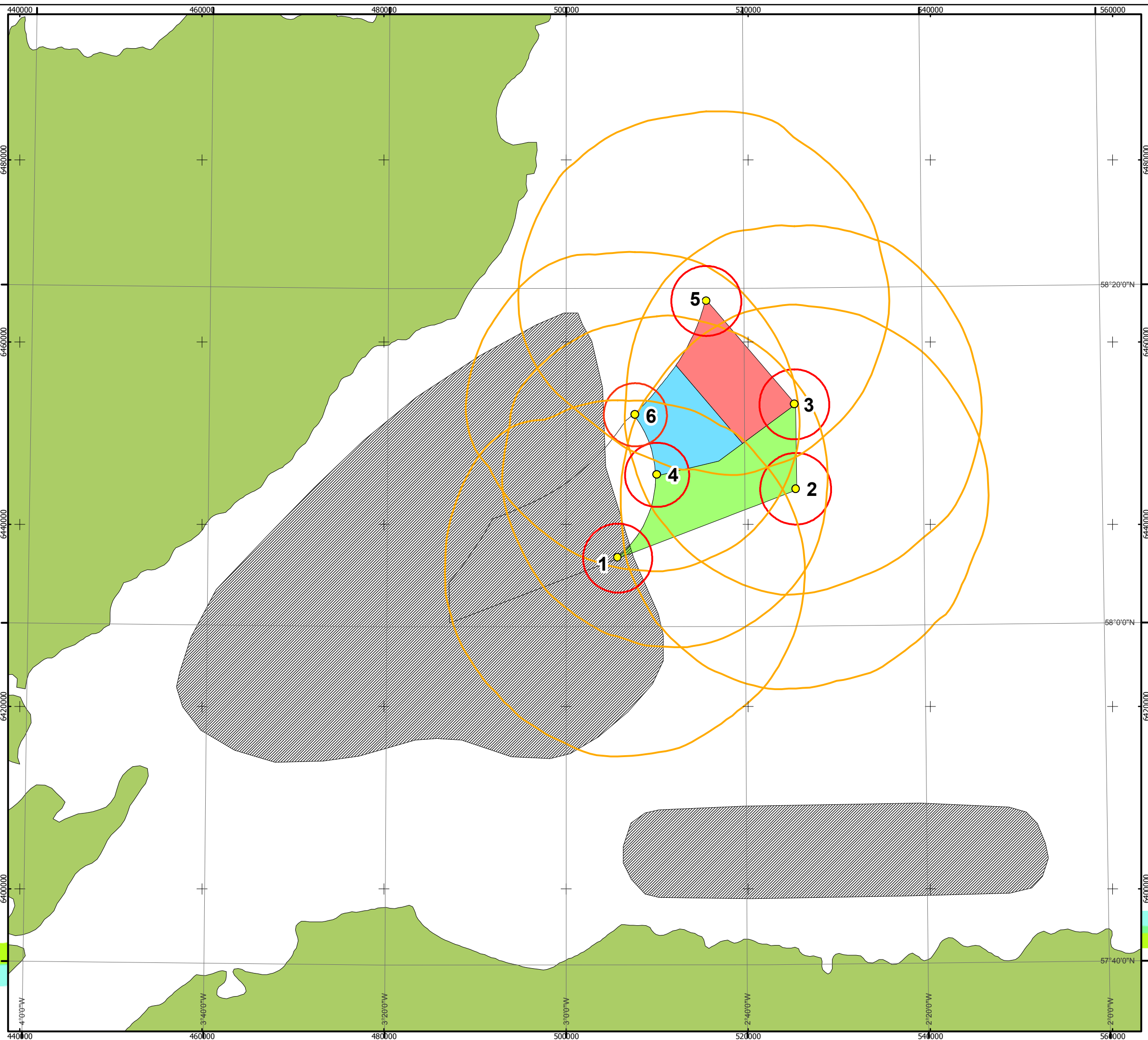
Date: 19/03/2012 Revision: A

REF: 8460001-PPW0200-BAM-MAP-014

Fig 7.2-2 90 dBht (Species) impact ranges for salmon, dab, herring and cod

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- KEY**
- MacColl
 - Stevenson
 - Telford
 - MORL Zone Boundary
 - Modelled 2.5 m piles (location 1 to 6)
 - 90 dBht (dab) contour
 - 75 dBht (dab) contour
 - Spawning grounds (Coull et al, 1998)

Horizontal Scale: 1:400,000 A3 Chart
 0 9,900 19,800 Meters N

Geodetic Parameters: WGS84 UTM Zone 30N

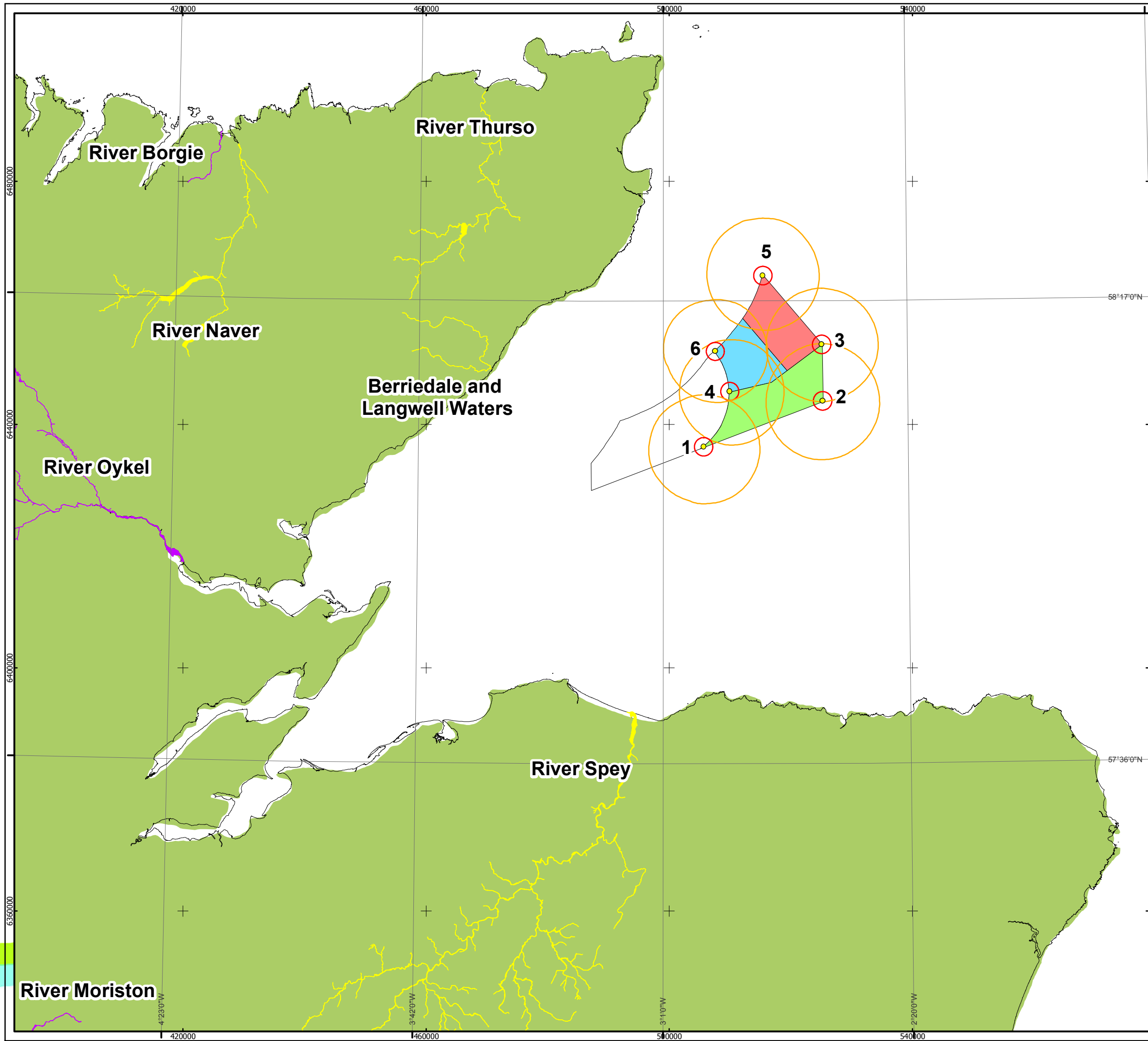
Produced: JW
 Reviewed: PMG
 Approved: PH

Date: 19/03/2012 Revision: A
 REF: 8460001-PPW0200-BAM-MAP-015

Fig 7.2-3 75 dBht and 90 dBht dab impact range with plaice spawning grounds (Coull et al, 1998)

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KEY

- MacColl
- Stevenson
- Telford
- MORL Zone Boundary
- Modelled 2.5 m piles (location 1 to 6)
- 75 dBht (salmon) contour
- 90 dBht (salmon) contour
- Salmon Primary Reason for Selection of SAC
- Salmon Qualifying Feature for Selection of SAC

Horizontal Scale: 1:600,000 A3 Chart

Geodetic Parameters: WGS84 UTM Zone 30N

Produced: JW
 Reviewed: PMG
 Approved: PH

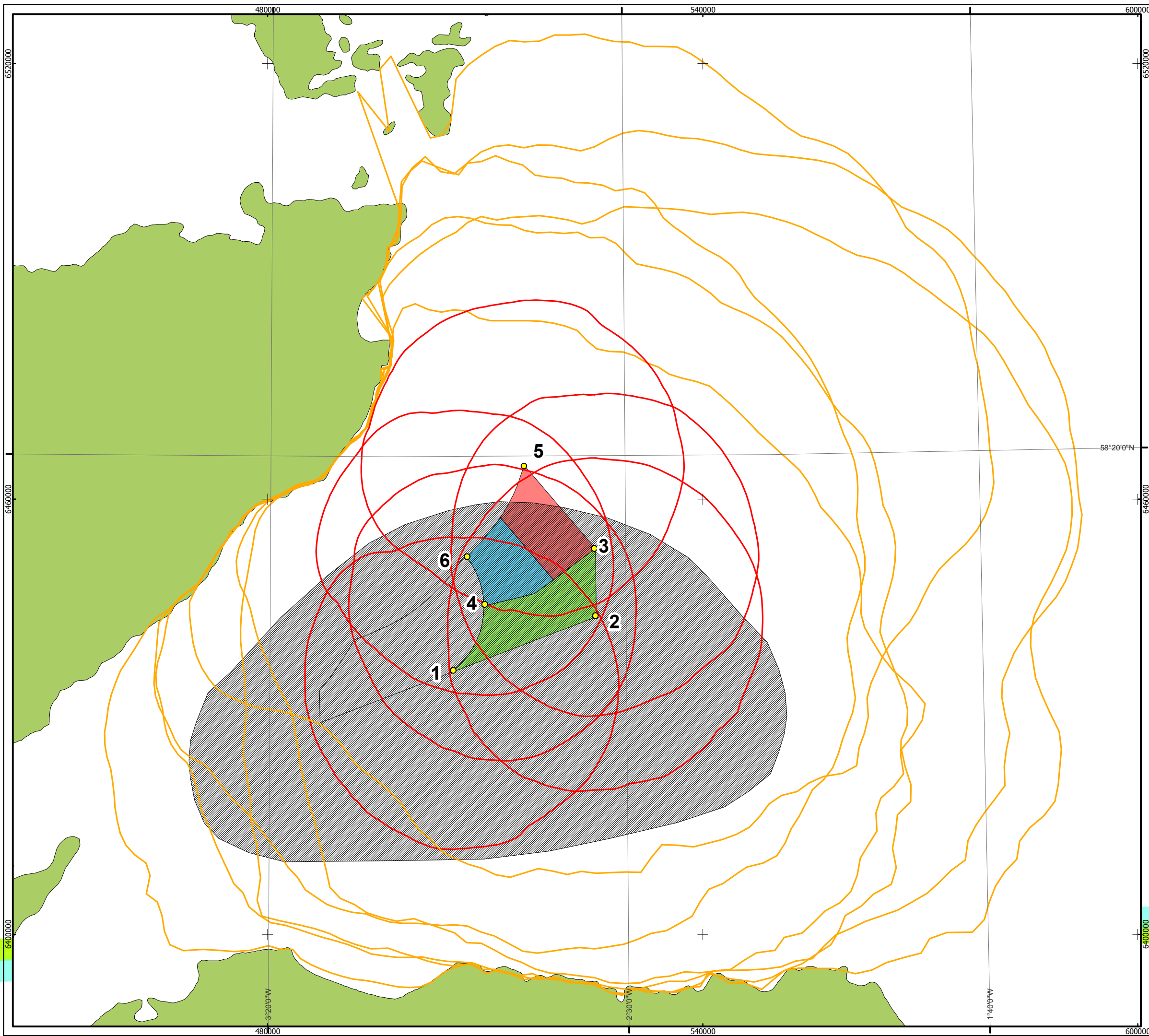
Date: 19/03/2012 Revision: A

REF: 8460001-PPW0200-BAM-MAP-016

**Fig 7.2-4 75 dBht and 90 dBht
 Salmon impact ranges with
 Scottish salmon SACs**









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Moray Offshore Renewables Ltd

KEY

-  MacColl
-  Stevenson
-  Telford
-  MORL Zone Boundary
-  Modelled 2.5m piles (location 1 to 6)
-  75 dBht (cod) contour
-  90 dBht (cod) contour
-  Cod spawning grounds (Coull et al, 1998)

Horizontal Scale: 1:500,000 A3 Chart
 N

Geodetic Parameters: WGS84 UTM Zone 30N

Produced: JW
Reviewed: PMG
Approved: PH

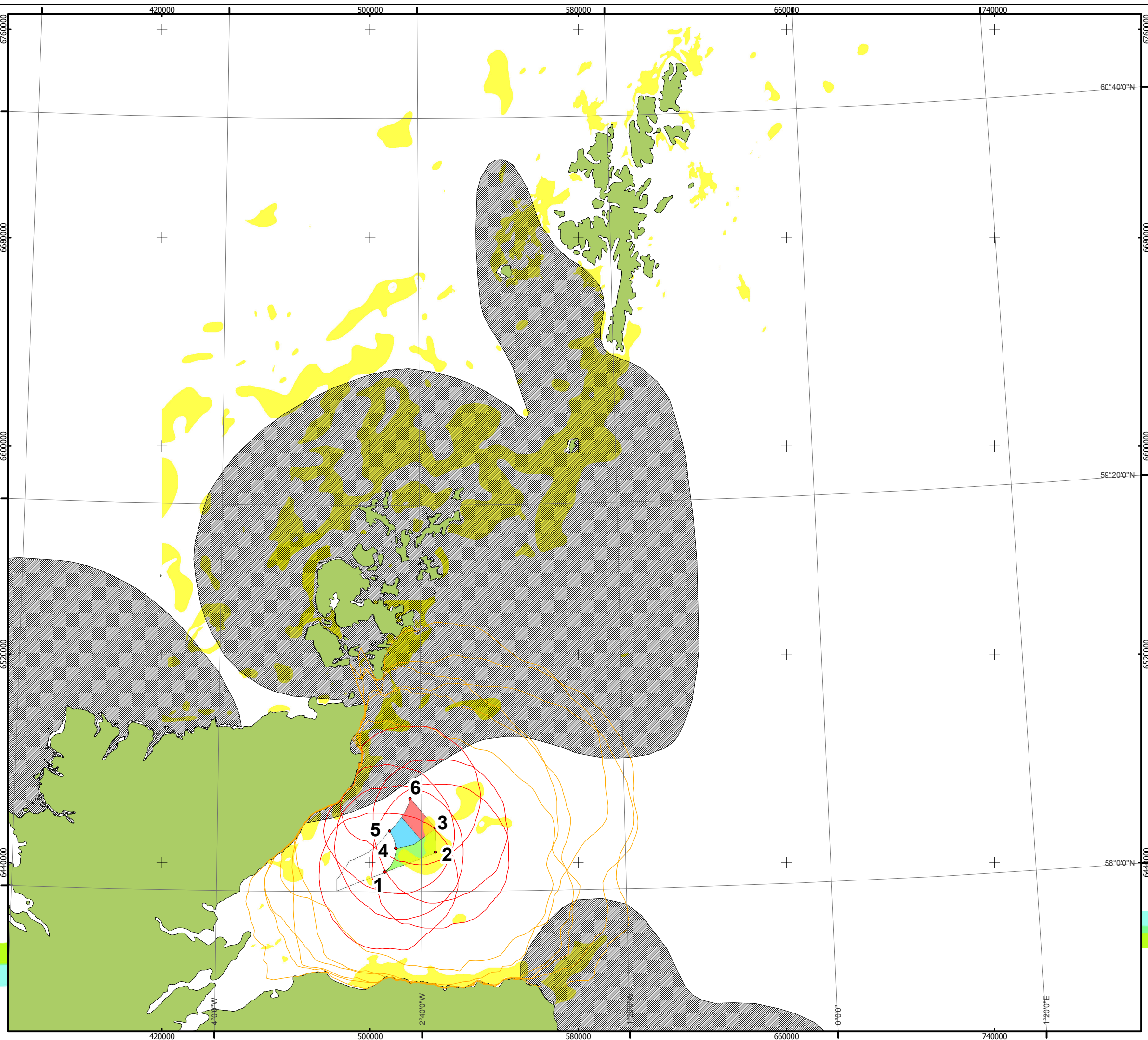
Date: 19/03/2012 Revision: A

REF: 8460001-PPW0200-BAM-MAP-017

Fig 7.2-5 75 dBht and 90 dBht cod impact ranges with cod spawning grounds (Coull et al, 1998)

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KEY

- MacColl
- Stevenson
- Telford
- MORL Zone Boundary
- Modelled 2.5 m piles (location 1 to 6)
- 75 dBht (herring) contour
- 90 dBht (herring) contour
- Spawning grounds (Coull et al, 1998)
- Gravel and Sandy Gravel (BGS Data)

Horizontal Scale: 1:1,400,000 A3 Chart
 0 35,000 70,000 Meters

Geodetic Parameters: WGS84 UTM Zone 30N

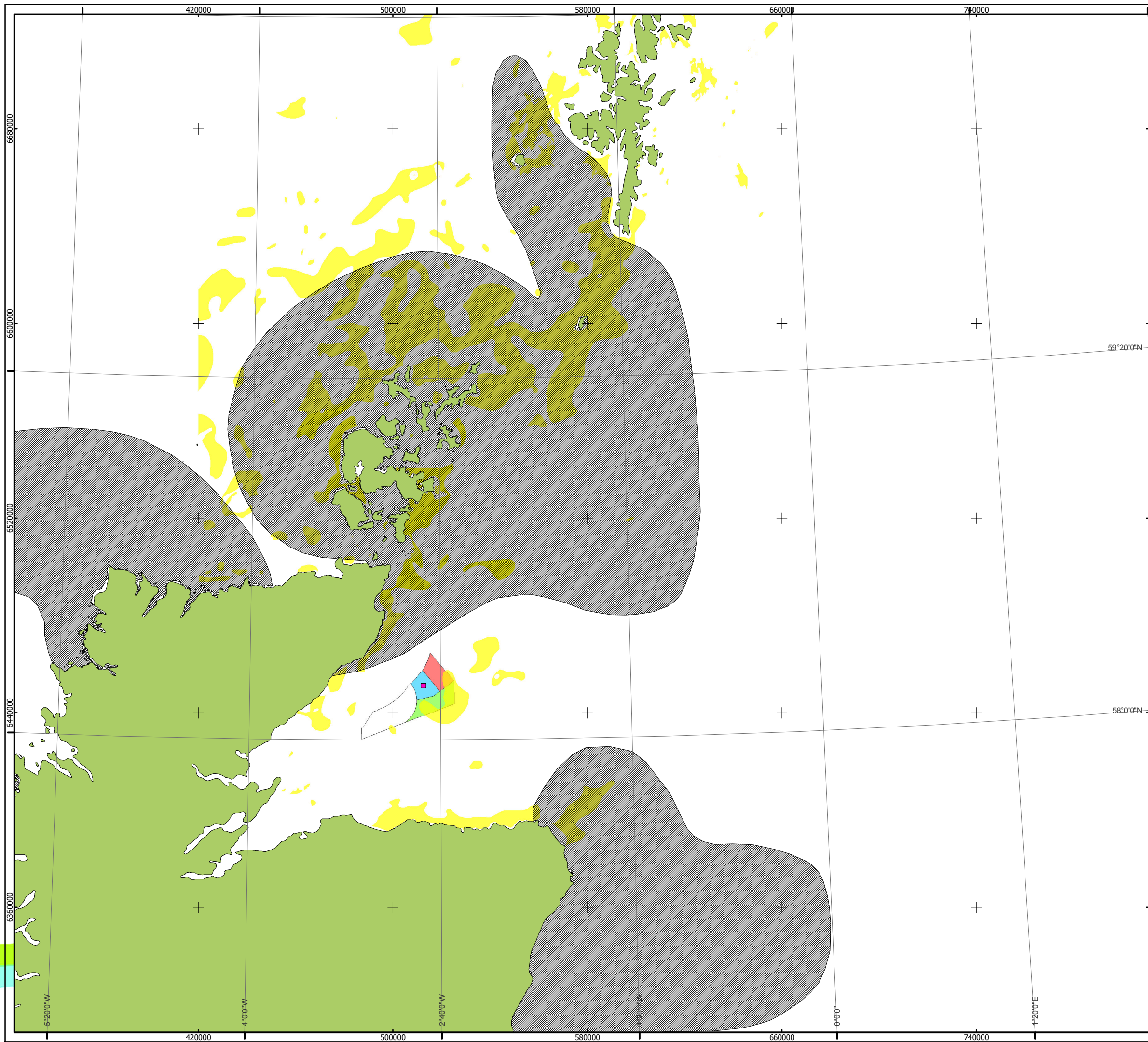
Produced: JW
 Reviewed: PMG
 Approved: PH

Date: 19/03/2012 Revision: A
 REF: 8460001-PPW0200-BAM-MAP-018

Fig 7.2-6 75 dBht and 90 dBht herring impact ranges with gravel and sandy-gravel and herring spawning grounds (Coull et al, 1998)

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KEY

- MacColl
- Stevenson
- Telford
- MORL Zone Boundary
- Spawning grounds (Coull et al, 1998)
- Gravel and Sandy Gravel (BGS Data)
- Worst Case Loss of Habitat (3.76 sq km)

Horizontal Scale: 1:1,500,000 A3 Chart N

Geodetic Parameters: WGS84 UTM Zone 30N

Produced: JW
 Reviewed: PMG
 Approved: PH

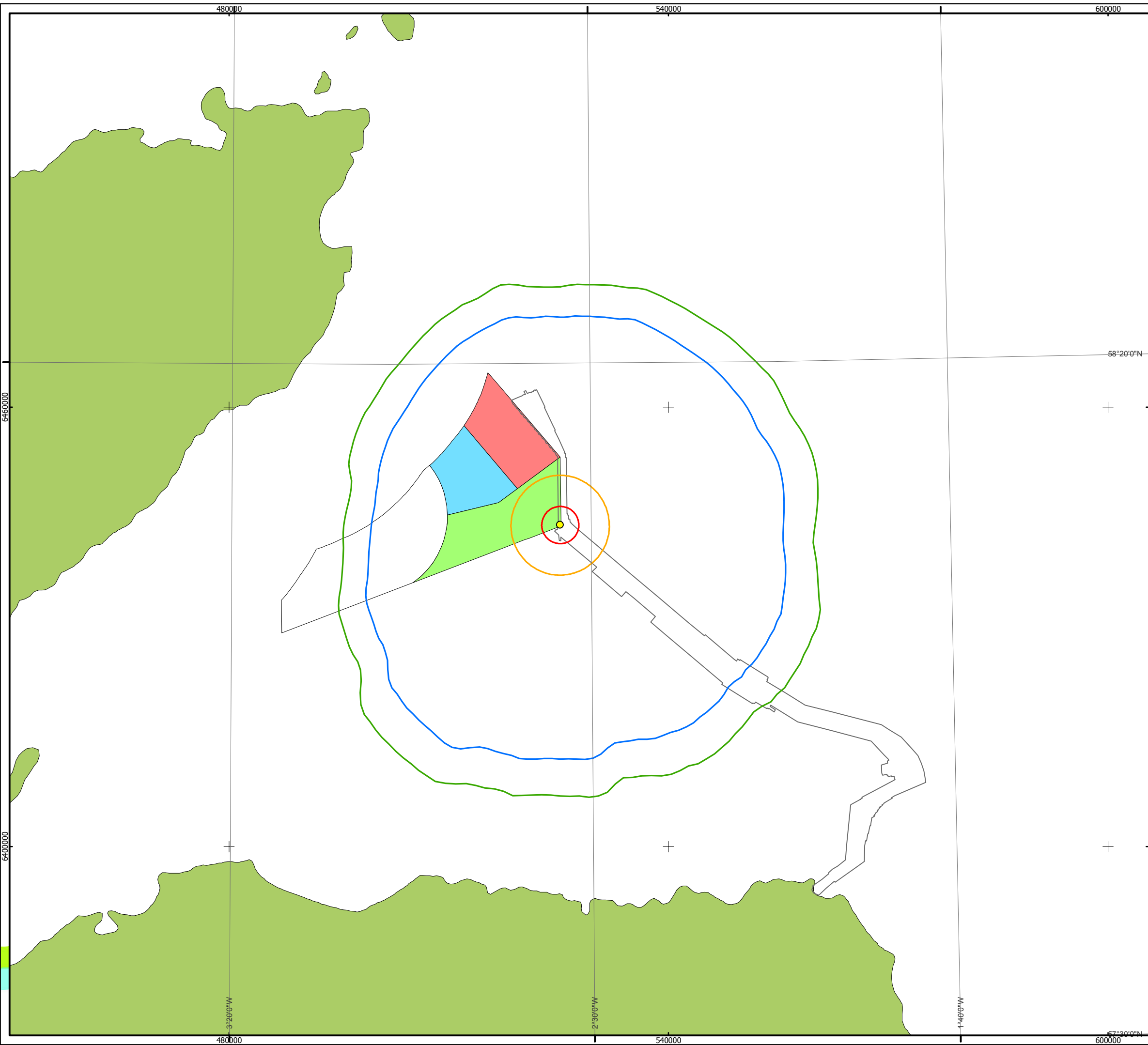
Date: 19/03/2012 Revision: A

REF: 8460001-PPW0200-BAM-MAP-019

Fig 7.2-7 Worst case loss of habitat with gravel and sandy-gravel areas and herring spawning grounds (Coull et al, 1998)











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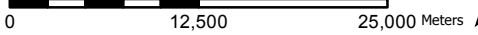
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KEY

-  Offshore Export Cable Route
-  MacColl
-  Stevenson
-  Telford
-  MORL Zone Boundary
-  Modelled pile (location 2)
3m pile (blow force 1800kJ)
-  90 dBht (cod) contour
-  90 dBht (herring) contour
-  90 dBht (dab) contour
-  90 dBht (salmon) contour

Horizontal Scale: 1:500,000 A3 Chart
 0 12,500 25,000 Meters

Geodetic Parameters: WGS84 UTM Zone 30N

Produced: JW
Reviewed: PMG
Approved: PH

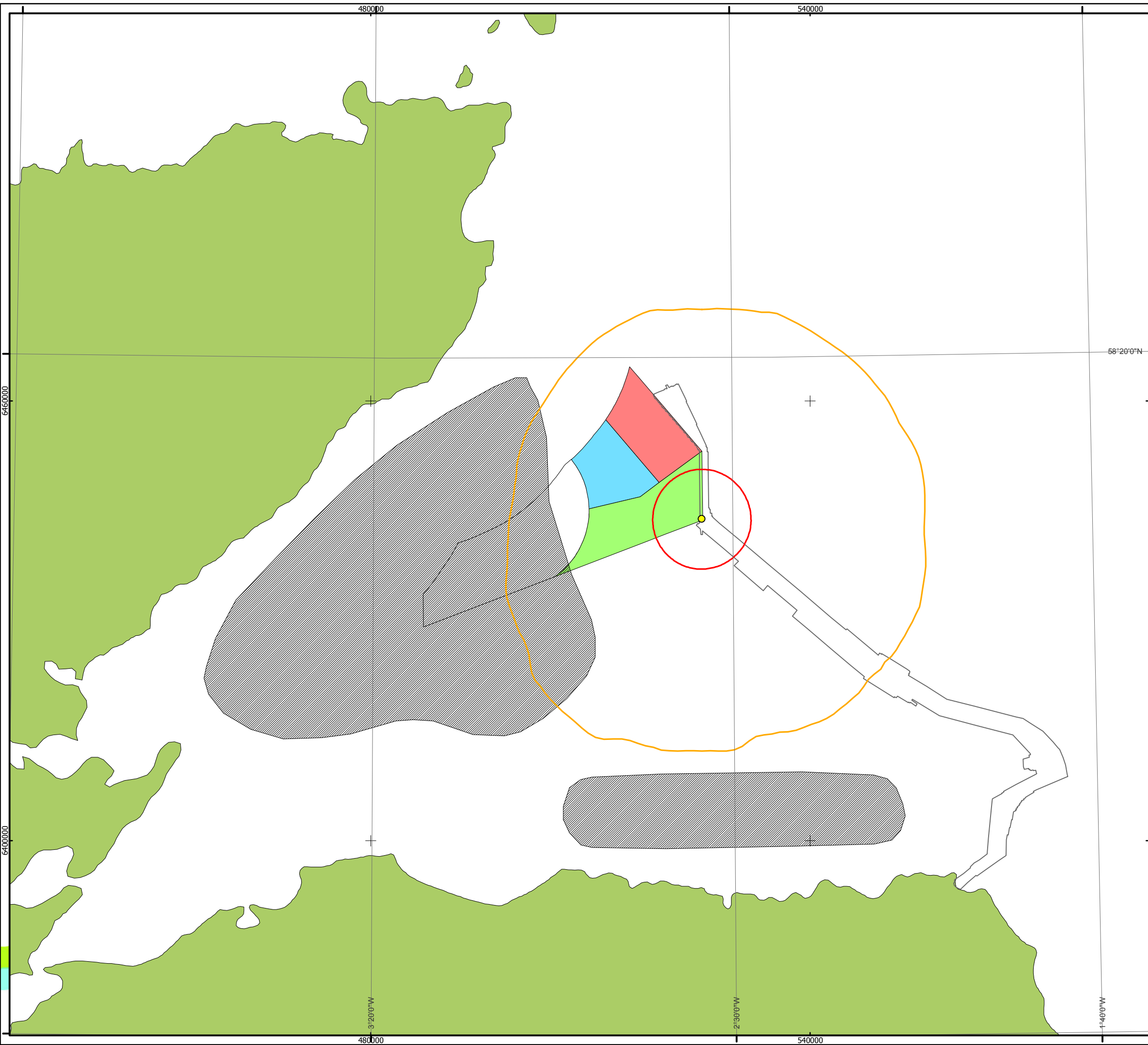
Date: 19/03/2012 Revision: A

REF: 8460001-PPW0200-BAM-MAP-020

**Fig 10.2-1 90 dBht (Species)
impact ranges for salmon, dab,
herring and cod**










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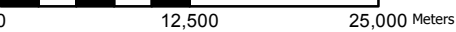
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KEY

-  Offshore Export Cable Route
-  MacColl
-  Stevenson
-  Telford
-  MORL Zone Boundary
-  Modelled pile (location 2)
3m pile (blow force 1800kJ)
-  90 dBht (dab) contour
-  75 dBht (dab) contour
-  Spawning grounds (Coull et al, 1998)

Horizontal Scale: 1:500,000 A3 Chart N


Geodetic Parameters: WGS84 UTM Zone 30N

Produced: JW
Reviewed: PMG
Approved: PH

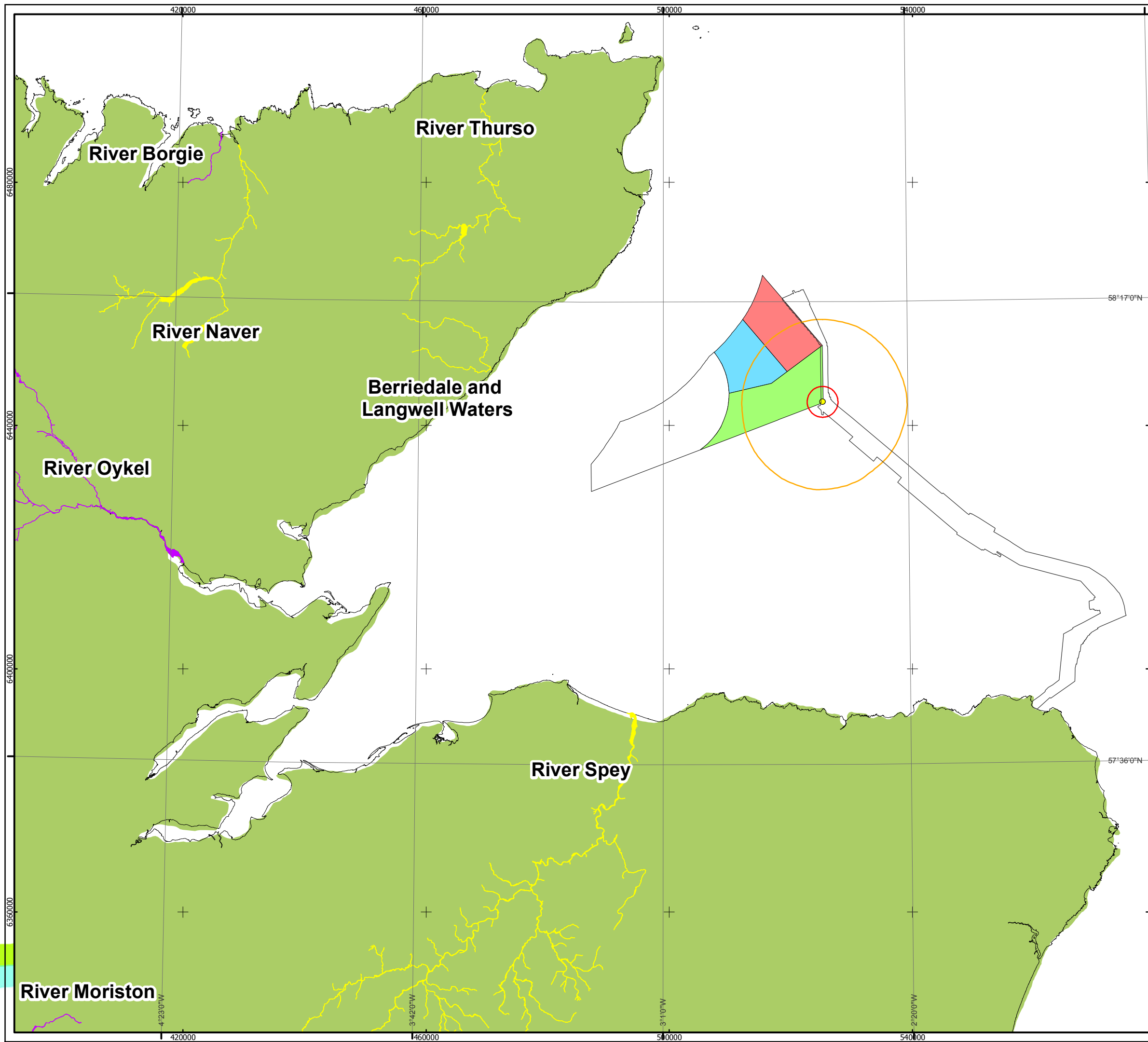
Date: 19/03/2012 Revision: A

REF: 8460001-PPW0201-BAM-MAP-021

**Fig 10.2-2 75 dBht and 90 dBht
dab impact ranges with plaice
spawning grounds (Coull et al, 1998)**

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KEY

- Offshore Export Cable Route
- MacColl
- Stevenson
- Telford
- MORL Zone Boundary
- Modelled pile (location 2)
3m pile (blow force 1800kJ)
- 75 dBht (salmon) contour
- 90 dBht (salmon) contour
- Salmon Primary Reason for Selection of SAC
- Salmon Qualifying Feature for Selection of SAC

Horizontal Scale: 1:600,000 A3 Chart
 0 15,000 30,000 Meters

Geodetic Parameters: WGS84 UTM Zone 30N

Produced: JW
 Reviewed: PMG
 Approved:

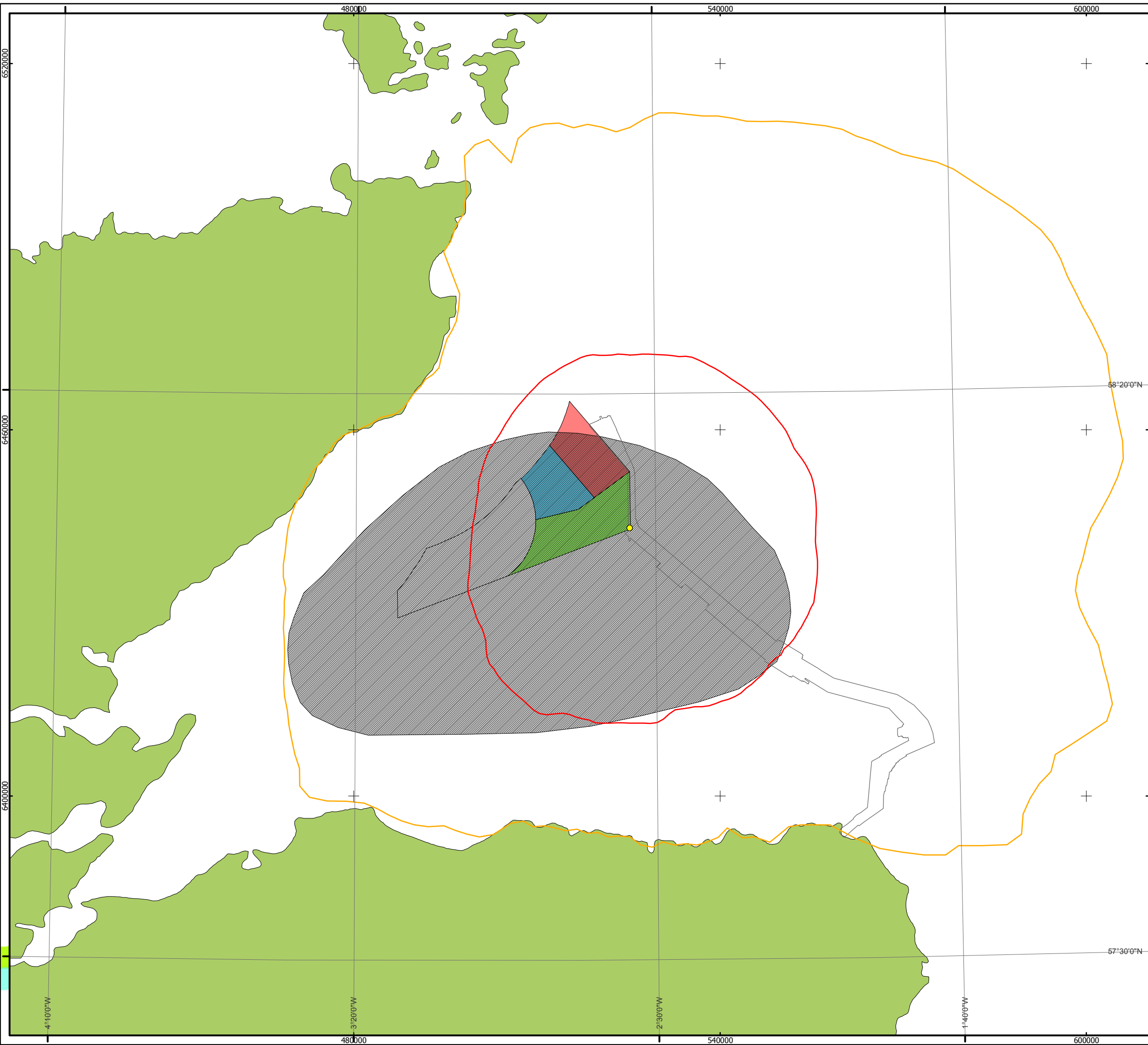
Date: 19/03/2012 Revision: A

REF: 8460001-PPW0201-BAM-MAP-022

**Fig 10.2-3 75 dBht and 90 dBht
 Salmon impact ranges with
 Scottish salmon SACs**










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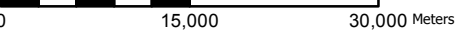
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KEY

-  Offshore Export Cable Route
-  MacColl
-  Stevenson
-  Telford
-  MORL Zone Boundary
-  Modelled pile (location 2)
3m pile (blow force 1800kJ)
-  90 dBht (cod) contour
-  75 dBht (cod) contour
-  Spawning grounds (Coull et al., 1998)

Horizontal Scale: 1:600,000 A3 Chart N


Geodetic Parameters: WGS84 UTM Zone 30N

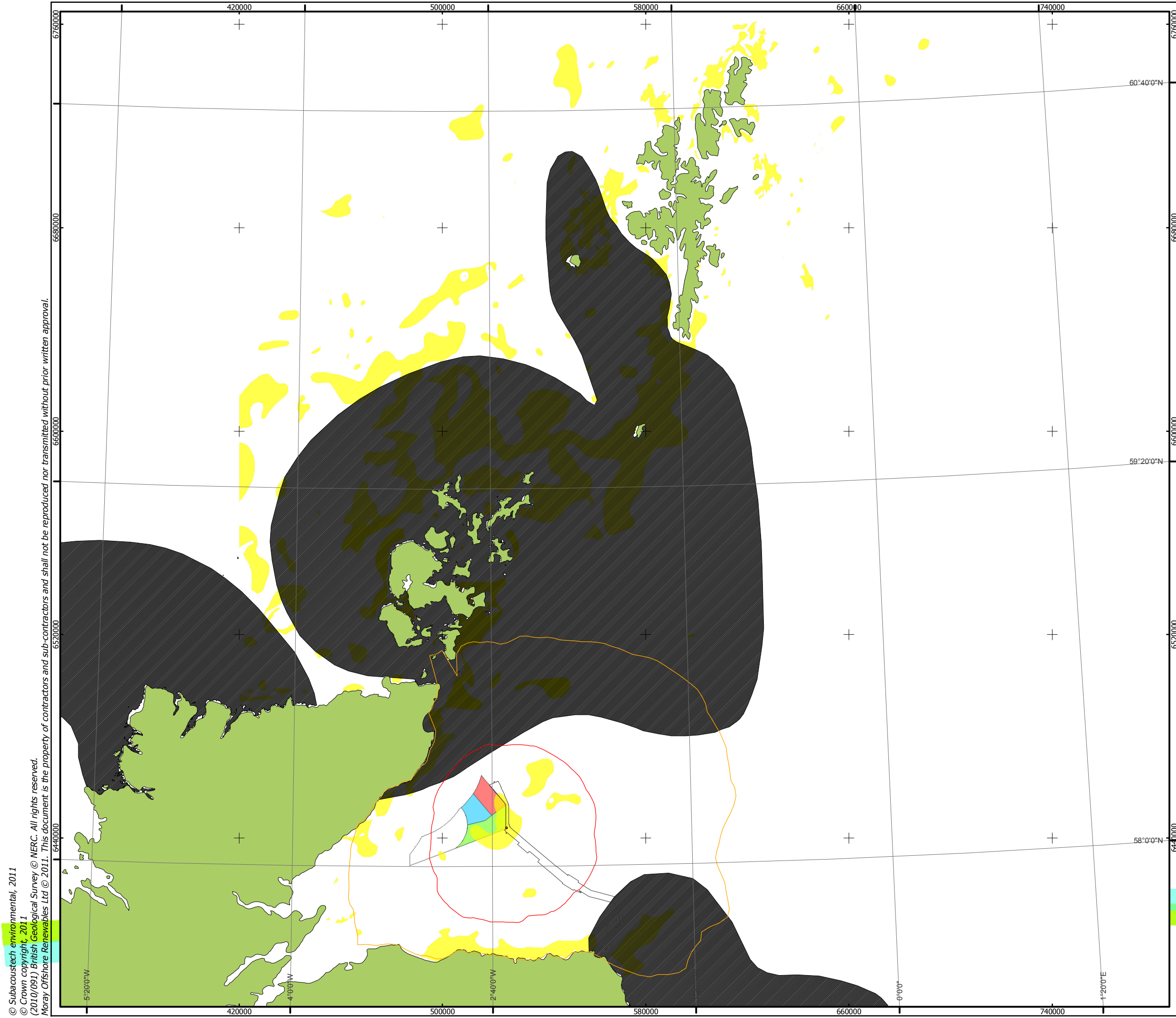
Produced: JW
Reviewed: PMG
Approved:

Date: 19/03/2012 Revision: A

REF: 8460001-PPW0201-BAM-MAP-023

**Fig 10.2-4 75 dBht and 90 dBht
cod impact ranges with cod
spawning grounds (Coull et al, 1998)**

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KEY

- Offshore Export Cable Route
- MacColl
- Stevenson
- Telford
- MORL Zone Boundary
- Spawning grounds (Coull et al, 1998)
- Gravel and Sandy Gravel (BGS Data)
- Modelled pile (location 2)
3m pile (blow force 1800kJ)
- 75 dBht (herring) contour
- 90 dBht (herring) contour

Horizontal Scale: 1:1,400,000 A3 Chart N

 0 35,000 70,000 Meters

Geodetic Parameters: WGS84 UTM Zone 30N

Produced: JW
 Reviewed: PMG
 Approved: PH

Date: 19/03/2012 Revision: A
 REF: 8460001-PPW0201-BAM-MAP-024

Fig 10.2-5 75 dBht and 90 dBht herring impact ranges with gravel and sandy-gravel and herring spawning grounds (Coull et al, 1998)

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