

A photograph of an offshore wind farm at sunset. The sky is a mix of orange, yellow, and grey, with a few clouds. The sea is dark with white-capped waves in the foreground. Several wind turbines are visible, their silhouettes against the bright sky. A small bird is seen in flight in the center of the image.

Salamander Offshore Wind Farm

Offshore EIA Report

Volume ER.A.4, Annex 12.8: Offshore Ornithology


Regional Populations Report



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Salamander Offshore Wind Farm Annex ER.A.4.12.8: Offshore Ornithology Regional Populations Report

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Acronyms and abbreviations

Term	Definition
BDMPS	Biologically Defined Minimum Population Scales
BTO	British Trust for Ornithology
CRM	Collision Risk Modelling
MD-LOT	Marine Directorate – Licensing Operations Team
PVA	Population Viability Analysis
SMP	Seabird Monitoring Project

I Introduction

- 1 Salamander Offshore Wind Farm (hereafter ‘the Salamander Project’) is a proposed floating offshore wind farm, located approximately 35km off the northeast coast of Scotland, being developed by Salamander Wind Project Company Limited (formerly called Simply Blue Energy (Scotland) Limited), a joint venture between Simply Blue Group, Ørsted and Subsea7.
- 2 This Annex outlines the approach for deriving regional populations of breeding and non-breeding seabirds for use in the marine ornithology quantitative assessment. Regional populations are used to quantify and put into context, impacts from Distributional Responses (Annex ER.A.4.12.5: Displacement Assessment) and Collision Risk Modelling (CRM) (Annex ER.A.4.12.3: Collision Risk Modelling Report) associated with the Salamander Project. Regional populations are also required for Population Viability Analysis (PVA) (Annex ER.A.4.12.4: Population Viability Analysis (PVA)) at the EIA level. Breeding and non-breeding season regional populations are species-specific although the methods used to derive them are generally similar. There is some variation in how regional populations were calculated, between species, and the rationale behind this is given.
- 3 The calculation of regional populations followed guidance provided by NatureScot (2023) and the Marine Directorate – Licensing Operations Team (MD-LOT) (Scoping Opinion dated 21st June 2023).
- 4 The species considered within ornithological impact assessment which require the calculation of breeding and non-breeding season regional populations are:
 - Black-legged kittiwake (*Rissa tridactyla*), hereafter ‘kittiwake’;
 - Great black-backed gull (*Larus marinus*);
 - Herring gull (*Larus argentatus*);
 - Common guillemot (*Uria aalge*), hereafter ‘guillemot’;
 - Razorbill (*Alca torda*);
 - Atlantic puffin (*Fratecula arctica*), hereafter ‘puffin’ (breeding season only);
 - Northern fulmar (*Fulmarus glacialis*), hereafter ‘fulmar’; and
 - Northern gannet (*Morus bassanus*), hereafter ‘gannet’.
- 5 A non-breeding season regional population was not required for puffin as they disperse widely offshore during this period, negating the need for impact assessment.

2 Compiling regional populations

2.1 Breeding season

- 6 Within the breeding season, regional populations were derived using species-specific foraging ranges presented in Woodward *et al.* (2019), following guidance from NatureScot (2023). Per species, the total number of breeding adult birds from all colonies within foraging range of the Salamander Project were combined to derive the breeding season regional population. Standard guidance is that for most species, the mean max foraging range plus one standard deviation (mmfr + 1SD) is used (Table I). Exceptions to this approach were made here for fulmar, guillemot, razorbill and gannet (see paragraphs seven, eight and nine).
- 7 The mmfr + 1SD for fulmar encompasses all colonies within the UK and Ireland. Realistically, it is unlikely that all these birds will be using the Salamander Project to forage, as many birds will utilise foraging grounds within the wider northeast Atlantic. Following this, the breeding season regional population for

fulmar was restricted to colonies along the north and east coasts of Scotland and the north-east coast of England. It was assumed that birds from these colonies would be more likely to utilise the area within and around the Salamander Project, compared to those further afield, such as those around Ireland. For a full list of the colonies included in the fulmar breeding season regional population, see Appendix I: Colonies included in breeding season regional populations.

- 8 For guillemot and razorbill, tracking data from Fair Isle has shown that foraging distance may be greater than at other colonies. Therefore, for colonies north of the Pentland Firth, the mmfr + 1SD calculated using Fair Isle data were used to determine if colonies were in foraging range of the Salamander Project. For colonies south of the Pentland Firth, the mmfr + 1SD excluding Fair Isle data were used (Table 1).
- 9 For gannet, the mmfr + 1SD was used for all colonies without site-specific data. For colonies where site-specific data indicated that foraging range may exceed the mmfr + 1SD, maximum foraging range values were used to determine if the Salamander Project would be within foraging range (Table 1).

Table 1 Foraging ranges (plus one standard deviation) used to calculate breeding season regional populations

Species	Foraging Range (km)	One Standard deviation (km)	Metric
Kittiwake	156.1	144.5	Mean-max
Great black-backed gull	73.0	-	Mean-max
Herring gull	58.8	26.8	Mean-max
Guillemot	55.5	39.7	Mean-max (excluding Fair Isle)
	73.2	80.5	Mean-max (including Fair Isle)
Razorbill	73.8	48.4	Mean-max (excluding Fair Isle)
	88.7	75.9	Mean-max (including Fair Isle)
Puffin	137.1	128.3	Mean-max
Gannet	315.2	194.2	Mean-max
	590	-	Max (Forth Islands)
	516.7	-	Max (Grassholm)
	709	-	Max (St Kilda)

- 10 Seabird colony data spanning 1986 to 2022 from the UK and Ireland was taken from the Seabird Monitoring Project (SMP) and provided by the British Trust for Ornithology (BTO) (data received 25th May 2023).
- 11 Using the species-specific foraging ranges, seabird colonies were filtered out of the database so it contained only colonies within foraging range of the Salamander Project. All data manipulation was conducted using R version 4.2.2; code can be made available upon request.
- 12 Generally, the seabird species of interest are unlikely to fly over land, as they primarily rely on the marine environment to forage and transit. Therefore, when determining if the Salamander Project was likely to be within foraging range, by-sea distance rather than Euclidian or 'straight line' distance was used.
- 13 Table 2 presents breeding season regional populations of the species of interest. Maps indicating which colonies were included in breeding season regional populations can be found in Appendix I: Colonies included in breeding season regional populations.

Table 2 Breeding season regional populations for the Salamander Project (adult individuals)

Species	Regional population
Kittiwake	202,258
Great black-backed gull	98
Herring gull	14,612
Guillemot	407,959
Razorbill	70,208
Puffin	287,593
Fulmar	375,261
Gannet	432,894

2.2 Non-breeding season

- 14 For the non-breeding season, regional populations were taken from Biologically Defined Minimum Population Scales (BDMPS) (Furness, 2015). The regions encompassing the Salamander Project, from which non-breeding season populations were derived, differed between species and are presented in Table 3 alongside population size (number of individuals). For kittiwake and gannet, the spring migration population presented in Furness (2015) was used as a 'non-breeding season' population was not defined (split into spring and autumn migration BDMPS). The spring migration population was the smaller of the two non-breeding season estimates and will therefore be the more precautionary approach.

- 15 Following advice from MD-LOT and NatureScot (Scoping Opinion dated 21st June 2023 and NatureScot advice on Scoping Report dated 5th May 2023), non-breeding season regional populations for guillemot and herring gull were not calculated using BDMPS. For both species, the non-breeding regional populations were derived from the breeding season regional populations as breeding birds do not disperse as widely post-breeding (e.g. Buckingham *et al.*, 2022). For herring gull, a correction factor of 29.8% was applied to account for the influx of wintering birds from further afield, following NatureScot advice (advice on Scoping Report dated 5th May 2023).
- 16 No non-breeding season regional population was calculated for puffin as post-breeding the species disperses offshore and are not expected to be present within or around the Salamander Project in significant densities.

Table 3 Non-breeding season regional populations (individuals) (Furness, 2015)

Species	Regional population	Region
Kittiwake	627,816 ^a	UK North Sea
Great black-backed gull	91,399	UK North Sea
Herring gull	20,551	Breeding season mean max foraging range + ISD plus correction factor for wintering migrants
Guillemot	407,959	Breeding season mean max foraging range + ISD
Razorbill	218,622	UK North Sea and Channel
Fulmar	568,736	UK North Sea
Gannet	248,385 ^a	UK North Sea and Channel

a – spring migration population from Furness 2015, the smaller of the two non-breeding season estimates

3 Population Viability Analysis (PVA)

- 17 As part of PVA, mortality impacts to seabirds due to the presence of the Salamander Project are modelled using the regional populations for each species. Non-breeding season impacts were attributed to the breeding season regional population in proportion to the relative contribution of the breeding season regional population to the non-breeding season population for all species. The breeding season regional population was the smaller of the two regional populations for all species, except gannet. Therefore, for these species, impacts during the non-breeding season were apportioned back to the breeding season regional population using the proportion of the breeding population expected to be found within the larger non-breeding population. For gannet, the non-breeding season population is smaller due to migration away from UK waters, so impacts were scaled to reflect the proportion of UK birds' contributing to the up the total North Sea and English Channel non-breeding season population.

4 References

Buckingham, L., Bogdanova, M.I., Green, J.A., Dunn, R.E., Wanless, S., Bennett, S., Bevan, R.M. *et al.* (2022). Interspecific variation in non-breeding aggregation: a multi-colony tracking study of two sympatric seabirds. *Marine Ecology Progress Series*, 684, 181-197.

Furness, R.W. (2015). *Non-breeding season populations of seabirds in UK waters: Population sizes for Biologically Defined Minimum Population Scales (BDMPS)*. Natural England Commissioned Reports, No.164.

NatureScot. (2023). *Guidance Note 3: Guidance to support Offshore Wind applications: Marine Birds - Identifying theoretical connectivity with breeding site Special Protection Areas using breeding season foraging ranges*. NatureScot.

Woodward, I., Thaxter, C. B., Owen, E. and Cook, A.S.C.P. (2019). *Desk-based revision of seabird foraging ranges used for HRA screening*. BTO research report number 724.

Appendix I: Colonies included in breeding season regional populations

- 18 Figure 1 to Figure 8 present colonies included in breeding season regional populations of kittiwake, great black-backed gull, herring gull, guillemot, razorbill, puffin, fulmar and gannet. For all species except fulmar, the foraging ranges as presented in Woodward *et al.* (2019) were used to calculate breeding season regional populations (see Section 2.1).
- 19 As the foraging range of fulmar encompasses all UK and Ireland colonies, but it is unlikely that individuals from all colonies will utilise the area within and around the Salamander Project, only colonies on the north and east coasts of Scotland were included in the fulmar breeding season regional population (see Section 2.1 for more detail). Table 4 presents the colonies and colony counts included in the fulmar breeding season regional population. For the other species of interest, colonies included in breeding season regional populations are presented in Table 5 to Table 11.

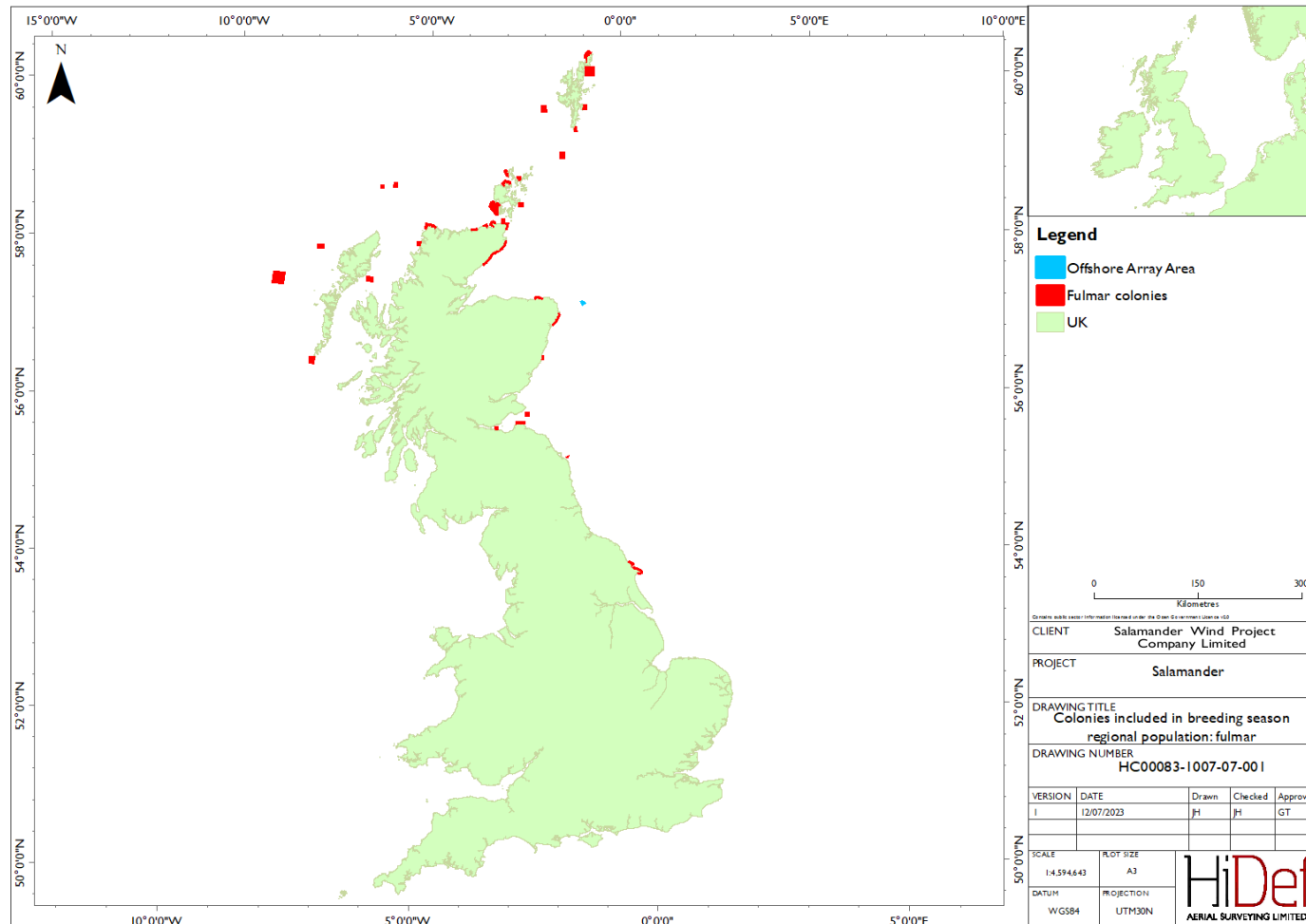


Figure 1 SPA colonies included in breeding season regional population: fulmar

Table 4 Colonies included in fulmar breeding season regional population

Colony	Count (adult individuals)
Buchan Ness to Collieston Coast SPA	1652
Calf of Eday SPA	4648
Cape Wrath SPA	4640
Copinsay SPA	3236
East Caithness Cliffs SPA	27628
Fair Isle SPA	64982
Farne Islands SPA	372
Fetlar SPA	18396
Flamborough and Filey Coast	1598
Flannan Isles SPA	6132
Foula SPA	20506
Forth Islands SPA	1370
Fowlsheugh SPA	1050
Handa SPA	1382
Hermaness, Saxa Vord and Valla Field SPA	21814
Hoy SPA	42221
Mingulay and Berneray SPA	14096
North Caithness Cliffs SPA	31310
North Rona and Sula Sgeir SPA	4420
Noss SPA	15674
Rousay SPA	4390
Shiant Isles SPA	3012

Colony	Count (adult individuals)
St Kilda SPA	58372
Sumburgh Head SPA	14954
Troup, Pennan and Lion's Head SPA	4006
West Westray SPA	3400
Total	375261

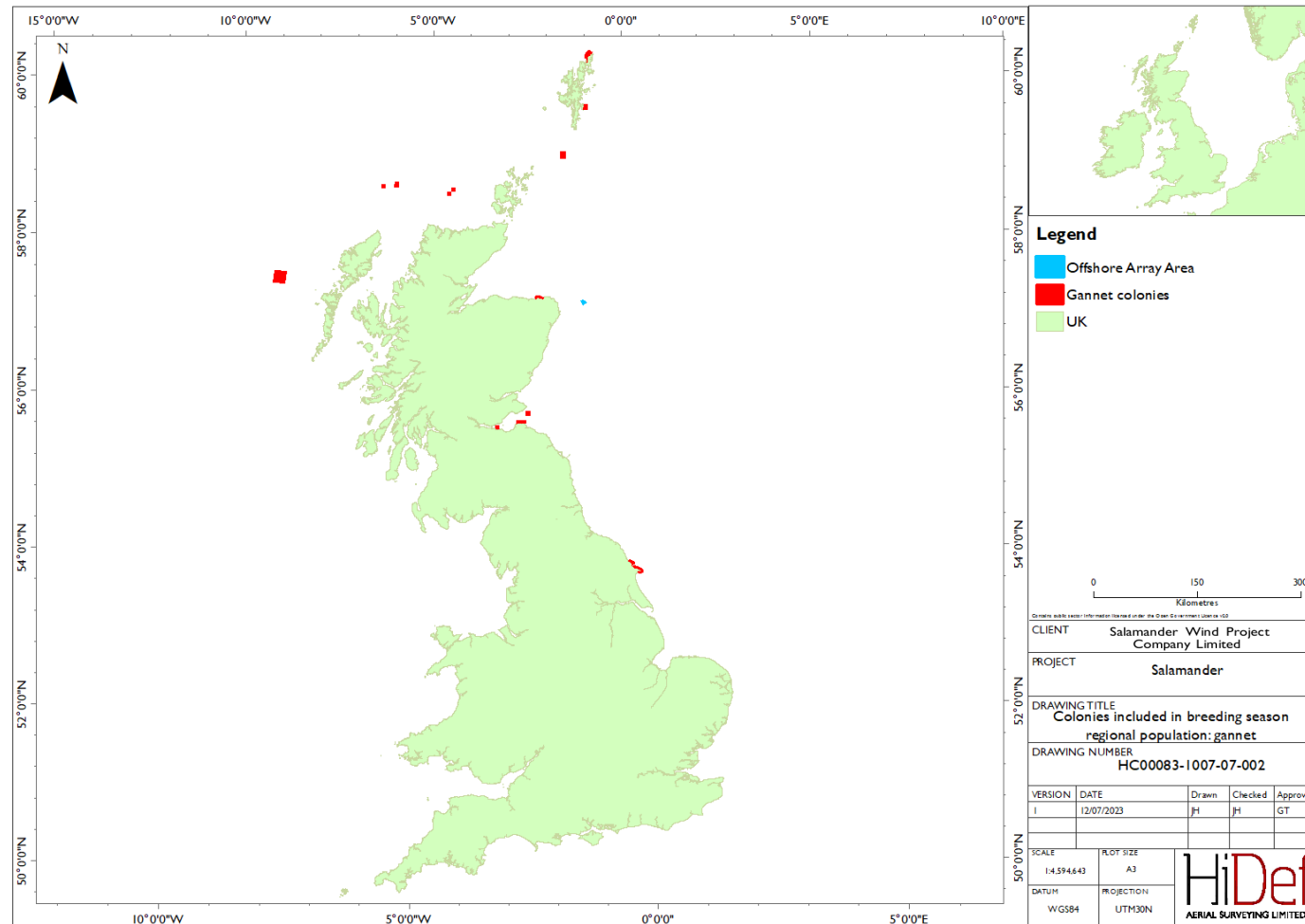


Figure 2 SPA colonies included in breeding season regional population: gannet

Table 5 Colonies included in gannet breeding season regional population

Colony	Count (adult individuals)
Fair Isle SPA	9942
Flamborough and Filey Coast SPA	26250
Forth Islands SPA	150518
Hermaness, Saxa Vord and Valla Field SPA	51160
North Rona and Sula Sgeir SPA	22460
Noss SPA	22944
St Kilda SPA	121840
Sule Skerry and Sule Stack SPA	18130
Troup, Pennan and Lion's Head SPA	9650
Total	432894

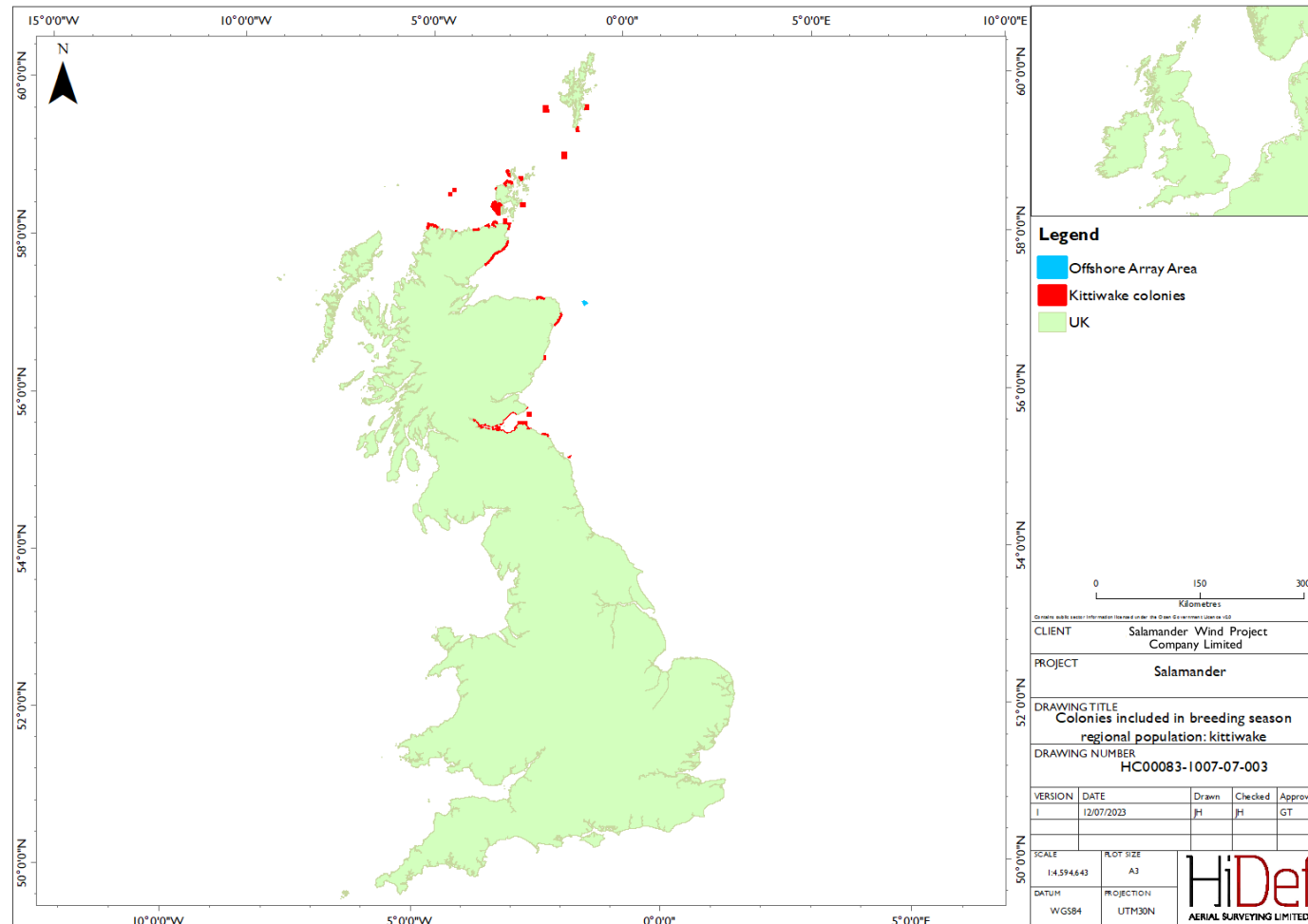


Figure 3 SPA colonies included in breeding season regional population: kittiwake

Table 6 Colonies included in kittiwake breeding season regional population

Colony	Count (adult individuals)
Buchan Ness to Collieston Coast	22590
Calf of Eday	292
Cape Wrath	7256
Copinsay	1910
East Caithness Cliffs	48834
Fair Isle	896
Farne Islands	8804
Forth Islands	13676
Foula	850
Fowlsheugh	28078
Hoy	608
Marwick Head	1812
North Caithness Cliffs	11142
Noss	236
Rounsay	966
St. Abb's Head to Fast Castle	10300
Sule Skerry and Sule Stack SPA	102
Sumburgh Head	866
Troup, Pennan and Lion's Head	27038
West Westray	8676
Newtonhill - Hall Bay	468
Berwick to Scottish Border	3054

Colony	Count (adult individuals)
Bressay	54
Eilean Hoan, Eilean Cluimhrig, An Dubh-Sgeir	26
Firth of Forth SPA	2310
North Sutherland Islands	300
Skeld, Westerwick and Culswick	46
Sumburgh to Peerie Voe of Spiggie	310
Westray	758
Total	202258

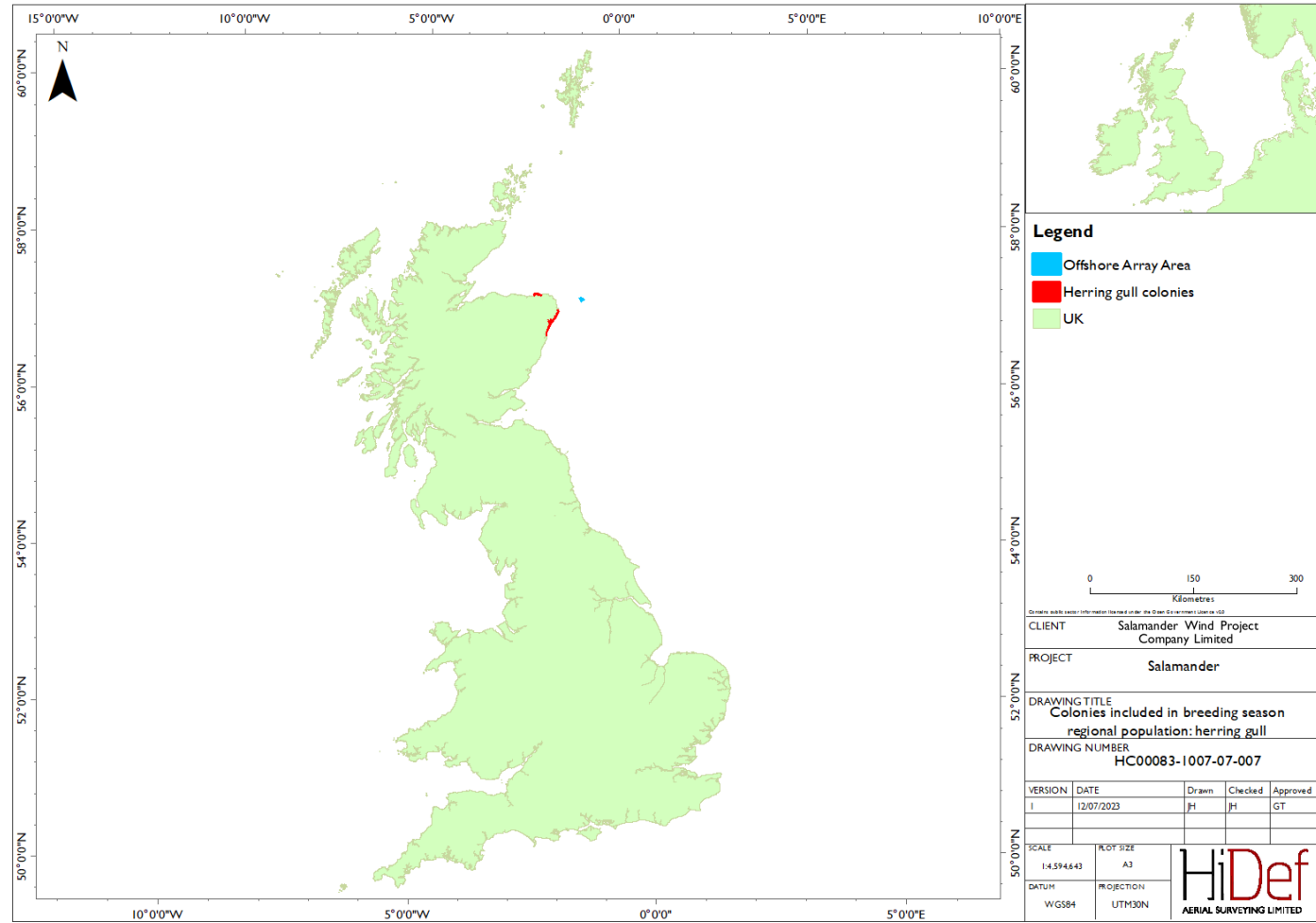


Figure 4 SPA colonies included in breeding season regional population: herring gull

Table 7 Colonies included in herring gull breeding season regional population

Colony	Count (adult individuals)
Buchan Ness to Collieston Coast SPA	4154
Troup, Pennan and Lion's Head	1098
Burn of Daff	326
Findon Ness - Hare Ness	250
Girdle Ness to Hare Ness	134
Newton Hill	136
Newtonhill - Hall Bay	102
Rosehearty to Bay of Cullen	740
Ythan Estuary, Sands of Forvie and Meikle Loch SPA	34
Aberdeen City	6700
Banff	52
Fraserburgh	126
Macduff	56
Peterhead	646
Sandhaven	2
St Fergus	50
Whitehills	6
Total	14612

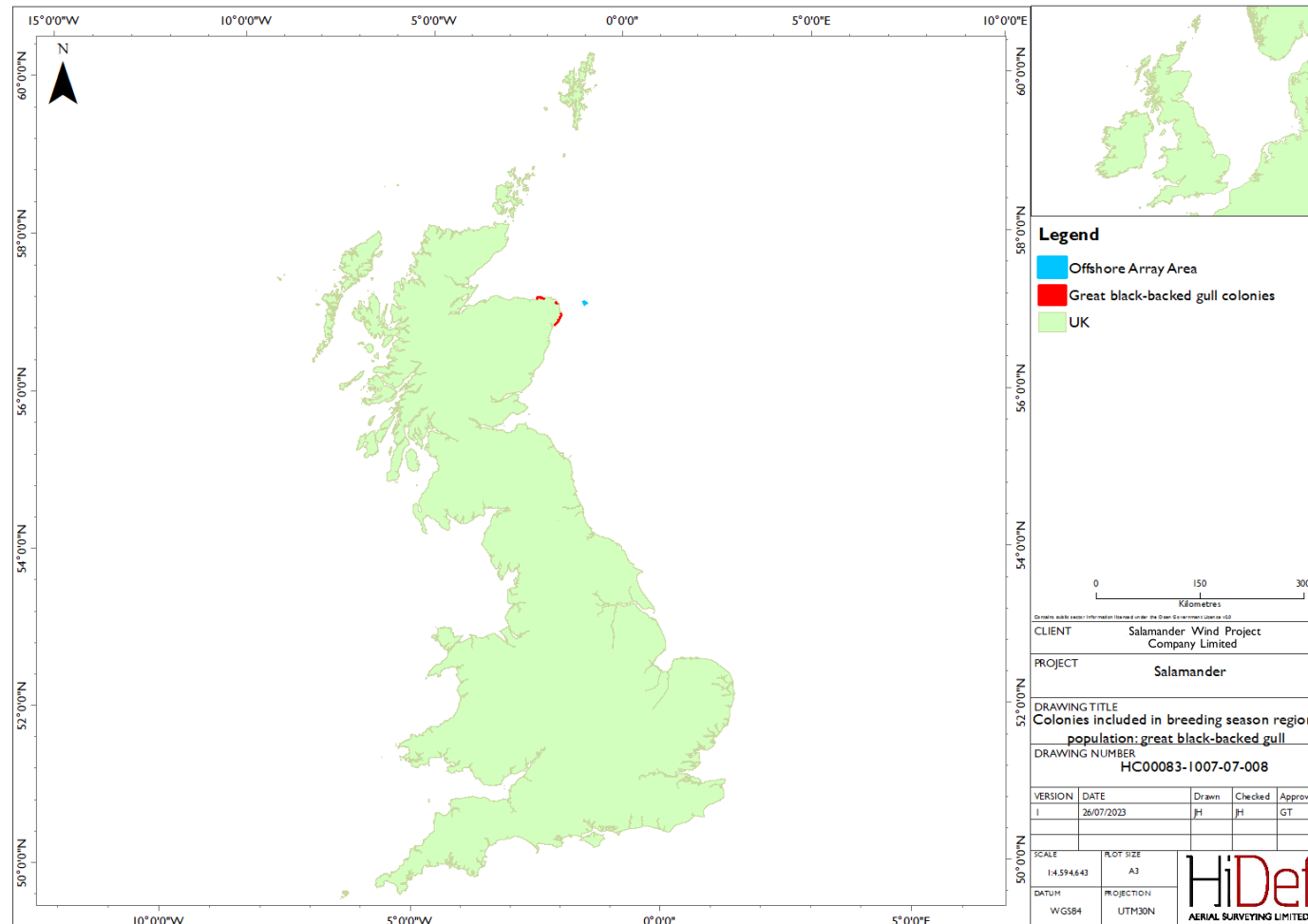


Figure 5 SPA colonies included in breeding season regional population: great black-backed gull

Table 8 Colonies included in great black-backed gull breeding season regional population

Colony	Count (adult individuals)
Buchan Ness to Collieston Coast SPA	72
Loch of Strathbeg SPA	4
Rosehearty to Bay of Cullen	10
Troup, Pennan and Lion's Heads SPA	12
Total	98

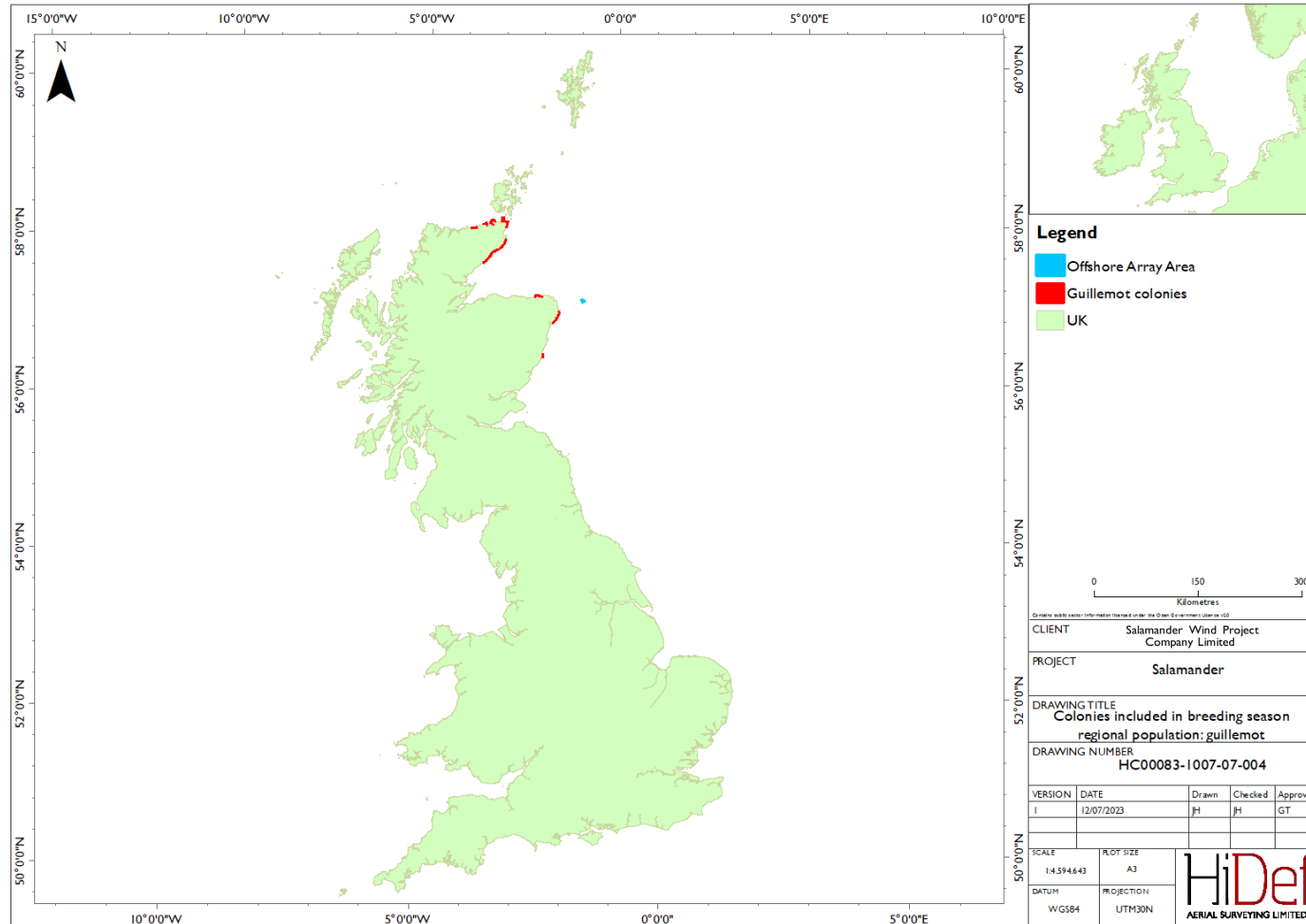


Figure 6 SPA colonies included in breeding season regional population: guillemot

Table 9 Colonies included in guillemot breeding season regional population

Colony	Count (adult individuals)
Buchan Ness to Collieston Coast	39553
East Caithness Cliffs	199399
Fowlsheugh SPA	93570
North Caithness Cliffs	36648
Troup, Pennan and Lion's Head	38790
Total	407959

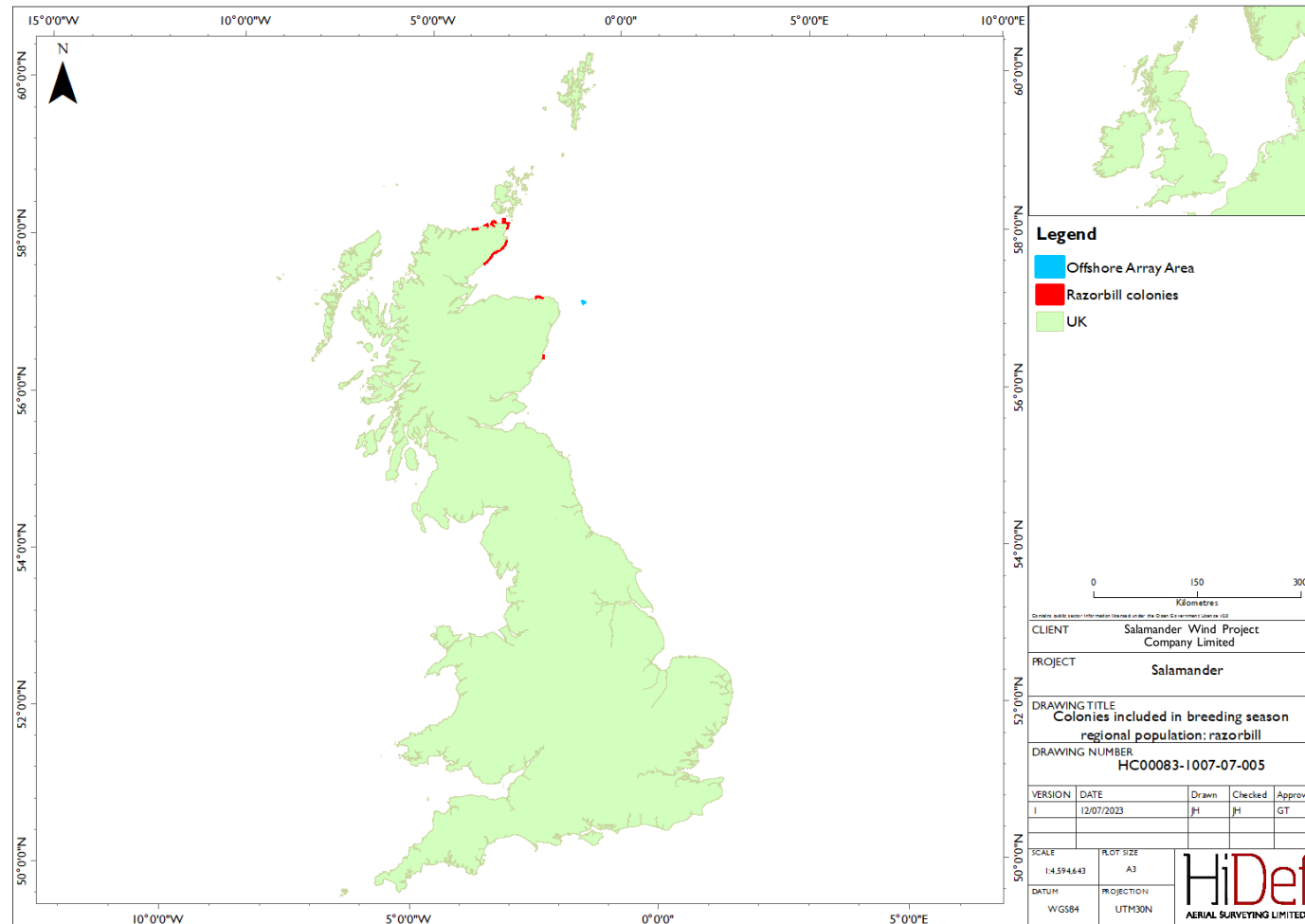


Figure 7 SPA colonies included in breeding season regional population: razorbill

Table 10 Colonies included in razorbill breeding season regional population

Colony	Count (adult individuals)
East Caithness Cliffs	40204
Fowlsheugh SPA	18844
North Caithness Cliffs SPA	4796
Troup, Pennan and Lion's Heads SPA	6364
Total	70208

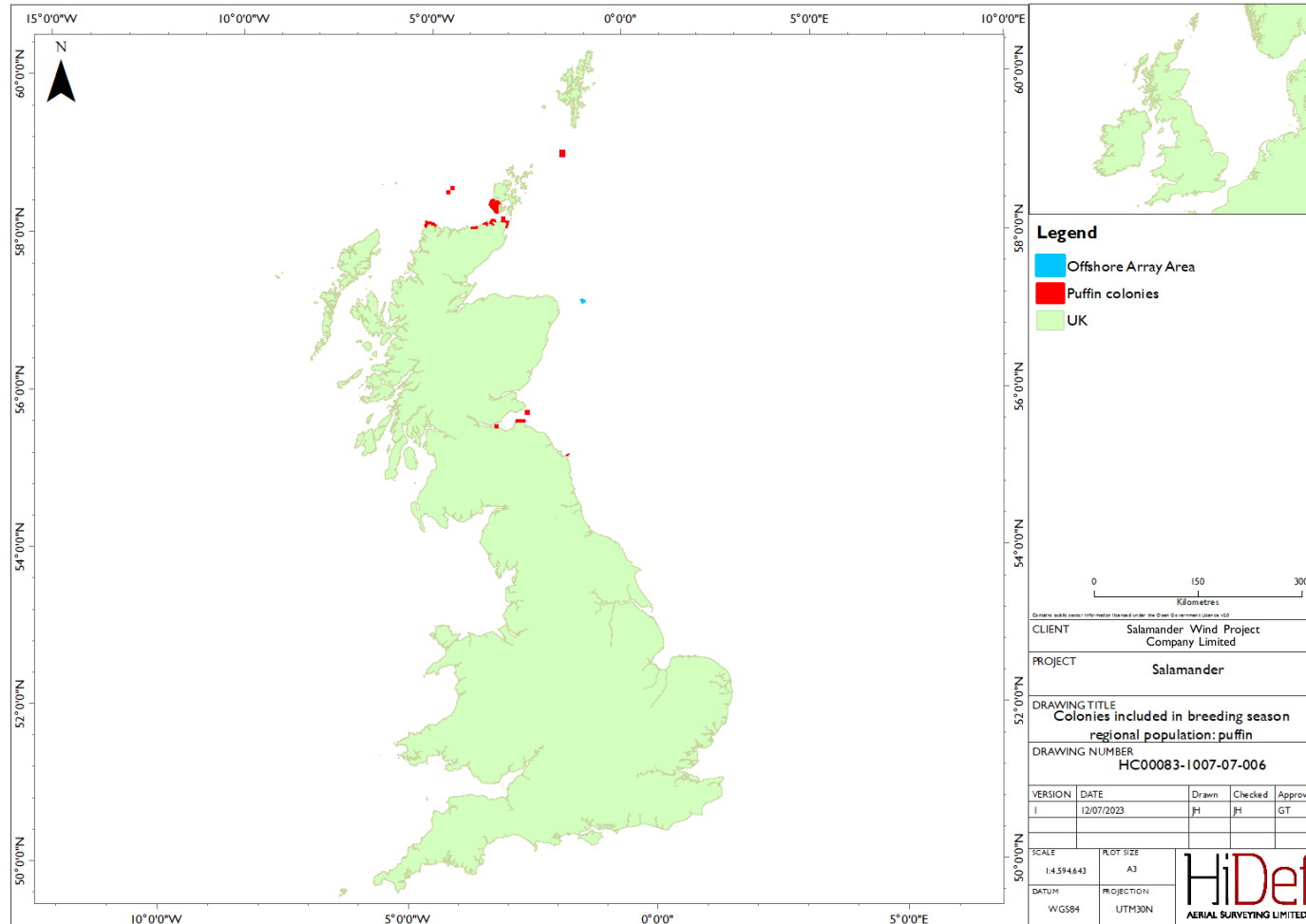


Figure 8 SPA colonies included in breeding season regional population: puffin

Table II Colonies included in puffin breeding season regional population

Colony	Count (adult individuals)
Cape Wrath SPA	2244
Fair Isle SPA	6666
Farne Islands SPA	87504
Forth Islands SPA	92281
Hoy SPA	361
North Caithness Cliffs SPA	3053
Sule Skerry and Sule Stack SPA	95484
Total	287593