

Liverpool Bay CCS Ltd

HYNET CARBON DIOXIDE TRANSPORTATION AND STORAGE PROJECT - OFFSHORE

Volume 3, Appendix K4: Little Tern Foraging Distribution Technical Report



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Glossary

Term	Meaning
The Applicant	This is Liverpool Bay CCS Ltd.
Project	The HyNet Carbon Dioxide Transportation and Storage Project.
Proposed Development	The offshore components of the Project which are subject of the submitted Environmental Statement. These are described in the Environmental Statement Chapter 3: Proposed Development Description
Special Protection Area (SPA)	A site designation specified in the Conservation of Habitats and Species Regulations 2017 (as amended), classified for rare and vulnerable birds, and for regularly occurring migratory species. Special Protection Areas contribute to the national site network, a network comprising of sites that were previously part of the European Union's Natura 2000 ecological network and any new protected sites designated under the Conservation of Habitats and Species Regulations 2017 (as amended).
Nearshore waters	Coastal waters adjacent to the coast.
Terns	Birds from the family <i>Sterniidae</i> .
Foraging	Actively seeking food. For the purposes of the analysis carried out in this report no distinction was made between foraging (seeking food) and feeding (actively eating)
Abundance	The number of individuals.
Breeding season	This season when birds mate, lay their eggs and raise offspring.
Passage seasons	The period when migratory species are travelling between their breeding grounds and non-breeding grounds
Sites of Special Scientific Interest (SSSIs)	An area of land that has been designated as protected due to a biological or geological feature that is located there.
Mean High Water Spring (MHWS)	The average height of the high astronomical tide.
Mean Low Water Spring (MLWS)	The average height of the low astronomical tide.
Intertidal	The area between MHWS and MLWS which is within the tidal range.
Subtidal	The area below MLWS which is below the tidal range and is permanently submerged.

Acronyms

Acronym	Description
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
MLWS	Mean Low Water Springs
MHWS	Mean High Water Springs
PoA	Point of Ayr
SMP	Seabird Monitoring Programme
RSPB	Royal Society for the Protection of Birds
WeBS	Wetland Bird Survey
AON	Apparently Occupied Nest

Units

Acronym	Description
m	Metre (distance)
km	Kilometre (distance)
%	Percentage

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1 LITTLE TERN FORAGING DISTRIBUTION TECHNICAL REPORT

1.1 Introduction

This technical report provides a baseline characterisation of the little tern (*Sternula albifrons*) foraging distribution in the nearshore waters surrounding the proposed cable and pipeline landfall for the Hynet Carbon Dioxide Transportation and Storage Project (hereafter referred to as “the Project”).

As part of the offshore components of the Project (hereafter referred to as the ‘Proposed Development’), the existing offshore natural gas import pipeline from Point of Ayr (PoA) gas terminal will be re-purposed to become a CO₂ export pipeline and will transport the CO₂ to the re-purposed Douglas platform. From the Douglas platform, CO₂ will be transported along re-purposed natural gas pipelines to the New Hamilton main platform for injection into the Hamilton main reservoir, to the Hamilton north platform for injection into the Hamilton north reservoir, and to the Lennox platform for injection into the Lennox reservoir. The Proposed Development will also require new electrical and fibre optic transmission infrastructure seawards of Mean High-Water Spring (MHWS), connecting the PoA terminal to the offshore infrastructures.

The Proposed Development passes directly through the Liverpool Bay Special Protection Area (SPA), Dee Estuary SPA, Ramsar and Site of Special Scientific Interest (SSSI), and Gronant Dunes and Talacre Warren SSSI. These sites are of national and international importance for breeding little tern and common tern (*Sterna hirundo*) and for passage sandwich tern (*Sterna sandvicensis*). Seaward of Mean Low-Water Spring (MLWS) is the Liverpool Bay SPA and landward of the MLWS is the Dee Estuary SPA.

Little tern are the smallest members of the tern family. They are a migratory bird that winters on the west African coast with British breeding birds forming breeding colonies at coastal locations. Due to their habit of colonially nesting on beaches and their limited foraging range, little tern are highly susceptible to storm tides, disturbance, predation, and changes in prey distribution. Little tern feed mostly on small fish such as sandeels (*Ammodytes spp*) that are found in the nearshore waters. Little tern are named features of both the Dee Estuary and Liverpool Bay SPAs as well as being listed under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) and Annex 1 of the Birds Directive, they are also a red listed species on the Birds Of Conservation Concern 4 (BOCC), Wales (Johnstone *et al.*, 2022) and amber listed on the BOCC5 UK (Stanbury *et al.*, 2021).

The Dee Estuary SPA little tern colony is situated on the upper beach at the Gronant Dunes approx. 1.2km from the Proposed Development. Whilst the UK has seen a decline of 42% in little tern abundance since the 1980s (SMP, 2019), the colony at Gronant has quadrupled in size over the same period. It held 211 and 212 Apparently Occupied Nests (AONs) in 2022 and 2023 (RSPB) respectively making it one of the UKs largest colonies. In addition to the main colony a satellite colony has formed to the east at Point of Ayr (see Figure 1.1 for locations of the colonies). This hosted 39 AONs in 2022 and 30 in 2023 (RSPB). These two colonies combined contain all of the Welsh breeding population of little tern and circa. 10% of the UK breeding population. The threshold for international importance for little tern is 190 individuals, so this site is internationally important for this species.

Volume 2, Chapter 8: Offshore Ornithology of the Environmental Statement stated that: In the absence of hard data, it was assumed that as 8.6% of the little tern foraging range would be covered by the area of physical works (based upon a 5km foraging range as reported by Woodward, *et al.*, 2019), this same area might be subject to indirect impacts from changes in prey availability due to potential displacement from underwater noise and/or sedimentation This technical report aims to determine the distribution of little tern in the nearshore waters of the Proposed Development using site-specific surveys.

1.2 Study area

The little tern foraging distribution study area is situated on the outer western edge of the Dee Estuary in Denbighshire, North Wales. The study area was designed using published evidence on foraging ranges (Parsons *et al.*, 2015; Woodward *et al.*, 2019).

Using tracking data from two studies at the Scroby Sands colony, Woodward *et al.* (2019), reported that the max breeding season foraging range of little tern was 5km from the colony. However, Parsons *et al.* (2015) used three-years' worth of targeted surveys at 13 regularly occupied SPA colonies to study little tern foraging ranges during the breeding season. They found that the mean max foraging distance alongshore was 3.9km whilst the mean max foraging distance offshore was 2.2km. Furthermore, they found that the maximum offshore foraging extent at the Dee Estuary colony was 1,674m in 2010 and 2,070m in 2011, and the maximum alongshore foraging extents for the Dee estuary were reported as 3km either side of the colony (based upon surveys in 2009, 2010 and 2011).

As little tern mostly forage in the nearshore waters within close proximity of the colony, the study area encompasses all of the intertidal and nearshore waters up to 4.5km either side of the main colony at Gronant Dunes and extends to 2km offshore (this was the distance at which land based surveyors could reliably identify little tern using spotting scopes with x 60 magnification as per Joint Nature Conservation Committee guidance (2004)).

Figure 1.1 **Error! Reference source not found.** shows the location and extent of the study area. As little tern use both the intertidal (when it is inundated) and subtidal zones for foraging, the landward extent of the surveys was taken as Mean High Water Spring (MHWS).

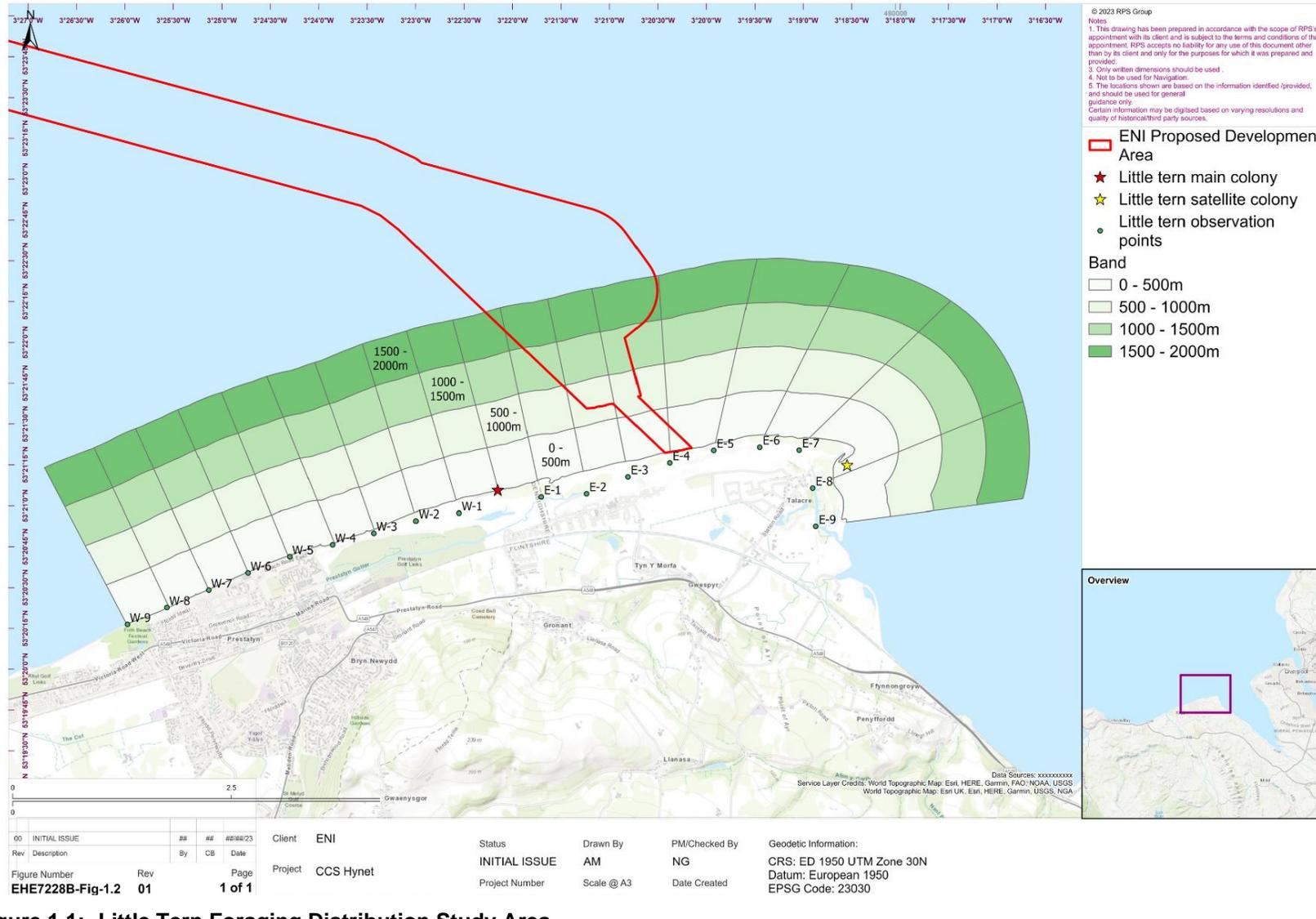


Figure 1.1: Little Tern Foraging Distribution Study Area

1.3 Survey methodology

The survey methodology was based on Parsons *et al.* (2015).

- The programme consisted of 8 survey visits spaced throughout the little tern breeding season (May 2023 to July 2023 inclusive).
- Counts were undertaken from 18 vantage points located on the upper shore above MHWS (see **Error! Reference source not found.**).
- Survey started at different tidal states, i.e., low, high, ebb, and flood.
- During each survey, two surveyors started at the observation points closest to the little tern colony (W-1 and E-1) and then moved outwards to W-9 and E-9. These were spaced as close to 500m apart as possible, except for between E-6 and E-9 as access was restricted. Therefore, surveyors had to use the inland path and took the best vantage points as close to 500m apart as was possible. Due to the curvature of the estuary mouth the eastern part of the study area has a larger surface area.
- At each observation point the surveyors stopped for a 30min period (this time is based on the mean foraging trip duration for little terns lasting between 16 and 29 minutes according to Perrow *et al.* (2006)) and looked outwards perpendicular to the shore and recorded all little terns within each zone (**Error! Reference source not found.**). Little terns that were at their colonies were not recorded. The following details were recorded:
 - Number and age of little terns (adult or juvenile).
 - Flight direction (only marked as west or east, e.g., if birds heading northeast then marked as east).
 - Behaviour (actively foraging, transiting, on sea, etc.)
 - Distance from the shoreline (0m – 500m, 500m – 1000m, 1000m – 1500m, 1500m – 2000m).
 - Notes, e.g., if terns are carrying prey.
 - Numbers of common tern and sandwich tern were also recorded as secondary target species.
 - Disturbance – Any source of disturbance to the birds across the study area at the time of the count was recorded. The perceived effect of disturbance on abundance and behaviour of birds in the count sector was also scaled according to the following categories (see below table)

Surveys were carried out by experienced ornithologists and using binoculars and spotting scopes with x 60 magnification.

	Notation	Definition
Effect	W	Weak e.g. change in behaviour, but birds not excluded
	M	Moderate e.g. birds excluded from parts of the recording sector
	S	Strong e.g. avoidance of the recording sector

Additional survey data was also collected, including:

- Weather conditions (wind speed using the Beaufort Scale, cloud cover estimated as eighths or octas of the sky, sea state, and visibility).
- Date
- Tidal state range during survey period.

1.4 Designated sites

DEFRA's Magic map was consulted to identify designated sites situated within 20 km of the Proposed Development (landfall only). The results of this are displayed in Table 1.1. A 20 km buffer was applied to the

Proposed Development as this is beyond the mean max foraging ranges for common tern (which are the only other breeding tern with possible connectivity to the Proposed Development. Sites that were designated for breeding and non-breeding (passage) tern species, and the features for which the sites are designated, are summarised in Table 1.1. The Dee Estuary and Mersey Narrows and North Wirral Foreshore are also Ramsar. The Dee Estuary Ramsar is designated in part for breeding common and little tern and the Mersey Narrows and North Wirral Foreshore Ramsar for non-breeding common tern.

Both of the coastal SPA and Ramsar sites are underpinned by SSSIs. The Dee Estuary is underpinned by multiple SSSIs. The main estuary is underpinned by two SSSIs, one Welsh and one English. The area surrounding Gronant is underpinned by the Gronant Dunes and Talacre Warren SSSI. The Mersey Narrows and North Wirral Foreshore is underpinned by the North Wirral Foreshore SSSI. The Gronant Dunes and Talacre Warren SSSI and the Dee Estuary SSSIs are designated for breeding little and common tern and the North Wirral Foreshore SSSI is designated for passage terns.

Only the SPAs are summarised as they contain citation population estimates, although it should be noted that these citation counts are out of date so therefore the recent colony counts and/or WeBS counts provide more up to date population estimates.

This shows that the Gronant Dunes and PoA colonies have increased with an estimated 242 pairs in 2023. Sandwich tern also appeared to have increased with common tern numbers in the Dee Estuary showing a slight decline with a major decline in the Mersey Narrows and North Wirral Foreshore population.

Table 1.1: Summarising The Tern Features Of The SPAs With Connectivity To The Proposed Development

SPAs	Distance from site	Features	Citation population	Period	Recent population estimate
The Dee Estuary	0 km	Common tern	392 pairs	Breeding	382 ¹ Pairs
		Little tern	69 pairs	Breeding	242 ² Pairs
		Sandwich tern	957 individuals	Passage	1,402 ³ Individuals
Liverpool Bay	0 km	Little tern	260 Individuals	Breeding	289 ² Pairs
		Common tern	360 Individuals	Breeding	*
Mersey Narrows and North Wirral Foreshore	7.9 km	Common tern	177 pairs	Breeding/non-breeding	60 ⁴ Individuals

¹ Based upon Seabird Monitoring Programme (SMP) counts for the Shotton Steelworks colony from 2021. ² Based upon published counts for Gronant and PoA colonies for 2023. ³ Based upon Wetland Bird Surveys (WeBS) 5-year averages for the Dee Estuary. ⁴ Based upon SMP colony counts for Birkenhead Docks in 2019. * As the number of tern colonies that utilise the Liverpool Bay is unknown no estimate is given.

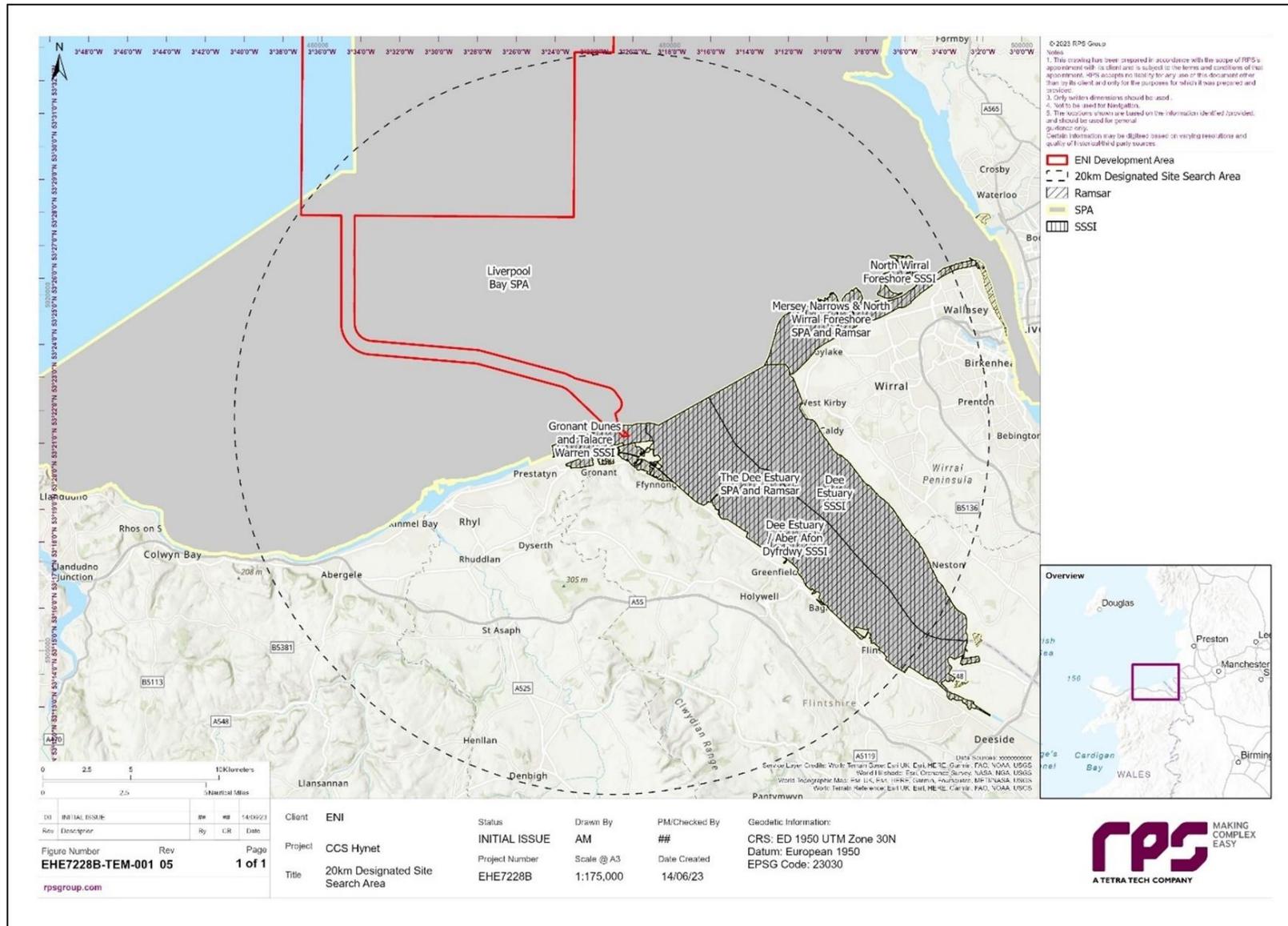


Figure 1.2: 20km Site Search For Designated Sites

1.5 Site-specific surveys

1.5.1 Survey dates and weather conditions

A summary of the surveys undertaken to inform this little tern foraging technical report is outlined in Table 1.2 below.

Table 1.2: Summary Of Site-Specific Survey Dates And Weather Conditions

Date	Surveyor	Direction	Start time	End time	Wind speed	Wind direction	Precipitation	Cloud cover	Visibility	Sea state	Tidal cycle at start
21-May	IKJ	W	15:00	21:20	2	NW	0	0	4	1	High
	MBH	E	15:00	21:20	2	NW	0	0	4	1	High
25-May	IKJ	W	15:00	21:20	1	W	0	0	4	1	Flood
	MBH	E	15:00	21:20	1	W	0	0	4	1	Flood
12-Jun	AC	W	09:55	16:00	1	N	0	6	4	0	Ebb
	AM	E	10:20	16:04	1	N	0	6	3	0	Ebb
23-Jun	GH	W	06:45	13:25	2	SW	2	8	4	1	Low
	AC	E	08:15	14:40	1	SW	2	7	4	1	Low
28-Jun	AC	W	07:00	12:40	2	SW	0	8	4	2	High
	GH	E	06:55	13:08	3	SW	0	7	4	2	High
03-Jul	GH	W	08:00	14:05	3	W	3	8	3	3	Low
	AC	E	08:00	13:50	3	W	3	8	3	4	Low
10-Jul	AC	W	08:00	14:20	2	S	3	6	3	1	High
	GH	E	08:00	14:55	3	SE	3	7	3	2	High
17-Jul	GH	W	08:00	14:20	3	NW	2	7	4	3	Low
	AC	E	08:00	13:40	3	W	3	6	4	4	Low

1.5.2 Survey findings

The results of the site-specific surveys corroborate the findings of previous studies with 90% of foraging birds concentrated within 1.5km offshore from MHWS and 3.5km alongshore either side of the colony (see Figure 1.4 and Figure 1.5).

Figure 1.3 **Error! Reference source not found.** shows how little tern foraging is concentrated within the study area. The highest concentrations of foraging little tern were situated close to the main colony at Gronant Dunes and within the first 1.5km offshore.

Of the 11,279 sightings of little tern recorded only 41 were recorded flying out of the western limit of the study area (this represents 0.36% of all sightings) with 164 recorded flying out of the eastern edge of the study area (this represents 1.45% of all sightings). Whilst the western edge is situated 4.5km from the main little tern colony, the eastern edge of the study area is only approx. 0.5km from the smaller satellite colony situated at

PoA, so it is likely that the greater number of birds extending beyond the eastern edge of the study area were composed of birds from the satellite colony. No birds were reported as flying beyond the 2km seaward limit of the study area although due to the distance involved it's possible that birds may have been missed, or distances wrongly estimated, by surveyors.

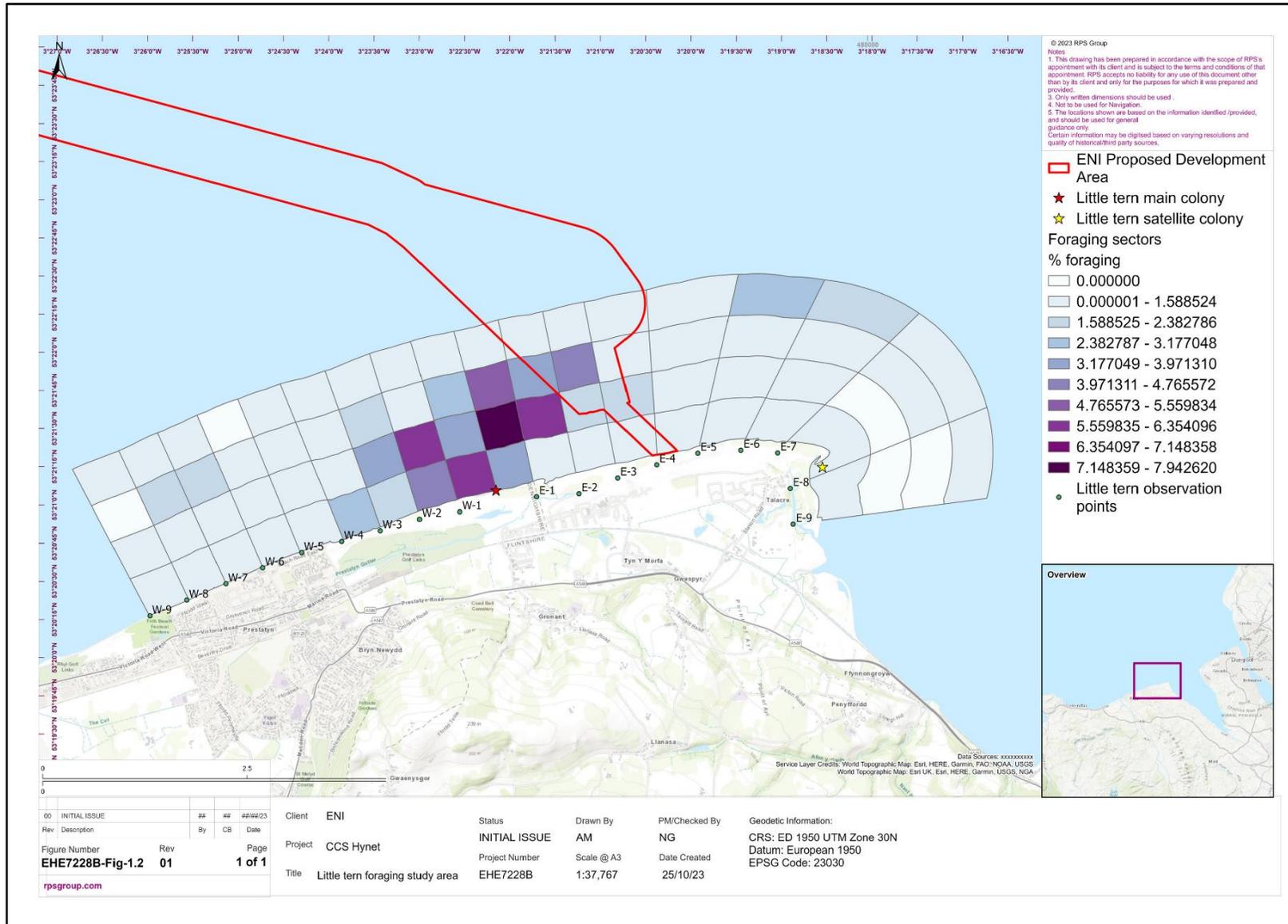


Figure 1.3: Distribution Of Foraging Little Tern Split By Count Sectors And Distance Bands

Figure 1.4 shows that the core foraging range (50% of all foraging) for little tern is less than 1km offshore from MHWS with almost all of the total foraging range (90% of all foraging) within 1.5km from MHWS. These findings are backed up by the findings of Parsons *et al.* (2015) who found maximum foraging distances offshore between 1,674m and 2,070m.

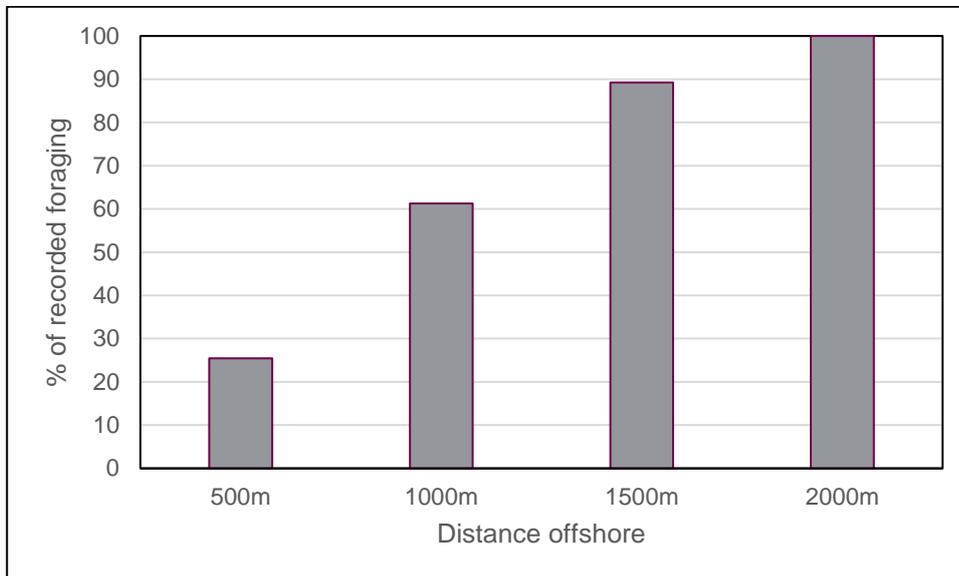


Figure 1.4: Cumulative % Of Recorded Little Tern Foraging In Relation To Distance Offshore.

The alongshore foraging range extends to 1km from the colony with the total foraging range within 3.5km from the colony. This is closely aligned with the findings of Parsons *et al.* (2015) for the Dee estuary; however they reported a max foraging distance of 3km whereas the survey findings recorded low numbers of birds still foraging beyond 3km from the colony.

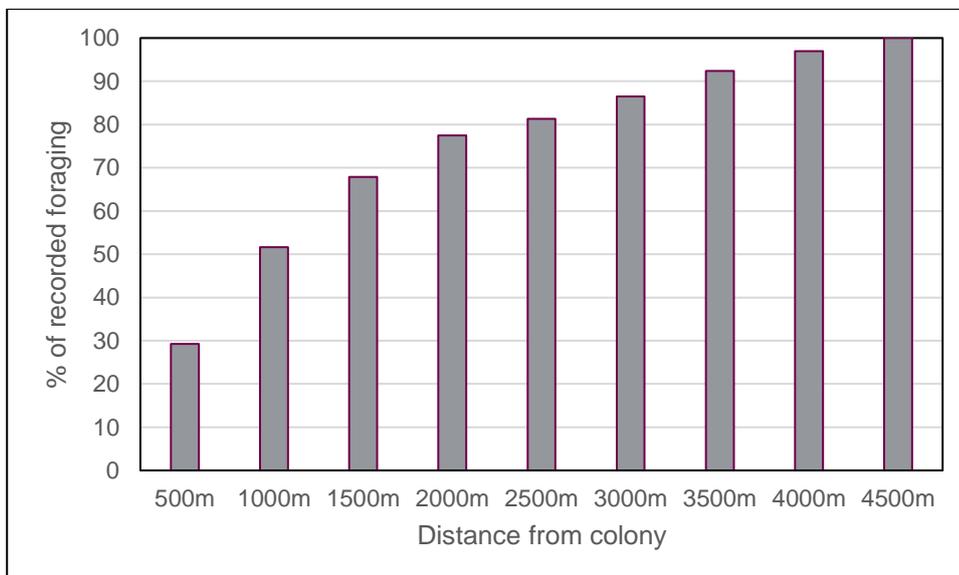


Figure 1.5: Cumulative % Of Recorded Little Tern Foraging In Relation To Distance Alongshore.

Figure 1.6 shows how this foraging is aligned with direction from the colony. Although approx. 50% little terns forage to the east and 50% forage to the west, there are higher concentrations of foraging within 500m to the east of the main colony, the reasons for this are unknown however sand bar and associated lagoon occurrence

were also noted as increasing towards the east of the colony. Both easterly and westerly directions show a sharp drop off in foraging up to 2.5km from the colony. However, both directions then see small peaks occur, westerly at 4km and easterly at 3km. The easterly peak may be easily explained by the presence of the satellite colony however, the westerly peak remains unexplained, although it should be noted that it only represents approx. 6.4% of all recorded foraging.

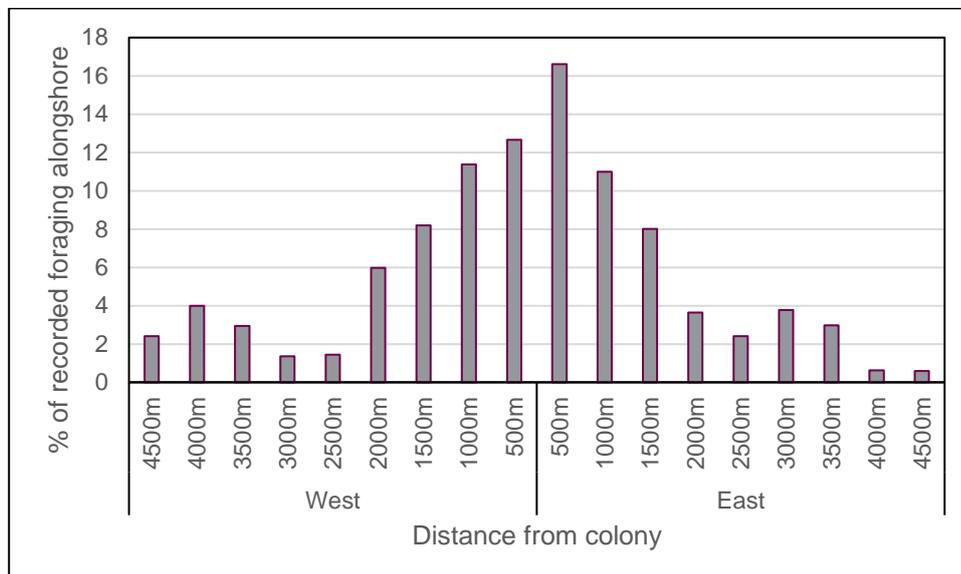


Figure 1.6: The Differences In Recorded Little Tern Foraging As Related To Direction From The Colony.

It can be safely concluded that the areas close to the colony (within 1.5km offshore and 3.5km alongshore) are of principal importance for foraging little tern, with the minor fluctuations recorded possibly representing the complex and dynamic estuarine environment of shifting sandbars and pools.

To estimate the proportion of little tern foraging that is within the area of physical works the mapped concentrations of foraging little tern (Figure 1.3) were used to calculate what % of foraging was contained within the Proposed Developments area of physical works. Table 1.3 shows the calculations made.

Based upon the 2023 breeding season data approx. 10.2% of the Gronant Dunes and Point of Ayr little terns foraging distribution is situated within the area of physical works.

Table 1.3: Calculations To Determine What Percentage Of Little Tern Foraging Is Located Within The Area Of Physical Works.

Observation point	Distance band	% foraging per sector	% of the sector within the area of physical works	% foraging within area of physical works
E-1	1500-2000m	0.24493	8.58	0.02
E-2	1500-2000m	0.38488	93.29	0.36
E-3	1500-2000m	0.38488	100.00	0.38
E-4	1500-2000m	0.73478	91.28	0.67
E-2	1000-1500	3.324	37.61	1.25
E-3	1000-1500	4.6536	100.00	4.65
E-4	1000-1500	1.0147	44.94	0.46
E-2	500-1000m	6.12316	0.24	0.01

Observation point	Distance band	% foraging per sector	% of the sector within the area of physical works	% foraging within area of physical works
E-3	500-1000m	2.34432	54.50	1.28
E-4	500-1000m	1.81945	49.04	0.89
E-4	0-500m	0.06998	41.79	0.03
E-5	0-500m	0.06998	12.75	0.01
Total foraging within the area of physical works				10.02

In addition to the little terns, both common tern and sandwich tern were sighted. There were 131 sightings of common tern (or 1.09% of all tern sightings) throughout the surveys and 591 sightings of sandwich tern (or 4.92% of all tern sightings). This indicates that although the study area is beyond the mean max foraging ranges published by Woodward, *et al.* (2014) for SPA colonies, the area is still used by low numbers of birds for foraging and/or commuting.

1.6 Summary

- The Gronant Dunes and PoA colonies hold internationally significant numbers of little tern.
- These colonies have increased in size in recent years.
- Only 0.36% of sightings represented birds travelling further than 4.5km along the shore from either of the colonies. No birds were recorded as having travelled beyond 2km offshore.
- Thus, the little tern foraging range (90% of the total foraging area used by birds) at Gronant Dunes and PoA can be characterised as being within 3.5km either side along the shore from the main colony and within 1.5km offshore from MHWS. This small area is therefore of principal importance to this species during the breeding season.
- Of all recorded little tern, 10.02% were foraging within the Proposed Developments area of physical works.
- In order to avoid impacts upon foraging little tern, work in the nearshore waters could be carried out outside of the little tern breeding season which runs from mid-April to mid-July.
- Common tern were recorded using the study area in low numbers.
- Sandwich tern were more frequently recorded although still in relatively low numbers.

1.7 References

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