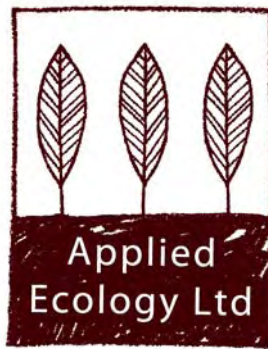


Annex 11.8

## AMEP Protected Species

*(Applied Ecology)*





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**ABLE MARINE ENERGY PARK  
PROTECTED SPECIES**

Report for

**Able UK Ltd**

May 2011

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**Client:** ABLE UK Ltd

**Title:** Able Marine Energy Park – Protected Species

**Project No:** AEL 306

**Date of Issue:** 19 May 2011

**Status:** Final Report

**Signed on behalf of Applied Ecology Ltd:**



Dr Duncan Painter  
Director

---

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# 1 INTRODUCTION

## 1.1 BACKGROUND

1.1.1 Applied Ecology Ltd (AEL) was appointed by ABLE UK Ltd, to undertake follow-up great crested newt and bat survey work on two land areas associated with the proposed development of a Marine Energy Park adjacent to the south bank of the River Humber estuary near South Killingholme, north Lincolnshire (central OS grid reference TA 166 186).

1.1.2 The two survey areas include the development site itself near South Killingholme, and an area of arable farmland at Cherry Cobbs Sands alongside the north bank of the Humber. The Cherry Cobbs Sands site (central OS grid reference TA 224 209) is to be flooded to create inter-tidal habitat as compensation for the loss of inter-tidal habitat on the south side of the river that will result from the Marine Energy Park development.

### Great Crested Newt

1.1.3 This report details a great crested newt (GCN) population survey completed in accordance with best practice guidance produced by English Nature, 2001<sup>1</sup> of two closely located ponds on the South Killingholme site that were found to support GCN by AEL in 2010<sup>2</sup>.

1.1.4 A GCN presence/absence survey of five water bodies identified on and close to the Cherry Cobbs Sands site was undertaken at the same time as the South Killingholme survey to confirm GCN presence/absence. The need for this survey was identified by in AEL in 2010<sup>3</sup>, and also included additional water bodies identified by Environmental Resources Management (ERM).

### Bats

1.1.5 Bat survey work was confined to the South Killingholme site and comprised a daylight inspection of all trees within the site for the presence of features that could be used by tree roosting bats and evidence of bat presence. A bat activity survey of a 0.01km<sup>2</sup> area of semi-natural deciduous woodland (central OS grid

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<sup>1</sup> English Nature (2001) *Great crested newt mitigation guidelines*. Version August 2001.

<sup>2</sup> Applied Ecology Ltd (October 2010) *South Killingholme Phase 1 Ecology Survey*. Report for Institute of Estuarine Studies - University of Hull, issued 9 June 2010.

<sup>3</sup> Applied Ecology Ltd (October 2010) *South Killingholme Phase 1 Ecology Survey - Cherry Cobb Sands*. Report for Able UK Ltd, issued 12 October 2010.



reference TA 16922 18419) within the site that would be lost to development was also completed.



## 2 GREAT CRESTED NEWT

### 2.1 SOUTH KILLINGHOLME

2.1.1 The location of the two ponds that were subject to a six visit population GCN survey in 2011 is shown by **Figure 1**. The ponds are referred to as Pond 12 (central grid reference (TA 16799 18139) and Pond 13 (TA 16835 18220) to maintain consistency with the pond numbering system adopted by the GCN presence/absence survey completed in 2010.

2.1.2 The ponds are located within 80m of each other with no barriers to GCN dispersal and can therefore be considered to support the same GCN population in accordance with EN 2001 (ibid).

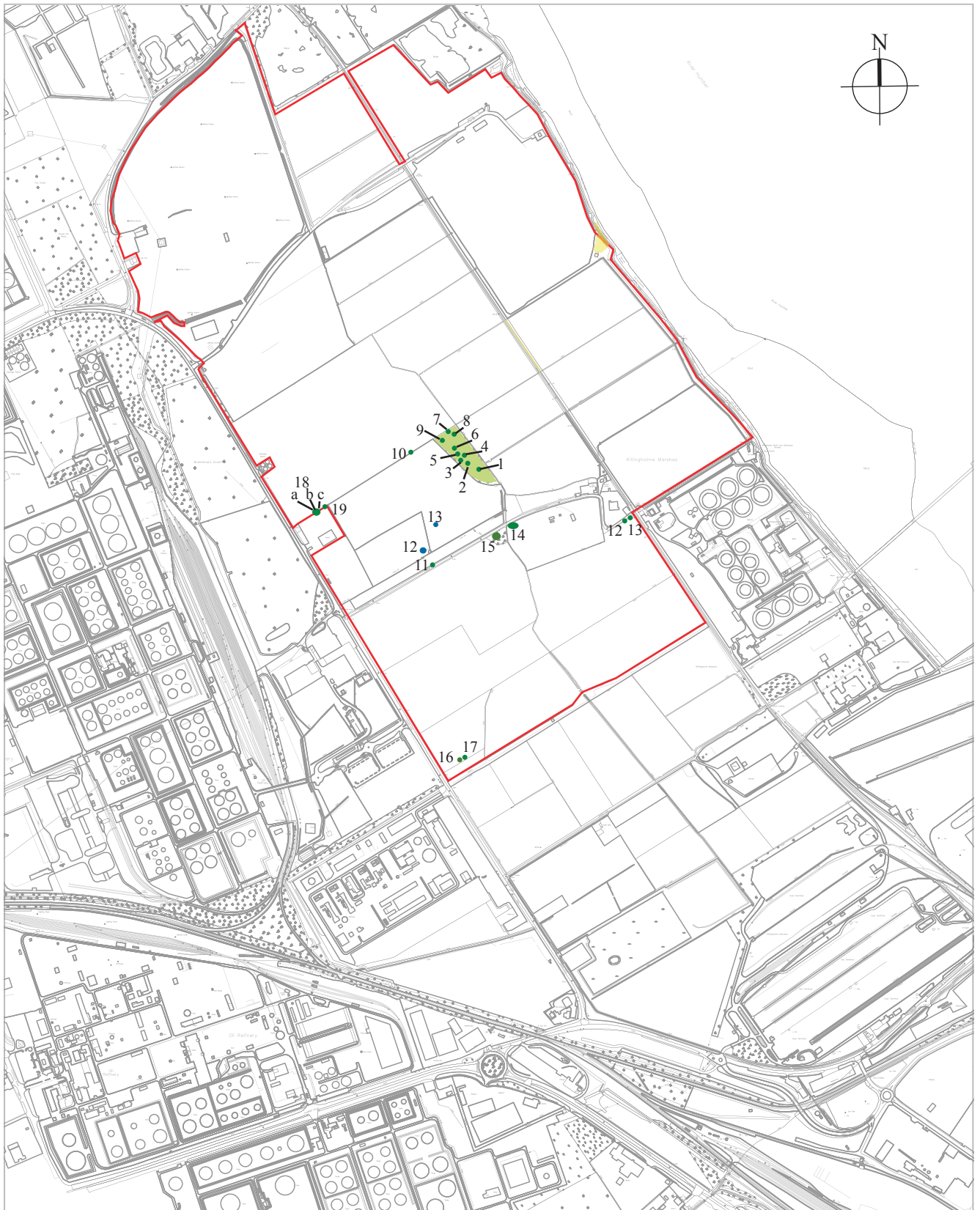
#### **Survey Approach**

2.1.3 The survey was undertaken during the 2011 amphibian breeding season by experienced AEL ecologists working in pairs for health and safety reasons (Dr Duncan Painter, Crystal Acquaviva, Martin Brammah, and Chris Woolley) under the auspices of a Natural England GCN survey and handling licence no. 20111861 held by Duncan Painter.

2.1.4 Guidance for GCN survey has been produced by English Nature<sup>2</sup>. For GCN population size class assessment, EN 2001 recommends that two survey methods should be completed in each water body; torch survey and bottle [or funnel] trapping. EN 2001 guidance suggests that six separate survey visits in suitable weather conditions should be completed between mid-March and mid-June as a reasonable standard of survey effort, with at least three of the visits being completed during the period mid-April to mid-May. This is because there is a risk that GCN may not have reached their breeding ponds in full numbers before mid-April, and because adult GCN may have left their breeding ponds after mid-May depending on local conditions.

2.1.5 The methodological approach adopted by this survey was based on the use of the EN 2001 recommended methods, where possible to do so effectively, with six separate overnight visits to the two ponds being conducted simultaneously between 4 April and 19 May 2011 to determine GCN population size class.





Key

- Survey boundary
- Semi-natural deciduous woodland (TA 16922 18419)
- Trees with bat roost potential
- GCN pond
- Unsurveyed area

### ABLE Marine Energy Park

Figure 1: South Killingholme Location & Results Plan





### *Funnel Trapping*

- 2.1.6 Double ended funnel traps (40cm x 20cm, with a 3mm square mesh) were set at regular intervals around the entire perimeter of each pond in order to live capture newts. The traps work on the same basis as plastic drinks bottle traps but are larger and have two as opposed to one inverted funnel entrance. The number of traps used was roughly proportional to the range of littoral aquatic habitats present in each water body with traps being set at approximately 1.5 m centres around all accessible pond banks. Traps are set such that the upper quarter is above the water surface such that any captured animals can easily reach the water surface to gulp air.
- 2.1.7 The traps were set on the nights of 4, 11, 18 April and 9, 10, 16 May and removed the following morning in accordance with the recommended trapping times described by EN 2001.
- 2.1.8 All GCN captured in each trap were sexed, counted and returned to the pond immediately.

### *Egg Searching*

- 2.1.9 The first survey visit confirmed that both ponds were largely devoid of suitable submerged aquatic vegetation for GCN egg laying, thus a string of ten clear polythene "leaves" were set in both ponds on 12 April, to provide an artificial egg laying substrate for GCN. These egg laying strings were checked for GCN eggs on subsequent visits.

### *Torch Light Survey*

- 2.1.10 A one million candle power torch (Clulite CB2 Clubman Deluxe) was used to conduct an after dark torchlight survey of both ponds on the nights of 11 April and 16 May. Both surveys were undertaken in complete darkness after 22.00 hrs by walking slowly around the perimeter of each water body, and shining the torch into the water to enable a count of all newts seen to be made.
- 2.1.11 Torch survey was not conducted on every survey visit occasion as both ponds were obviously sub optimal for torch survey. Pond 12 possessed relatively clear water conditions (turbidity 2 on a scale of 0-5), but access to a large proportion of its margins (circa 50%) was restricted by overhanging woody scrub vegetation that grew around the pond margins and meant that only a relatively small proportion of the pond bank was safely accessible and visible with the torch.



- 2.1.12 Pond 13 had a fringe of tall reed growth and a floating root mat of wet grassland around its entire margin that completely prevented safe access to the pond edge and effective torch survey and restricted views in the water column. Water conditions were also relatively turbid (turbidity 3 on a scale of 0-5).
- 2.1.13 It is important of note that the funnel traps used in both ponds captured more GCN than were seen the same nights with the torch. In light of this, it can be concluded that the limitations of the torch survey did not significantly limit the overall assessment of GCN population size.

### Survey Findings

- 2.1.14 The Habitat Suitability Index (HSI) for the two ponds and the results of the GCN survey are provided in **Table 2.1**.
- 2.1.15 Pond 12 had the highest HSI of 0.71 as it is less shaded than Pond 13 which has an HSI score of 0.65. **Table 2.1** confirms that GCN were captured in Ponds 12 and 13 on each of the six survey visit occasions. The maximum total count of GCN from the two ponds was 19 animals on the 11-12 April which suggests that, taken together, they support a “medium” sized GCN population (i.e. between 10 and 99 seen/captured on any survey occasion) in accordance with EN 2001.
- 2.1.16 GCN eggs were found on the egg strips in Pond 12 on 18 April, but none were found on the strips in Pond 13 on any occasion. The presence of GCN eggs confirms breeding in Pond 12. Despite the apparent absence of GCN eggs from Pond 13, it is of note that gravid female GCN were captured from Pond 13 and it is considered likely that egg laying did take place in the pond.

**Table 2.1 Results of GCN Survey - South Killingholme**

Survey Date	Air temp (°C)	Turbidity (0-5 scale)	Vegetation cover (%)	GCN seen with torch	GCN caught in funnel traps
<b>Pond 12</b>					<i>8 traps</i>
<b>HSI - 0.71</b>					
4-5 April	10	2	10	-	8
<b>11-12 April</b>	<b>13.5</b>	<b>2</b>	<b>10</b>	-	<b>12</b>
18-19 April	14.8	2	10	8	16
9-10 May	15.5	2	10	-	13
11-12 May	14.5	2	10	-	13
16-17 May	13.8	2	10	5	12
<b>Pond 13</b>					<i>5 traps</i>
<b>HSI - 0.65</b>					
4-5 April	10	3	45	-	3
<b>11-12 April</b>	<b>13.5</b>	<b>3</b>	<b>45</b>	-	<b>7</b>
18-19 April	14.8	3	45	0	2
9-10 May	15.5	3	45	-	1
11-12 May	14.5	3	45	-	0
16-17 May	13.8	3	45	0	2

2.1.17 Smooth newts were captured in funnel traps in both ponds with the maximum total number being 52 on 11-12 April survey visit. No other amphibian species were captured or seen.

## 2.2 SUMMARY

2.2.1 Ponds 12 and 13 together support a medium sized breeding population of GCN.



## 2.3 CHERRY COBB SANDS

- 2.3.1 A total of five water bodies (numbered Ponds 1-5) were identified as requiring GCN survey – see **Appendix 1**.
- 2.3.2 Survey access permission to Pond 1 (grid reference TA 22568 21565) was denied by the land owner who described the water body as a former slurry lagoon. Pond 5 (TA 23411 19040), while evident on the 1:25,000 Ordnance Survey map of the area, was found to not be present on the ground, with absolutely no field evidence that it ever existed. The site of Pond 5 is an arable field with no low spots or any other evidence on the ground that it was ever a pond.
- 2.3.3 Ponds 3 (TA 22012 20505) and 4 (TA 22281 20302) are shown on the OS map to be separate water bodies. In reality they are one large and hydrologically connected saline drainage ditch or “soke dyke” located behind the Humber river embankment.

### Survey Approach

- 2.3.4 A four visit presence / absence GCN survey of Ponds 2 (TA 22509 20927), Pond 3 and Pond 4 was completed by the same AEL staff following exactly the same survey approach as outlined above for the South Killingholme GCN survey.
- 2.3.5 Ponds 3 and 4 were surveyed separately on the first survey visit occasion (4-5 April), but there after were surveyed as one water body as they were hydrologically connected and both supported a large predatory fish population.
- 2.3.6 The four survey visits were conducted on 4-5, 11-12, and 18-19 April and 9-10 May 2011.
- 2.3.7 Both water bodies were unsuitable for torch survey, and torch survey of both was therefore completed on only one occasion - the night of 18 April. Pond 2 was turbid (turbidity scale 3) and covered with floating blanket weed (*Enteromorpha* sp) across 80% of its surface so that views into the water column were severely restricted. Ponds 3 and 4 were both heavily vegetated with emergent plant growth (95% cover) that restricted views into both.

### Survey Findings

- 2.3.8 No GCN were captured or seen on any of the four survey occasions in any of the water bodies that were surveyed. A single smooth newt was captured in one



funnel trap in Pond 2 on the April 18-19 survey occasion only.

- 2.3.9 As highlighted above, Pond 3 and 4 are one brackish drainage ditch that was found to support a large breeding population of nine- and three-spined stickleback that were caught in their hundreds in the funnel traps on each occasion.
- 2.3.10 No amphibians were seen in either water body during the torch survey, and no GCN or other amphibian eggs were found during egg searching on each of the four survey visit occasions.

## 2.4 SUMMARY

- 2.4.1 GCN are absent from Ponds 2, 3 and 4 within the Cherry Cobbs Sands site. The inter-connected brackish water ditch, that is Ponds 3 and 4, is completely unsuitable for GCN on account of the presence of a large breeding population of predatory fish.
- 2.4.2 The absence of GCN and virtual absence of other amphibians from Pond 2 may possibly be explained by its isolation from other populations of amphibians in an area dominated by arable land use.



## 3 BATS

### 3.1 SURVEY APPROACH

#### Tree Survey

- 3.1.1 A daylight visual inspection of all mature trees within the survey area outlined by **Figure 1** (the South Killingholme development site) was completed by two experienced AEL bat workers (Dr Duncan Painter – Natural England bat licence 20104310; and Ms Crystal Acquaviva licence no. 20110210) over two days in April 2011 (4 April and 18 April) to record the presence of trees with features that bats could use for roosting (e.g. natural and woodpecker holes, loose bark, and splits in limbs and trunks) and for any associated evidence of the presence of bats e.g. droppings, staining and scratch marks around hole entrances.
- 3.1.2 All survey work was completed from ground level using a high-powered (1-million candle power) torch and binoculars as necessary to search for evidence of bat presence and features that bats could use for roosting.

#### Woodland Bat Activity Survey

- 3.1.3 A bat activity survey to watch for and count bats emerging from an area of semi-natural deciduous woodland within the South Killingholme site (see **Figure 1**), as well as recording general levels of bat activity around the woodland, was undertaken at dusk on 10 May 2011. A return to roost survey was completed the following morning (11 May) before dawn to count bats returning to roost in the woodland. Both surveys were completed by two ecologists: Ms Crystal Acquaviva, with assistance from Dr Martin Brammah (AEL).
- 3.1.4 The evening roost emergence survey commenced 15 minutes before sun set and continued for 120 minutes after sun set. The dawn return survey commenced at 90 minutes before first light the following morning and continued until dawn. Sunset on the evening of the survey was at 20.46 and first light (dawn) the next day was at 05.06.
- 3.1.5 Weather conditions during the survey were good for bat activity, with an air temperature of 14.5°C at the start of the emergence survey falling to a low of 12.5°C at dawn. Wind was at Beaufort scale 3, gentle breeze, during the emergence survey, rising to a fresh breeze (Beaufort scale 5) the following morning before dawn. Cloud cover at the start of the survey was 95% with a few



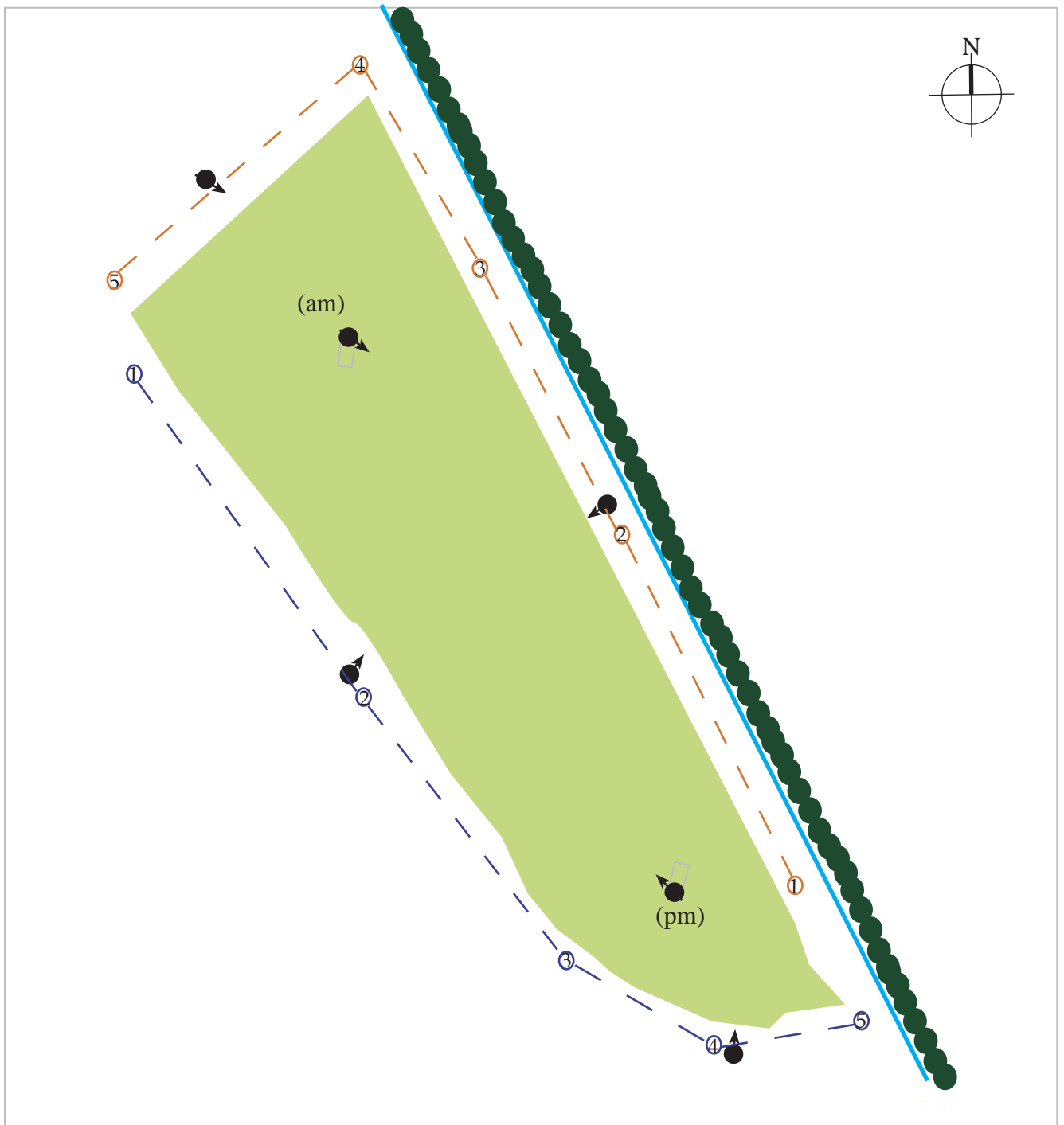
- sports of light rain, clearing to 50% cloud cover and no rain at sun set and continuing dry for the rest of the evening and through the night to dawn the next day.
- 3.1.6 The two surveyors were each equipped with a hand-held bat detector (Pettersson D230) and walked transects on opposite sides of the woodland (south west and north east sides) during the emergence and return surveys. Each transect was divided into five stopping points, where surveyors stopped for three minutes to observe bat activity. Stopping points were set approximately 1 minute walk apart (see **Figure 2**). Transects were repeated until the survey end.
- 3.1.7 Five Anabat SD1 frequency division bat detectors within inbuilt time recording facility were employed during the survey to record bat calls and are shown on **Figure 2**. Four detectors were attached to tripods 1.5m above ground on each of side of the woodland with their microphones pointed at a 45 degree angle towards the woodland canopy. All four detectors were left to record bat calls throughout the night. The fifth detector was positioned on a 1.5m tripod within the woodland. From 20.30 to 03.30 it was positioned in the south end of the wood, and from 03.36 to 05.30 it was re-located in the north end of the wood.

## 3.2 SURVEY FINDINGS

### Tree Survey




- 3.2.1 A total of 21 trees with features suitable for roosting bats were identified within the South Killingholme site (see **Figure 1** and photos in **Appendix 2**). Nine of these trees were located within the semi-natural deciduous woodland, and the remaining 12 trees were located in the southern half of the site, mainly along field edges, as shown on **Figure 1**. Restricted access prevented the inspection of two small areas of the site as shown on **Figure 1**.
- 3.2.2 None of the trees recorded possessed any obvious evidence that would indicate use by tree roosting bats, and the trees were recorded because of their theoretical potential to support roosting bats only.
- 3.2.3 The results of the tree survey are provided in **Table 3.1**.





**Key**

50 m

- 
 Anabat electronic bat detector on tripod (1.5m above ground) and direction of microphone (arrow)
- 
 Transect A. Surveyor repeatedly walked transect, stopping at points (#) for three minutes during the dusk and the dawn return to roost survey
- 
 Transect B. Surveyor repeatedly walked transect, stopping at points (#) for three minutes during the dusk and the dawn return to roost survey

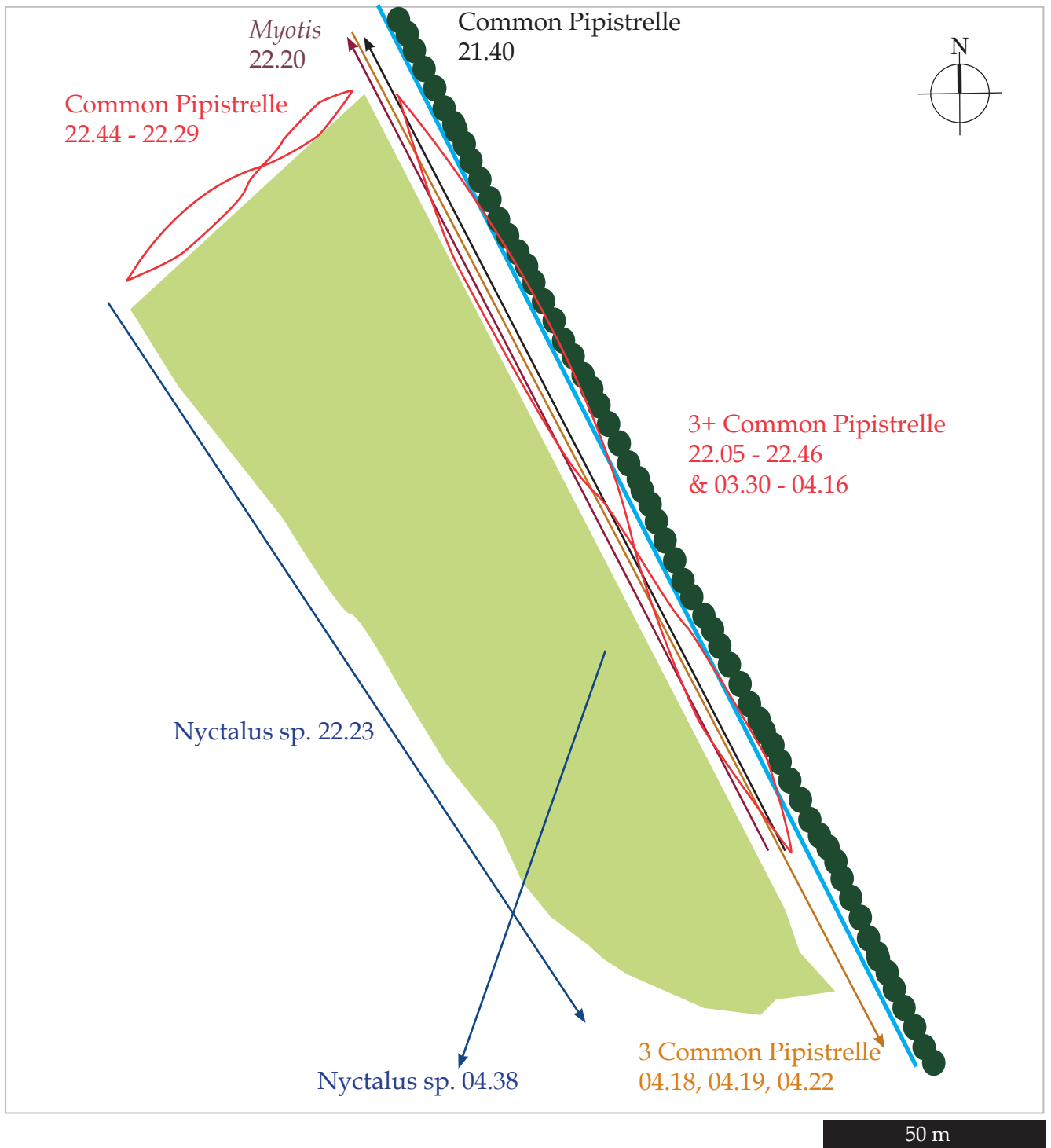
**Table 3.1 Results of Tree Survey – South Killingholme**

Tree no.	Tree Species	Potential Bat Roost Feature	Signs of Bat Presence	Grid Ref
1	Unknown - dead	Woodpecker hole at 2.5m height	None	TA17040 18310
2	Elm - dead	Loose bark	None	TA16967 18361
3	Oak	Hollow trunk, dense, thick-stemmed ivy	None	TA16961 18364
4	Elm - dead	Loose bark	None	TA16958 18372
5	Elder - dead, splayed	Natural holes, splits in major limbs	None	TA16943 18382
6	Oak	Split at 5m height	None	TA16939 18409
7	Large Hawthorn? - dead	Hollow trunk, loose bark	None	TA16878 18498
8	Oak - dead	Loose bark	None	TA 16882 18492
9	Unknown - dead	Multiple woodpecker holes	None	TA16862 18481
10	Ash	Natural holes	None	TA16776 18438
11	Elm	Cracked trunk with cavity	None	TA 16837 18105
12	Ash	Several small holes, and large crack	None	TA 17406 18226
13	Ash	2 small holes	None	TA 17423 18240
14	Unknown - row of dead trees	Loose bark	None	TA 17064 18224
15	Group of half-dead elms	Holes and loose bark	None	TA 17012 18187
16	Willow - pollarded	Cracks, loose bark, natural holes and hollows	None	TA 16910 17470
17	Willow - pollarded	Loose bark, many woodpecker holes	None	TA 16916 17481
18	3 Willows- A B C	A - Loose bark, holes in trunk B - Splits in trunks C - No features apparent but foliage blocking view	None None None	TA 16467 18250 TA 16473 18254 TA 16479 18257
19	Willow - half-dead	Lots of loose bark, split in trunk	None	TA 16497 18268

### Woodland Bat Activity Survey

3.2.4 No bats were observed flying out of or into the woodland during the dusk and dawn surveys respectively. Common, soprano, and Nathusius' pipistrelle, noctule, and *Myotis* (probably Brandt's bat) were first and last recorded foraging and/or commuting along the woodland edge at times after sun set and before sun rise that suggested they had been roosting in location/s away from the woodland.

3.2.5 **Noctule** bat calls were first heard, but not seen, during the emergence survey at 21.11 (approximately 20 minutes after sunset). A *Nyctalus* bat was also heard, but not seen, at 22.15. The last recorded noctule call was at 04.38, with the bat seen commuting over the wood in south-west direction (see **Figure 3**). Noctule calls were also recorded by the fixed detectors at 22.20 on the east side, and at 04.14 on



**ABLE Marine Energy Park**

Figure 3: Bat activity survey results 10-11th May 2011





- the north and east side of the wood. A large bat (probably a noctule) was seen by commuting southward on the west side of the woodland at 22.23 (see **Figure 3**).
- 3.2.6 **Common pipistrelle** bat calls were first recorded at 21.22 (approximately 35 minutes after sunset) by the detector on the east side of the woodland. A common pipistrelle was seen commuting northward along the east side of the woodland at 21.40 (see **Figure 3**). During the return to roost survey, three common pipistrelles were seen commuting southward along the east side of the woodland at 4.18, 4.19 and 4.22 respectively. These were the last common pipistrelle recorded before sun rise.
- 3.2.7 Common pipistrelle bat foraging and commuting calls were recorded regularly throughout the night by the detectors located on the east and north sides, and for a shorter period from 22.13-1.48, on the south and west sides of the woodland. At least three common pipistrelle bats were seen foraging along the east side of the woodland from 22.05 until 22.46 when the emergence survey ended. Common pipistrelles were also seen foraging in this area during the dawn survey from 03.30 until 04.16. A single common pipistrelle was also seen foraging along the north side of the woodland from 22.44 until 22.29.
- 3.2.8 The north and east sides of the woodland were sheltered from the prevailing wind which probably accounts for the greater levels of bat activity in these locations during the survey along with the presence of a water filled drainage ditch that runs alongside the eastern edge of the wood.
- 3.2.9 Very little bat activity was recorded within the woodland during the survey with only a single set of common pipistrelle calls being recorded (at 03.32) during the entire survey period by the fixed detector located within the woodland.
- 3.2.10 **Soprano pipistrelle** bat calls were recorded occasionally during the survey. They were foraging calls recorded by the southern woodland edge at 21.39, by the eastern edge from 01.01-1.02 and 01.55-02.02, and by the northern edge 02.33-2.34 and 02.59.
- 3.2.11 **Nathusius' pipistrelle** bat calls were recorded by the fixed detector on the western edge at 23.00, and at 23.45 by the detector along the northern edge of the wood. While these were the only calls that can be confirmed as Nathusius' pipistrelle by their distinct peak frequencies, many of the other recorded pipistrelle calls had peak frequencies not exceeding 44.1 kHz. The Nathusius' peak frequencies of 41.7-44.1 kHz are shared with common pipistrelle, thus



hypothetically many of the calls attributed to common pipistrelle above could have been Nathusius' pipistrelle.

- 3.2.12 *Myotis* bat species calls were first recorded by the eastern edge of the wood at 21.38. *Myotis* calls were also recorded by the detectors to the east and north sides of the woodland at 22.17 and 22.20, and later in the north at 22.30 and east at 23.48. The *Myotis* recorded at 22.20 was seen flying northward (see **Figure 3**). No *Myotis* calls were recorded during the return to roost survey. All recorded *Myotis* calls had similar characteristics and were probably those of Brandt's bats.

### Summary

- 3.2.13 All of the bat species recorded during the survey were recorded at times later than expected had they emerged from tree roosts within the woodland or, as in the case of *Myotis* bat/s (which were recorded relatively early during the emergence survey) were not recorded during the return to roost survey. This coupled with a virtual absence of bat activity within the woodland, and sightings of bats commuting into and away from the woodland at dusk and dawn respectively suggests strongly that the woodland did not support a significant bat roost during the survey, and that a breeding (maternity) roost of bats is not present within trees within the wood.
- 3.2.14 The woodland edge and adjacent habitat (hedgerows, scrub, and drainage ditch) were of importance as a foraging area for a range of bats in the local area with at least five species of bats being recorded making use of the woodland during the survey.
- 3.2.15 While no evidence of roosting bats has been found in association with any tree within the South Killingholme site, the future use of trees by roosting bats, particularly those identified by this survey, cannot be discounted as bats will switch their tree roost locations with great regularity.
- 3.2.16 A precautionary approach to any future tree removal is therefore recommended, with appropriate checks being made for bats in tree holes and cavities immediately before felling, and the felling of any tree with roost potential to take place in the autumn while bats are still active after maternity colonies have dispersed and before the start of winter hibernation.
- 3.2.17 If no evidence of bat presence in the tree is found, and an appropriately experienced arborist is certain that bats are absent as all cavities/crevices have



been inspected, then the tree could be felled without restriction. If no evidence of bats is found, but it is not possible inspect all internal cavities, for whatever reason, the tree should be soft-felled in sections, with any section containing a cavity/crevice being left on the ground for 24 hours to enable any bat inside it to fly-off.

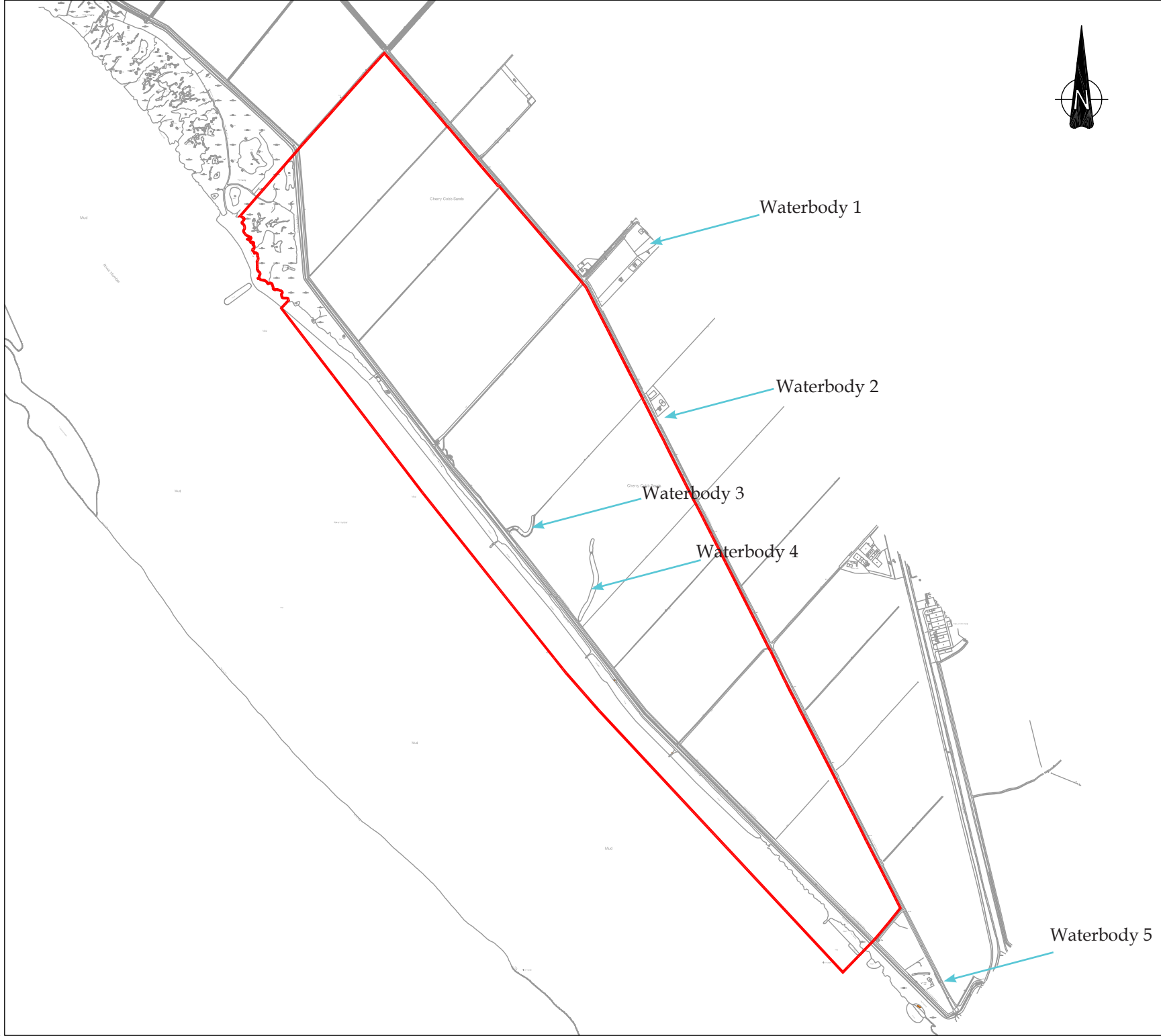
- 3.2.18 If evidence of bat presence is found, then work to that tree should stop until an appropriately licenced bat worker has been contacted and an appropriate mitigation strategy developed.

### **Habitat Loss Compensation**

- 3.2.19 At least five species of bat have been confirmed to use the woodland for foraging purposes during the survey and the woodland is clearly of importance to bats in the local area as a place to feed.
- 3.2.20 Ongoing research by the Bat Conservation Trust suggests that 90% of all bat roosts occur within 400m of broadleaf woodland. Reflecting this, it is recommended that replacement broadleaf woodland (unlit and well connected) is planted in a suitable area as compensation for any future woodland habitat loss that may occur as a result of future development.
- 3.2.21 Discussion with Able UK Ltd has verified that a landscape scale habitat creation strategy has been developed to compensate the loss of semi-natural habitat associated with future development that should be of significant benefit to foraging bats and other wildlife.
- 3.2.22 Consideration should be given to the erection of a number of bat boxes on poles within this new woodland and wetland landscape to increase bat roost opportunity in advance of the woodland maturing.



## Appendix 1



KEY

█ Cherry Cobb Sands

A	24/05/2011	Preliminary Issue	JH	JM	RC
Rev	Date	Comments	Drw	Chk	App



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Project:	ABLE Marine Energy Park
Client:	ABLE UK Ltd
Title:	Cherry Cobb Sands Land Boundary

PRELIMINARY

Scale:	1:12,500@A3	Drawn	J Harris	Checked	J Monk	Approved	R Cram
Date	24/05/2011	Date	24/05/2011	Date	24/05/2011	Date	24/05/2011
Drawing No.	AME - 01171		Revision:		A		





## **Appendix 2**



Tree 1



Tree 2



Tree 3



Tree 4



Tree 5



Tree 6



Tree 7



Tree 8



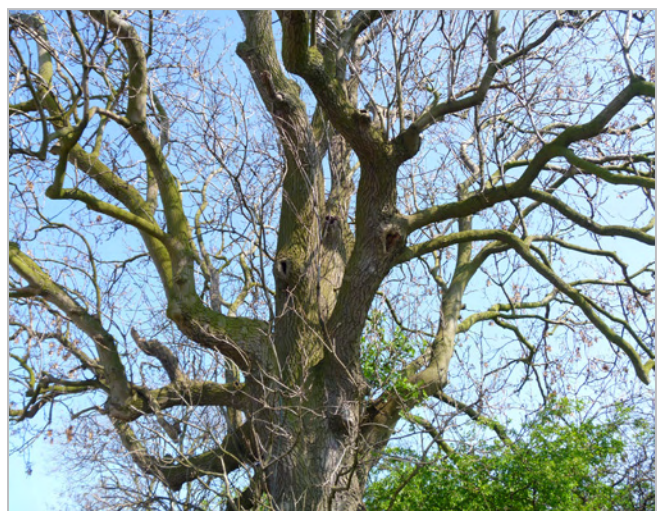
Tree 9



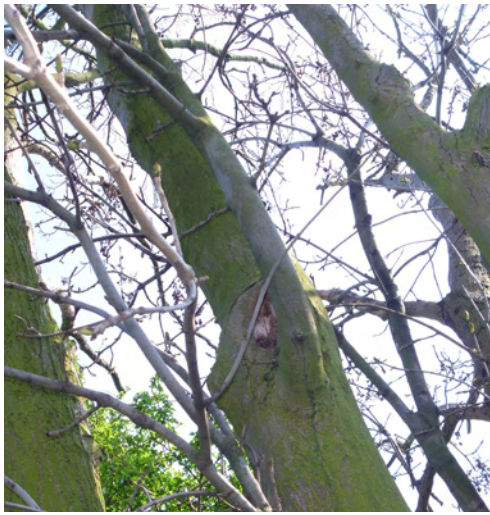
Tree 10



Tree 11



Tree 12



Tree 13



Tree 14



Tree 15



Tree 16



Tree 17



Tree 18



Tree 19