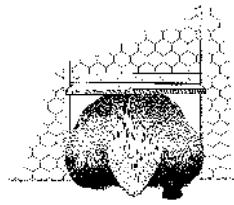
Annex 35.8

Land at Cherry Cobb Sands, Humberside
Badger Bait Marking Survey

(The Badger Consultancy)

POTENTIALLY EXCEPTED INFORMATION

THE BADGER CONSULTANCY



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Land at Cherry Cobb Sands Humberside

Badger Survey

A Report for
Able UK Ltd.

April 2011

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Status	FINAL
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NOTE

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Contents

Executive Summary

An area of land including Cherry Cobb Sands was surveyed for badgers in December 2010 on behalf of Able UK Ltd by The Badger Consultancy. A bait marking survey was then conducted including the surrounding area during March 2011. The proposals for this site include the migration of the sea wall to increase the area of estuarine shore/marshy habitat, and landscaping of the remaining areas to increase the suitability of the habitat for bird species associated with the Humber Estuary SPA, in order to mitigate for development elsewhere.

Eight badger setts were present within the site in March 2011. Setts C, I and F (the larger setts within the site) were classified as subsidiary setts. The remainder of the setts were classified as outlying setts. An additional twenty-five setts were found within the wider survey area, including two main setts (setts 11 and 28), and six annexe setts (10, 12, 15 & 16 and 22 & 26). The remainder of the setts in the wider survey area were classified as outlying setts. The bait-marking survey confirmed that two social groups of badgers were present.

It was been established that no main or annex setts exist within the site to be affected by the proposed landscaping and realignment of the seawall. The loss of three subsidiary setts and five outlying setts would have a minor detrimental impact on badgers. The loss or alteration to part of the badger group's range would have no impact in the longer term, and short term loss of foraging is only likely to be detrimental if it occurs during a period of severe food shortage.

Recommendations include:

- Increasing the diversity of habitats
- Creating opportunities for new sett excavation

1.0 Introduction

1.1 BACKGROUND

The Badger Consultancy (Environmental) Ltd was commissioned by Able UK Ltd to undertake a badger sett and bait-marking survey of land at Cherry Cobb Sands on the north bank of the Humber estuary in December 2010. The survey findings are presented in this report, together with an assessment of impact of the proposed work and any recommendations for further survey work or mitigation.

1.2 SURVEY OBJECTIVES

This report is based on a field survey using standard survey methodologies appropriate to badger (*Meles meles*). .

The objectives of the survey work were to:

- locate all setts and badger activity within the study area
- determine the number of social groups of badger resident within the main study area, their likely ranges, feeding areas, access routes and other relevant parameters to their survival
- provide an evaluation of the likely impact of the proposed development on badgers.
- provide recommendations to mitigate for any impact on badgers

1.3 SITE CONTEXT AND STATUS

The site is an area approximately 153 hectares (ha), to the south east of Hull, East Yorkshire, on the north bank of the Humber estuary. The centre of the site is at Grid Reference TA 221206. The surrounding area comprised low-lying agricultural land and isolated farms to the north and east, the Humber estuary to the south and west.

Plan 1.1 OS map scale 1:250,000showing site location

Plan 1.2 OS map scale 1:25,000showing site and wider survey area

2.0 Methodology

2.1 FIELD SURVEYS

A detailed walkover survey of the site was carried out by ecologist Huw Bramhall on 15th December 2010. A badger bait marking survey and walk over survey of a wider area enclosing the site, sea wall and the surrounding habitat was undertaken by ecologist Huw Bramhall between 7th and 22nd March 2011.

2.1.1 Badger field survey

The survey effort and the data recorded for each sett followed the standard methodology used in the two most recent national surveys of badgers (Cresswell *et al* 1990, Wilson *et al* 1997).

The area was searched systematically, with particular attention paid to areas where the vegetation and/or the topography offered suitable sett sites for badgers. Areas with dense ground cover (hedges, scrub, woodland, etc) were examined closely; if the vegetation prevented entry, then the perimeter was examined, in order to detect paths suggesting a hidden sett within the area.

Each of the sett entrances was examined and the level of activity was noted (classified as well used, partially used and disused); the location and tunnel direction for each entrance was mapped, and this information was used to confirm the type of sett (main, annexe, subsidiary or outlying, according to the criteria listed in **Appendix 1**).

In addition to setts, the presence of hairs, footprints, pathways, dung pits and feeding signs were used to plot the patterns of movement of the badgers. Where pathways were confirmed as badger pathways, i.e. there was a clear link to a sett or there was additional evidence of badger activity nearby (such as dung pits, feeding signs or hairs/footprints), these were also noted on the map. If no specific badger activity

were marked as general animal paths (i.e. could be used by deer, fox, as well as badger).

The 'foraging potential' of areas within the survey area was determined by a subjective assessment of the availability and number of potential food sources. Thus, areas such as short grazed permanent pasture enclosed by a network of dense hedges, which can provide badgers with a variety of opportunities for foraging throughout the year, were classified as 'good potential foraging'. Foraging opportunities in arable or grass-ley fields, woodland or scrub, can be limited by the season and the management regime, and so were classified as 'moderate potential'. Arable crops and other areas with no food value for badgers were considered 'poor potential foraging'.

2.1.2 Bait-marking survey

Bait containing peanuts, treacle, golden syrup and coloured granular plastic markers was placed at two putative main setts: bait containing red beads was placed at eight different entrances at sett C; and bait with orange beads was placed at four entrances at sett I. The setts were inspected for uptake of bait on 8 occasions between 8th and 21st March 2011, following the initial lay down of bait on 7th March 2011. When bait was taken from the setts, more was placed out.

In addition, bait containing lilac beads was placed at ten different entrances at main sett 28 from 17th March 2011 onwards. Care was taken to place the bait in several positions (and in considerable quantities) down well used entrances at the setts, to ensure that as many animals as possible had the chance to consume it.

A series of systematic surveys of the site incorporating all known dung pits and putative boundaries was carried out between 8th and 22nd March 2011. On each occasion, the contents of any dung pits found was thoroughly

searched for the presence of markers by removing the dung to a depth of up to 20cm and spreading it across a palette.

2.2 LIMITATIONS

It should be noted that whilst every effort has been made to provide a comprehensive description of the site, no investigation could ensure the complete characterisation and prediction of the natural environment.

3.0 Results

3.1 HABITAT DESCRIPTION

The site comprised a series of low-lying arable fields on the northern shore of the Humber Estuary. Each field was surrounded by water-filled drainage ditches, ranging from 1 to 3m wide, containing water 0.3 to 1 m deep. The banks of the ditches extended 0.5 to 1.5m above the water level. The fields were level with rank grass field margins, and rank grass dominated the ditches above the water line. Hedges, dominated by hawthorn (*Crataegus monogyna*), were present on the banks of some of the ditches; these were more widespread in the north western, and less common towards the south east of the site.

Bridges across the drainage ditches linked the fields together and to an unclassified road (Cherry Cobb Sands Road), which formed the northeastern boundary of the site. The sea wall formed the south-western boundary of the site; it was approximately 4m high, and was dominated by grasses, with discrete areas of bramble (*Rubus sp.*) and hawthorn. An access track provided vehicular access to the sea wall.

The wider survey area extended to the north and east of the site; it comprised arable fields, but the drainage ditches tended to be shallower and some were dry. There were also isolated farmsteads and areas of woodland. Keyingham drain formed the northeastern boundary of the wider survey area; it was a 15m wide watercourse, with banks vegetated with a mixture of rank grass, bramble, reeds and trees, approximately 3 – 5m above the water level.

3.2 BADGER SURVEYS

3.2.1 Badger survey results December 2010

During December 2010, nine badger setts, including two putative main setts, were found within the site. However there were anumber of constraints:

- The cold weather that prevailed during the survey was considered likely to have reduced the level of badger activity, although field signs were readily visibility as a result of the snow cover.
- The pattern and spacing of setts suggested that there were at least two social groups present, but it was clear that the badger groups' ranges extended beyond the limits of the site.
- The absence any comparative or contextual information, it was difficult to determine conclusively the status of the setts (e.g. main, annexe subsidiary, outlying).

As a result, it was not possible to predict confidently the likely impact of the proposed works, or to determine what would constitute an appropriate mitigation strategy for badgers. Therefore, it was recommended that additional survey work was carried out during spring to re-examine the levels of activity at setts within the site, survey setts and badger activity in the adjacent areas and determine the ranges of the social groups present.

3.2.2 Badger survey results March 2011

During a re-survey in March 2011, eight badger setts were found to be present within the site – six setts (A, C, D, E, F & I) were ones originally identified in the December 2010 survey, and two were new setts (L & M). There were an additional five burrows or groups of burrows that are used by rabbit but have potential to be used by badgers (by virtue of the size of some of the entrances). Two setts (B & H) previously identified were no longer present. The setts are listed in **Table 3.1** below and shown on **Plan 3.1.**

Sett C comprised 8 entrances spread out over approximately 70m of bank with small to medium-sized spoil heaps. There were gaps greater than 15 m between entrances/groups of entrances, and so it is unlikely that all the entrances were connected underground (as is normally the case with a single sett). ***However, given the restricted capacity for sett building, as a result of the high water table, badgers may be unable to create***

large or continuous tunnel systems, and so allowances have been made where there is clear evidence[1] that the entrances function as a single sett.

Similarly, setts F and I were a series of entrances that, together, functioned as a single sett. Although these setts showed evidence of previous use (ie with well compacted spoil heaps), during the March 2011 survey, the activity levels were lower than at setts elsewhere in the area.

Table 3.1 Badger setts within the site, including the sea wall

Sett	Status	Description
A	Outlying	2 well used and 1 partially used entrance on south east facing bank of ditch. Moderate to small spoil heaps, some freshly excavated spoil plus badger hair on one spoil heap. Visible path along bank above sett.
C	Subsidiary	Series of 8 well used entrances and one partially used entrance spread along a 200m+ section of south east facing bank. Visible connecting path along top of ditch bank. 1 well used entrance in north west facing bank connected by path on spoil in ditch. Small to medium-sized spoil heaps. Single dung pit found at north eastern end of sett.
D	Outlying	1 well used entrance in north east facing bank of sea wall. Moderate size spoil heap, above well worn path along bank.
E	Outlying	1 well used entrance in north east facing bank of sea wall. Moderate size spoil heap, above well worn path along bank.
F	Subsidiary	5 well used entrances spread along a 70m section of ditch. 4 entrances on south east facing bank, 2 in north west facing bank with grass overhanging entrances. Visible paths on both sides of ditch.
F2	Outlying	1 well used entrance in north west facing bank of ditch. Large spoil heap across ditch.
I	Subsidiary	6 well used entrances in south west facing bank of ditch. Group of 4 entrances with other 2 spread over approx 100m section of bank. Small - medium size spoil heaps, visible paths crossing ditch.
L	Outlying	1 well used entrance in north east facing bank of sea wall. Moderate size spoil heap, above well worn path along bank.

[1] ***such as well worn paths connecting a groups of entrances***

A further twenty-five badger setts were identified in the wider survey area (between Cherry Cobb Sands road and Keyingham drain). The main and annexe setts only are listed in **Table 3.2** and shown on **Plan 3.1**. A full list/description of setts is given in a plan and table in **Appendix 2**.

Table 3.2 Badger setts outside the site

Sett	Status	Description
10	Annexe	2 well used entrances in dry ditch, very large spoil heaps
11	Main	9 well used entrance in bank of Keyingham Drain and in adjacent dry ditch.
12	Annexe	2 well used, 1 partially used entrance in NW facing bank of ditch.
15	Annexe	1 well used entrance in dry ditch back from drain bank
16	Annexe	2 well used and 1 disused entrance in drain bank
22	Annexe	23 well used entrances in north east facing bank of Keyingham Drain and in north west facing bank of dried out ditch. Some with very large spoil heaps and bedding on spoil. Well worn connecting paths.
26	Annexe	3 well used entrances in opposite banks of dry ditch. Large spoil heaps.
28	Main	35+ well used entrances in north east facing bank of Keyingham Drain. Many with large spoil heaps. Bedding on spoil heaps. Very well worn connecting paths. Lots of digging and feeding activity.

Sett 11 comprised nine well used entrances with very large spoil heaps. As was the case with setts C, I and F, it is unlikely that all of the entrances are linked underground. However, the paths indicated that the entrances function as a single unit, and the high levels of activity, compared to those observed at the surrounding setts were consistent with it being a main sett. There were also another seven smaller setts within 200m, four of which are used as annexe setts.

Sett 28 was an extensive main sett comprising at least thirty-five well used entrances spread along a section of the north east facing bank of the

Keyingham Drain. Several of the entrances had very large, compacted spoil heaps with bedding material. There were well worn connecting paths linking the entrances and extending into the surrounding area, and there was widespread evidence of badger foraging activity on the land immediately surrounding the sett.

Setts 22 and 26 were annexe setts to sett 28. Sett 22 comprised twenty-three well used entrances in two adjoining banks. It had high levels of use with large, well compacted spoil heaps, bedding and well worn paths.

3.2.3 Badger bait marking survey

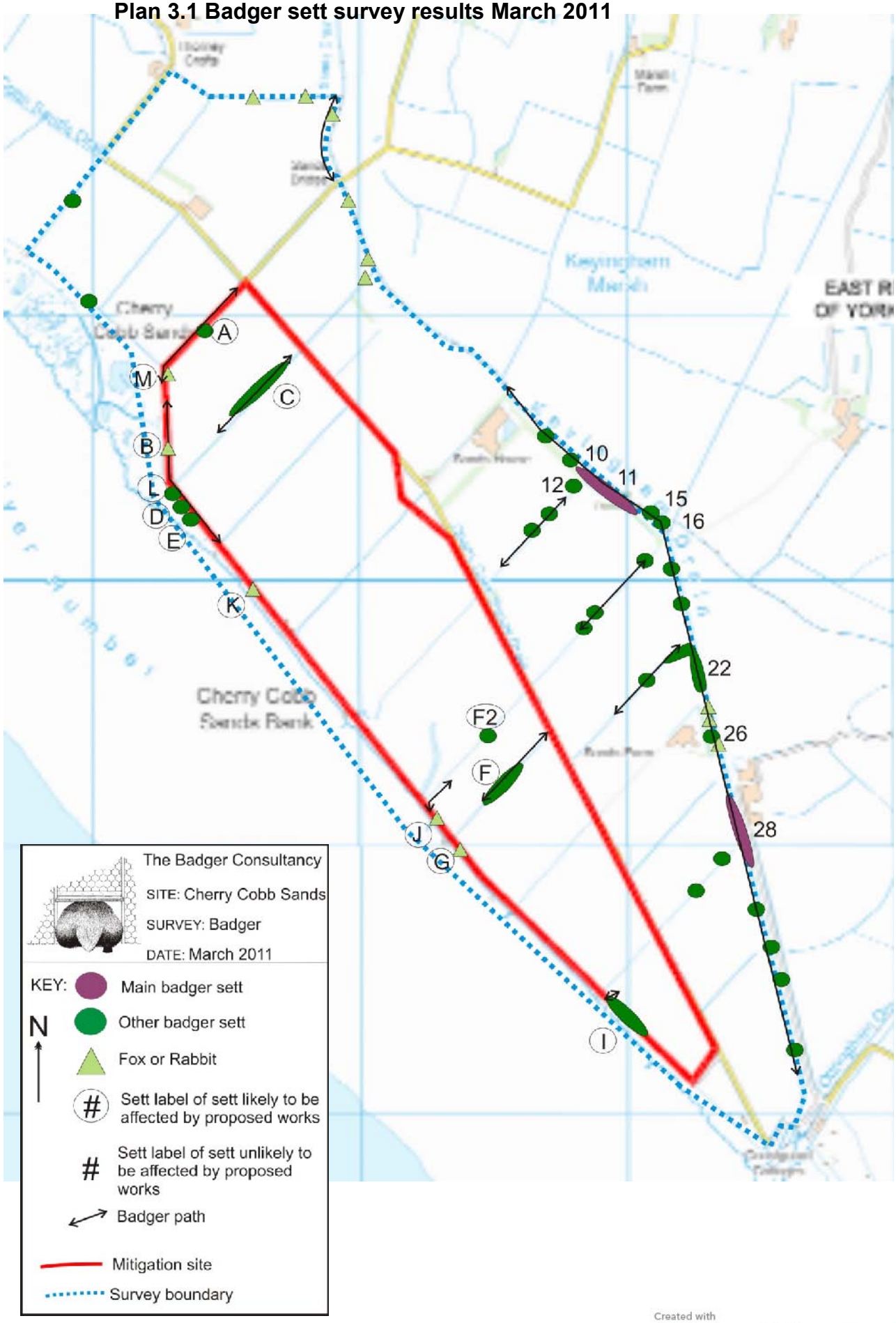
Uptake of bait from sett C was slow, although by the 21st March 2011, all bait had been taken from sett C. However, bait remained at sett I on the final day of surveying on 22nd March 2011, with very little extra having been placed after the initial lay-down of bait. The uptake of bait from sett 28 was good, with all the bait being consumed prior to the re-visit.

Red beads (from bait placed at sett C) were found in four dung pits at three different locations, one of which was at sett C itself. One return was found within a latrine comprising eight dung pits in a strip of woodland along the Keyingham Drain, close to sett 10. Two returns of red beads were found within a latrine with seven dung pits, on the south eastern edge of the same strip of woodland, between setts 16 and 21.

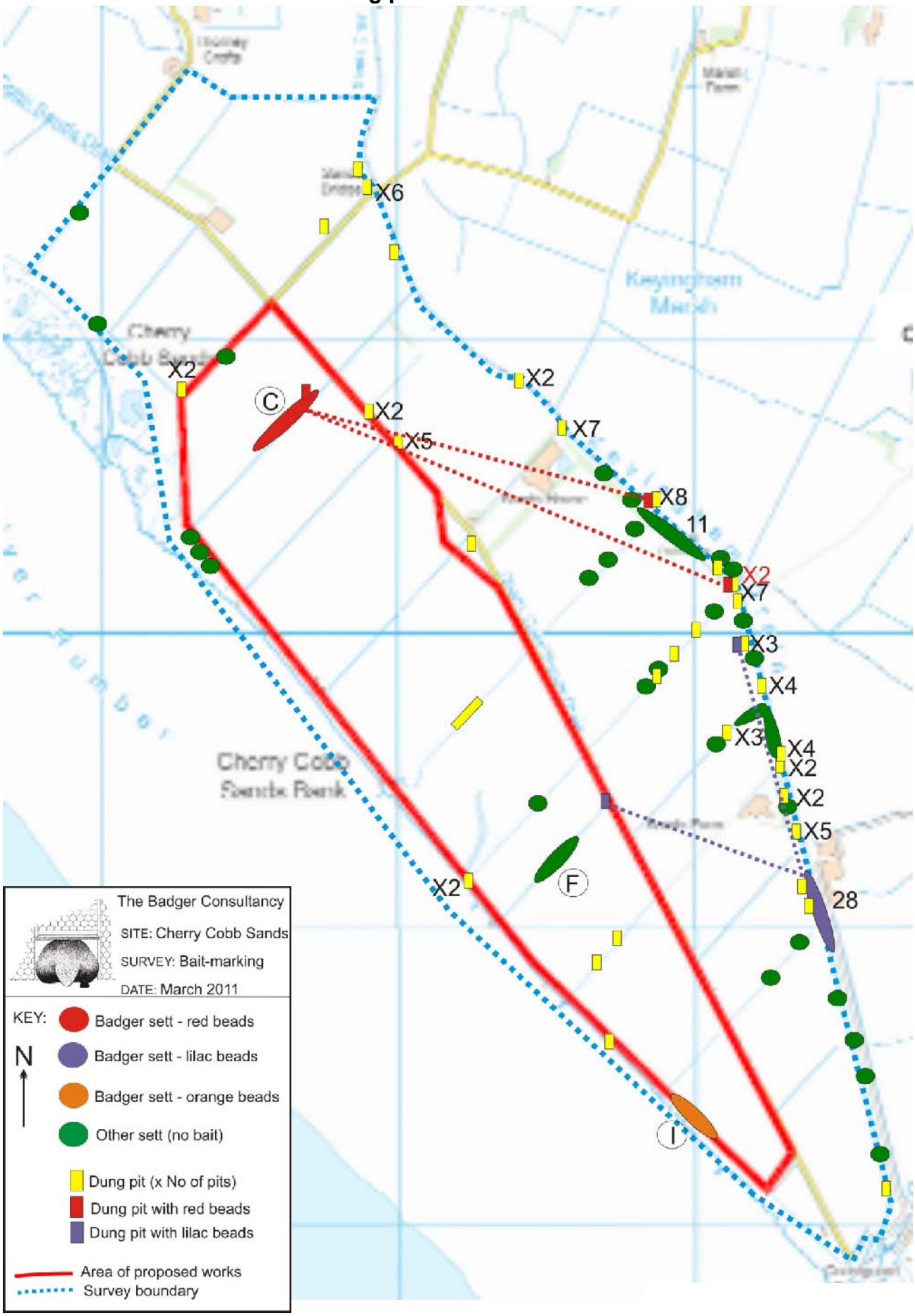
Lilac beads were found in two dung pits at two separate locations. One was at a latrine consisting of three dung pits, just to the north west of sett 21. The other was found in a single dung pit at a crossing point between the road and the ditch containing sett F. Both returns of lilac beads were found on 21st March 2011.

No returns of orange beads were found.

Plan 3.1 Badger sett survey results March 2011



Plan 3.2 Location of dung pits and bead returns March 2011



4.0 Assessment

4.1 CONSTRAINTS ON STUDY INFORMATION

There were no constraints on study information

4.2 EVALUATION OF SURVEY FINDINGS

4.2.1 Badger ecology

Badgers are neither rare, nor endangered; they are a widespread and common species in Britain. Between the national surveys of badgers carried out in the 1980s and 1990s, it was concluded that there had been an increase in both the number of social groups of badgers and the numbers of badgers within a social group *(*Wilson *et al. 1997)*. However, Humberside and Lincolnshire remains a medium to low density area for badgers.

Usually, there is only one main sett per social group of badgers, so distinguishing main setts from other types of sett enables the surveyor to count the number of social groups in an area. In rural areas, the spacing between the main setts is a function of the productivity of the area (in terms of food), together with the availability of sites for constructing large setts. When the spacing between main setts is 1km or less, badgers to defend their territory boundaries vigorously, to ensure that there is sufficient food for the group over the year (Kruuk 1989).

Badgers are omnivorous, taking a very wide range of invertebrates, plants, fruits and scavenged material, although in many areas of Britain, a large proportion of their diet comprises earthworms, taken from short grassland. They forage individually in different parts of their range according to the season, local weather conditions and chance events (road casualties, discarded food).

4.2.2 Badgers at Cherry CobbSands

The site consists of flat, low-lying land divided into large, open, arable fields by narrow field margins and water-filled drainage ditches. The high water table meant that the availability and suitability of areas for constructing setts was restricted. Although the sea wall would offer drier and better drained ground than the surrounding arable fields, it appears that the materials used to construct the sea wall or the location limit the extent to which badgers exploit this structure. Although still low-lying, the wider survey area offered a great range of opportunities for badgers to construct setts, including banks alongside dry ditches, and Keyingham Drain.

Eight badger setts were present within the site in March 2011. The low levels of activity associated with the setts during spring at setts C, I and F (the larger setts within the site) meant that these were classified as subsidiary setts. The remainder of the setts were classified as outlying setts. Five rabbit warrens were noted containing at least one entrance large enough to be used by a badger (these were not classified as setts, but could be used by badgers in the event of other setts being closed or removed).

An additional twenty-five setts were found within the wider survey area. Setts 11 and 28 (both on the south-western bank of Keyingham Drain comprised a large number of entrances with consistently high levels of badger activity and these were classified as main setts. Six setts (10, 12, 15 & 16 and 22 & 26) were classified as annexe setts to main setts 11 or 28. The remainder of the setts in the wider survey area were classified as outlying setts. A further nine holes or groups of holes were noted that were used by rabbit or fox, and which included entrance(s) large enough to be used by badgers.

The land within the site was largely arable, which offers poor potential foraging for badgers, although the grassy field margins, ditch banks, hedgerows and areas of scrub on the sea wall will support invertebrates and offer seasonal foraging for badgers. In the wider survey area, the foraging opportunities were similar, although the banks alongside Keyingham drain were more extensive,

and included both scrub and woodland. In addition, this area may be more productive, as it will offer a range of areas to forage that are sheltered from prevailing winds.

Thirty-one locations with one or more dung pits were identified in the survey area as a whole. Most of these were at or near setts, and on the pathways approaching setts. Only one series of dung pits on the northern boundary of the wider survey area (between holes 5 and 6) were on or near strong paths but not associated with a sett (and so might indicate a territorial boundary.

The movement of beads during the bait-marking survey indicated that the same badgers use setts within the site and the wider survey area. Badgers using sett C visited dung pits either side of sett 11 (approx. 1500m north-east); similarly, badgers using sett 28 visited dung pits on the north-eastern boundary of the site (approx 750 m south-west). The lack of cross-over between the lilac beads used at sett 28 and the red beads used at sett C indicates that there are at least two social groups of badgers present (one based sett 28 and one at sett 11).

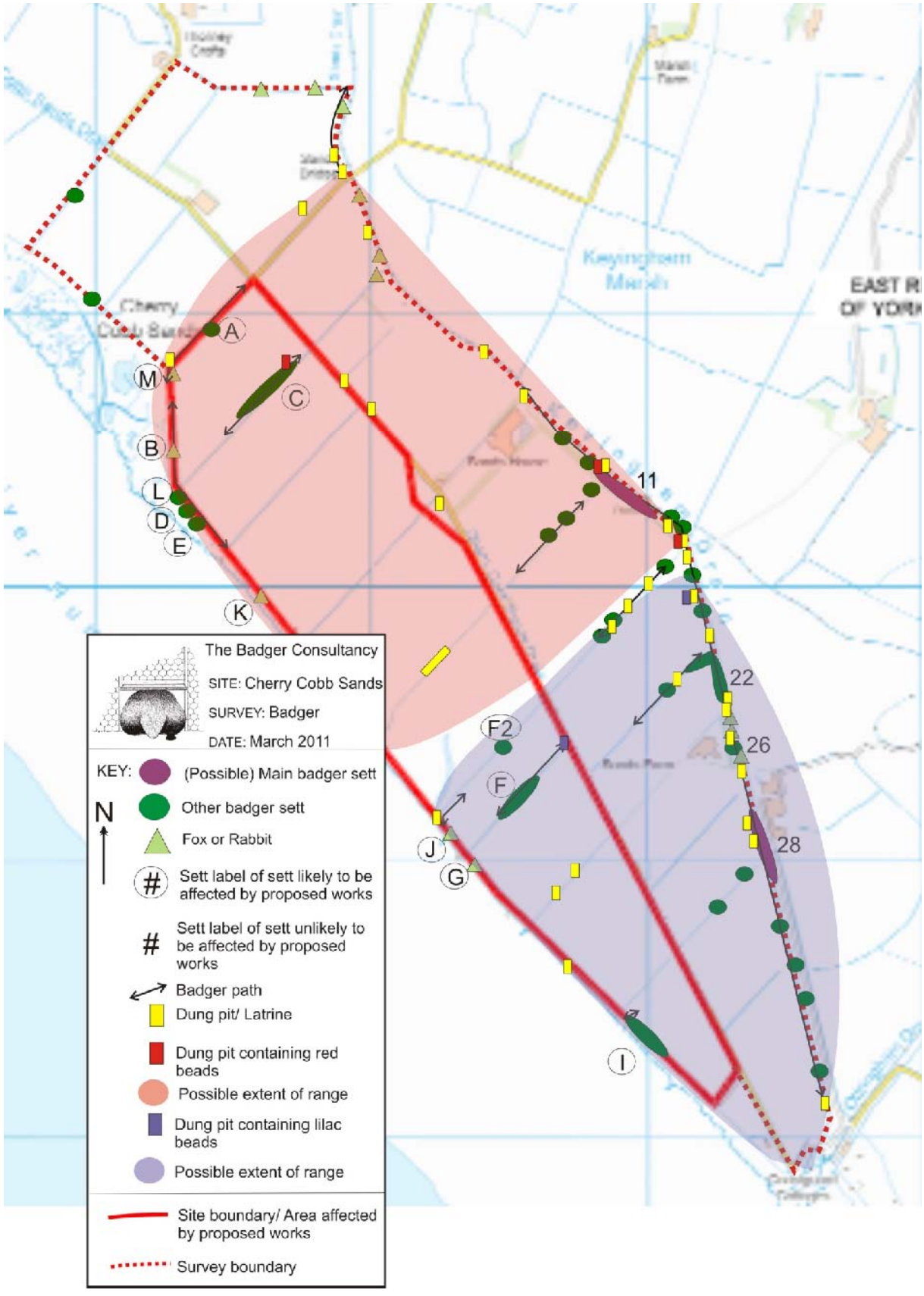
The spacing between the two main setts was approx 1200 m, indicating a medium to low density population. Keyingham Drain was 15 m or wide, and is likely to represent a barrier to regular badger movement except where there is a bridge (badgers can swim, but they are unlikely to do this on a nightly basis). Therefore, both main sett 11 and 28 are likely to be on the edge of the groups' ranges (rather than centrally located). From the patterns of paths, setts and latrines it was concluded that the range of the badger social group based at sett 28 is likely to include all of the south eastern section of the wider survey area including the south eastern end of the site. The boundary between the two groups is likely to be near sett 21, approx 750 m north-west of sett 28.

The north western section of the survey area, including the north western end of the site and sett C, is occupied by the group of badgers based at sett 11. This badger group will range as far south as the latrine between setts 16 and

20 where returns of red beads were found (see **Plan 4.1**). The clumping of setts on the Keyingham Drain banks means would explain the very high density of setts and latrines in the area between Sands House and Sands Farm. A third social group of badgers is likely to exist to the north of the site, occupying the northern part of the wider survey area. However, their range is likely to comprise very little, if any, of the site itself.

Badger activity within the site was at low levels when compared to the wider survey area: with fewer and smaller setts, less well worn paths and less evidence of foraging activity. However, there were signs that badgers forage within the field boundaries and also access the sea wall where there was a variety of foraging opportunities including scrub vegetation, rank grassland and access to the estuarine habitat.

Plan 4.1 Likely badger social group ranges at Cherry Cobb Sands



4.3 POTENTIAL IMPACTS

Development can affect badgers directly, through damage to setts, or indirectly, through disturbance, loss of foraging, interruption of access or increased risk of injury. The severity of the impact is judged on the magnitude, spatial extent, duration, and the nature/location of the impact. However, loss of foraging and the likely impacts of the loss of foraging can be difficult to assess; not all areas within a groups range will be equally productive, and as badgers can readily swap to alternative food sources, loss of any one area may have little or no impact.

The proposals for this site include the migration of the sea wall to increase the area of estuarine shore/marshy habitat, and landscaping of the remaining areas to increase the suitability of the habitat for bird species associated with the Humber Estuary SPA. Removal or loss of the existing seawall would result in the loss of a subsidiary sett (I) associated with the group of badgers based at sett 28, and three outlying setts, most likely associated with the group of badgers based at sett 11. Given the availability of alternative setts and the levels of activity associated with these setts, this would be unlikely to have any detrimental impact on badgers.

Within the site, the proposals may result in loss or alteration to water levels close to subsidiary sett C. Although not a main or annexe setts, sett C appears to be used regularly by badgers (probably during longer foraging forays from the main sett) and so the loss of sett C could have a minor detrimental impact on badgers. The loss of the other setts within the site would have no detrimental impact on the badgers.

Although the area of land that will be lost to badgers during and as a result of the works is extensive, and would constitute a significant proportion of the group's territories (>25%), the amount of useful foraging habitat within that area will form a small proportion of the area to be affected. Following completion of the proposed works, a wider range of foraging opportunities are likely to be created, although these will occupy a smaller area than previously,

as more of the habitat will be purely estuarine. As a result there will be no long term loss of food availability for badger. Short term impacts during the works are unlikely to occur, as a range or alternative foraging areas exist in the wider area, so unless severe weather conditions (such as a drought) result in a marked shortage of food, there would be no short term impacts on badgers through loss of foraging areas.

4.4 LEGISLATION AND POLICY GUIDANCE

In Britain, badgers are protected under the Protection of Badgers Act 1992, a consolidation Act which brought together the Badgers Acts of 1973 and 1991 and the Badgers (Further Protection) Act 1991. They are also covered by other, more general animal welfare laws. Under this range of legislation, amongst other things, it is illegal to:

- intentionally kill, injure, take or cruelly ill-treat a badger, or attempt to do so
- destroy or damage an active badger sett or any part thereof, obstruct access to an active sett or any of its entrances
- disturb a badger in a sett or cause a dog to enter a badger sett.

The Protection of Badgers Act 1992 enabled licences to be issued to carry out certain otherwise illegal operations. The responsibility for issuing these licences rests with Natural England (formerly English Nature), Countryside Council for Wales, Scottish Natural Heritage and the Department for the Environment (NI).

5.0 Recommendations

5.1 FURTHER SURVEY

If no work has taken place, a resurvey of the site prior should take place in 12 months time.

5.2 MITIGATION MEASURES

It has been established that no main or annex setts exist within the site to be affected by the proposed landscaping and realignment of the seawall at Cherry Cobb Sands. Loss of three subsidiary setts and five outlying setts would have a minor detrimental impact on badgers. The loss or alteration to part of the badger group's range would have no impact in the longer term, and short term loss of foraging is only likely to be detrimental if it occurs during a period of severe food shortage.

It would not be possible to avoid removing setts, however as the impacts would be minor to negligible, it would be possible to compensate for the loss of setts, whilst ensuring the site remains able to fulfil the primary function of increasing habitat for SPA birds. Mitigation for loss of setts could include the creation of structures (such as soil bunds) where new setts may be excavated.

Badgers can exploit a wide variety of habitats, and the key to maximising foraging within the remaining areas will be to increase habitat diversity, which in turn increases the foraging opportunities for badgers (Neal & Cheeseman 1996, Kruuk 1989). Therefore, creating new hedges or small scrub islands, alongside wet flushes, rough grass and other marginal habitats will benefit the badgers. New planting should include some native fruiting trees and shrubs (such as raspberry, wild plum, crab apple and wild pear), to provide additional seasonal foraging opportunities for the badgers.

Phasing and timing of the development would reduce some of the short-term impacts, particularly if landscaping could be established in advance of the start

of work. Should a particularly dry summer occur, then a review of the need for supplementary feeding should be undertaken.

5.3 REQUIREMENT FOR LICENSING

A licence will be required to allow the exclusion of badgers and the destruction of all setts with evidence of current use by badgers.

6.0 References

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Kruuk H. (1989) *The social badger: ecology and behaviour of a group-living carnivore* (Meles meles). Oxford University Press, Oxford.

Neal E. & Cheeseman C. (1996) *Badgers*. Poyser, London.

Wilson G., Harris S., McLaren G. (1997) *Changes in the British badger population, 1988 to 1997*. People's Trust for Endangered Species, London.

Appendix 1 Badger Ecology

The Eurasian badger (*Meles meles*) is a member of the *Mustelidae* (the weasel and stoat family). It is a widespread and common species in Britain, present throughout the country, but it is most numerous in the south and south-west of Britain. Badgers are nocturnal and spend long periods below ground in 'setts'. They feed largely on invertebrates such as earthworms, beetles and wasps/bees (dug out from underground nests), but their diet also includes other mammals (mice/rats/voles, occasionally hedgehogs), birds (adults and eggs), cereals, fruit, carrion, leaves and fungi (Neal & Cheeseman 1996)[2].

In Britain, most badgers live in social groups (sometimes referred to as 'clans') and the members of each group jointly defend a territory. Other badgers are more or less excluded from this area, which will encompass sufficient foraging opportunities to support the group throughout the year. Badgers defaecate in small (2-3 cm deep) scrapes called dung pits, and these are often used to mark setts, important feeding areas and territory boundaries (Kruuk 1978)[3]. In areas where badgers are at low density, and in urban areas where food is over-abundant, territory boundaries can become blurred and are often less vigorously defended (Cresswell & Harris 1988)[4].

Setts are commonly constructed in sloping ground (embankments, cuttings), but also appear in flat ground, ditches, drainage pipes and under buildings. A number of setts of different sizes and functions may be found within the range of a single social group (Cresswell *et al* 1990)[5]. Since the 1990s when a national survey of badgers was carried out, setts have been routinely classified according to their size and the level of activity associated with each sett (see Section 2.1.2).

Not all groups of badgers have examples of each of the types of setts within their range. However, all social groups of badgers have just one main sett, and so by counting the number of main setts, it is possible to count the number of social groups of badgers present within an area. The number of badgers within a social group can vary between three and 15, and so it is not possible to estimate of numbers of badgers from the number of setts.

[2] Neal E. & Cheeseman C. (1996) *Badgers*. Poyser, London.
[3] Kruuk H. (1989) *The social badger: ecology and behaviour of a group-living carnivore* (Meles meles). Oxford University Press, Oxford.
[4] Cresswell W.J & Harris S. (1988). Foraging behaviour and home-range utilization in a suburban badger (*Meles meles*) population. *Mammal Review* 18, 37-49
[5] Cresswell P., Harris S., & Jefferies D.J. (1990). *The history, distribution, status and habitat requirements of the badger in Britain*. Nature Conservancy Council, Peterbo

Assessment of Activity at Setts

- ***Well-used*** entrances are clear of any debris or vegetation, and are obviously in regular use, and may or may not have been excavated recently.
- ***Partially used*** entrances are not in regular use and have debris such as leaves or twigs in the entrance, or have moss and/or other plants growing in or around the entrance. Partially used holes could be in regular use after a minimal amount of clearance.
- ***Disused*** entrances have not been in use for some time; they are partially or completely blocked, and cannot be used without a considerable amount of clearance. If the hole has been disused for some time, all that may be visible is a depression in the ground where the hole used to be, together with the remains of the spoil heap, which may be covered by moss or plants.

Sett Classification

- ***Main setts*** are large, well established, often extensive and in continuous use. It is where the cubs are most likely to be born. There is only one main sett per social group of badgers.
- ***Annexe setts*** occur in close association with the main sett, and are linked to the main sett by clear well-used paths. If a second litter of cubs is born, this may be where they are reared.
- ***Subsidiary setts*** usually consist of up to five holes, and are not in continuous use.
- ***Outlying setts*** consist of one to three holes. They usually have small spoil heaps indicating that they are not very extensive underground

Appendix 2 Detailed Sett Description

Plan A2.1 Setts at Cherry Cobb Sands

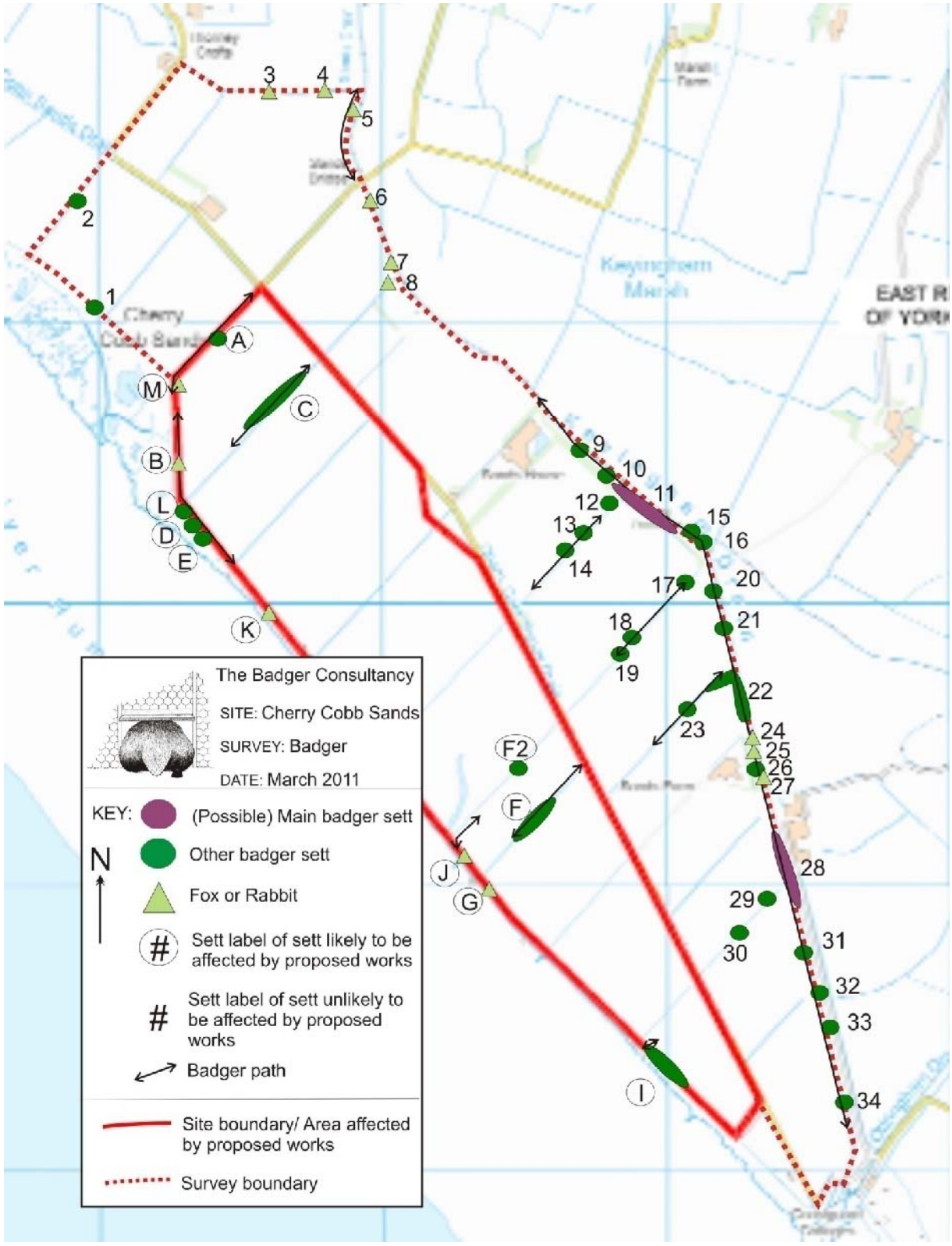

Table A2.1 Detailed description of setts within mitigation site

A **Large** entrance is >20cm at arm's length, **medium** is 15-20cm, **small** is <15 cm. Tunnel directions given as if facing bank from bottom of ditch

Sett	Status	Size/location	Description
A	**Outlying**	**3 entrances: in south east facing bank of ditch**	**1 – well used, 110m from start of hedge by road near top of bank. Moderate size spoil heap with recently dug spoil on top of grass** **2 – well used, 35m from entrance 1, near top of bank. Moderate size spoil heap with some recently dug spoil, grass, badger hair and some feathers – FOX?** **3 – partially used close to entrance 2, near top of bank. Small spoil heap with nettles and grass growing.**
B	*Rabbit*		*1 entrance in north east facing bank of sea wall, 135m from trig point on sea wall in north west corner of site, near top of bottom section of bank under hawthorn hedge.*
C	**Subsidiary**	**10 entrances: 9 in south east facing bank of ditch, 1 in north west facing bank**	**1 – Partially used halfway down bank, 12m from corner of field nearest road.** **2 – well used, 1/3 way down bank, close to entrance 1,. Medium spoil with moss and bramble on, protrudes into water** *Rabbit hole close to entrance 2* **3 – 40m from entrance 2 in opposite bank. Large entrance above tree trunk leads straight into bank, medium to large spoil heap protruding into water** **4 – 60m from entrance 3. Well used entrance near bottom of bank. Large entrance leads up and to the left, medium spoil heap slightly protruding into water has grass and tiny bramble** **5 – 10m from entrance 4. Well used entrance low on bank. Medium entrance leads to the right, small spoil has grass on.** **6 – 25m from entrance 5. Well used entrance near bottom of bank has grass overhanging it and leads up and to the left, small spoil heap with grass on** **7 – 45m from entrance 6. Well used entrance near top of bank. Large entrance leads to the right, medium to large spoil head is mostly bare with patches of grass, protrudes into water** **8 – 40m from entrance 7. Well used entrance near top of narrow section of bank. Large entrance leads to the left, small spoil with a little grass growing on it.** **9 – 14m from entrance 8. Well used entrance near top of narrow section of bank. Large entrance leads to the right, small spoil heap mostly grass covered with some freshly dug spoil** **10 – 9m from entrance 9. Well used entrance near top of bank. Large entrance leads left. Medium spoil with some recently dug spoil and tufts of grass.**
D	**Outlying**	**1 entrance in north east facing bank of sea wall, 8m from sett L**	**Entrance well used, in top section of bank, above trunk of hawthorn. Medium spoil heap is spread out. Smaller rabbit entrance nearby.**

Sett	Status	Size/location	Description
E	**Outlying**	**1 entrance in north east facing bank of sea wall, 23m from sett D.**	**Well used entrance in top section of bank, above trunk of hawthorn. Medium spoil heap burying trunk of hawthorn.**
F	**Subsidiary**	**5 entrances, 3 (nos 1-3) in south east facing bank of ditch and 2 (nos 4-5) in north west facing bank.**	**1 – 128m from road end of ditch. Well used entrance in middle of bank. Large entrance is also tall and leads downwards and to the left, medium spoil is flat, protrudes into water and is mostly grass covered.** **2 – 56m from entrance 1. Well used entrance into top half of bank. Large entrance leads slightly to left, Large spoil almost blocks off water flow and has a bare path with grass.** **3 – close to entrance 2. Well used entrance just below middle of bank. Medium entrance leads to right, small spoil is bare on top with grass below.** **4 – 5m from entrance 3 on opposite bank, Well used entrance in middle of bank. Large entrance leads to right and has grass overhanging, medium spoil is bare on top with grass below** **5 – close to entrance 4. Well used entrance above middle of bank. Large entrance leads left and has grass overhanging, large spoil is grassed over and almost blocks water flow.**
G	*Rabbit*		*with 8 large entrances big enough to be used by badger within an extensive area of rabbit activity/burrows.*
H			*Not found*
I	**Subsidiary**	**6 entrances in south west facing bank of ditch**	**1 – 5m from corner of field. Well used entrance near bottom of bank. Large entrance leads straight into bank and has grass overhanging, small spoil is grass covered.** **2 – close to entrance 1, next to hawthorn. Well used entrance in top of bank. Large entrance goes to T junction leading left and right, small spoil is bare and spread around tree trunk.** **3 – close to entrance 2, beside hawthorn. Well used entrance in top of bank. Large entrance goes to T junction like entrance 2, medium-large spoil is bare on top and grassy below. Small, rodent size hole to left of entrance.** **4 – close to entrance 3. Well used entrance in middle of bank. Medium entrance leads straight back into bank and has grass overhanging, small-medium spoil grass covered.** **5 – 25m from entrance 4. Well used entrance near top of bank. Large entrance at mouth split into medium (left) and large (right) at arms depth, Small-medium spoil grass covered.** **6 – 80m from entrance 5. Well used entrance near top of bank. Large entrance kinks to right, medium spoil is narrow, bare on top with grass below. Rabbit droppings on spoil but none fresh added in over two weeks.**
J	*Rabbit*		*with 7 large entrances in north east facing bank of sea wall big enough to be used by badger within an extensive area of rabbit activity/burrows – may be former badger.*
K	*Rabbit*		*with 1 large entrance in north east facing sea wall in bramble beside hawthorn standing back from water, roughly opposite mid-point of field.*

Sett	Status	Size/location	Description
L	**Outlying**	**1 entrance in north east facing bank of sea wall**	**Well used entrance in top section of bank, into roots of hawthorn, 45m from kink in sea wall. Small-medium spoil heap**
M	*Rabbit*		*Rabbit burrow – with 1 large entrance in north east facing sea wall, 6m from trig point on sea wall in north west corner of site.*
N	**Outlying**	**1 well used entrance in north west facing bank**	**Entrance near bottom of bank, large spoil had completely blocked ditch and was grass covered.**

Table A2.2 Description of setts outside the mitigation site

Sett	Status	Size	Location/Description
1	Outlying	1 well used entrance	In sea wall. Spoil not that big and no fresh digging
2	Outlying	1 well used entrance	In NW facing bank of ditch. A bit small, grass on spoil heap
3	*Rabbit*		*1 entrance big enough to be used by badger in rabbit warren.*
4	*Rabbit*		*1 entrance big enough to be used by badger in rabbit warren.*
5	*Rabbit*		*2 entrances in NE facing bank of Keyingham drain. Large holes with moderate spoil, old fox scat on one spoil heap.* *20m SE - 1 well used entrance big enough to be used by badger in rabbit warren.*
6	*Rabbit/ Fox*		*3 entrances in bank of drain spread over about 20m. 2 holes are large, 1 smells slightly of fox.*
7	*Fox*		*1+ entrance in bank of drain Fresh fox scats on spoil*
8	*Rabbit*		*1 entrance big enough to be used by badger in rabbit warren.*
9	Outlying	1 well used entrance	Moderate size spoil heap (3 other possible badger entrances in rabbit warren).
10	Annexe	2 well used entrances	in dry ditch, very large spoil heaps
11	Main	9 well used entrances	1 large well used entrance in drain bank with very large spoil and some bedding
			1 well used entrance in dry ditch under large double trunked tree, 2 well used entrances in opposite bank about 10m down
			1 large well used entrance in dry ditch, large spoil heap
			4 large well used entrance in dry ditch, 3 in field side and 1 in woodland side. Very large spoil heaps
12	Annexe	2 well used, 1 partially used entrance	1 well used entrance in NW facing bank of ditch. Medium spoil heap. 1 well used and 1 partially used entrance 20-30m further to SW
13	Outlying	2 well used, 1 disused entrance	well used entrances in SE facing bank of ditch, disused entrance overgrown
14	Outlying	1 well used entrance	At bottom SE facing bank of ditch in water-filled section, spoil forming dam.
15	Annexe	1 well used entrance	large entrance with large spoil and two rabbit holes nearby, in dry ditch back from drain bank
16	Annexe	2 well used and 1 disused entrance	in drain bank
17	Outlying	1 well used entrance	in SE facing bank of dry ditch, spoil covered with grass

Sett	Status	Size	Location/Description
18	Outlying	1 well used entrance	in NW facing bank of dry ditch, extensive spoil mostly grassed over
19	Outlying	1 well used entrance	In NW facing bank of ditch by start of water, big spoil heap.
20	Outlying	1 partially used entrance	in drain bank, half blocked with dead leaves
21	Outlying	1 well used entrance	under tree
22	Annexe	23 well used entrances	19 well used entrances along drain bank, some very large spoil heaps and some with bedding
			4 well used entrances in NW facing bank of ditch, 1 with huge spoil heap, 1 with large and 2 small/medium. Bedding on spoil and well worn paths
23	Outlying	1 well used entrance	in SE facing bank of ditch, large spoil heap with bedding, 3 dung pits nearby
24	*Rabbit*		*2 badger size entrances among rabbit holes*
25	*Rabbit*		*1 entrance of badger size by two rabbit size and dung pits. Sandy soil = might be large rabbit hole*
26	Annexe	3 well used entrances	in dry ditch back from drain bank, 1 large entrance with large spoil and 1 smaller entrance in NE facing bank, 1 middle size entrance in SW facing bank.
27	*Rabbit*		*1 badger size entrance in bank – 10m away and on top of bank – 1 entrance and 2 rabbit size entrances*
28	Main	39+ well used entrances	Spread along bank of drain. Many very large spoil heaps, some with bedding. Some rabbit holes towards NW end
29	Outlying	1 well used entrance	in south east facing bank of dried out ditch
30	Outlying	1 well used entrance	near bottom of south east facing bank of dried out ditch
31	Outlying	1 well used, 2 partially used entrances	well used entrance in bank of drain, some vegetation on spoil, 2 partially used entrances 15m along bank
32	Outlying	3 well used entrances	3 well used entrances, each about 15m apart, along path with digging nearby
33	Outlying	3 well used entrances	3 well used entrances in bank of drain, moderate spoil heaps
34	Outlying	1 well used entrance	in steep bank of drain, grass and nettles on spoil