



Corvus Consulting

Protected Species Surveys

Dunbia, Sawley

Castill Laithe Abattoir, Clitheroe, Lancashire, BB7 4LH

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1 INTRODUCTION

1.1 Corvus Consulting were engaged by McCarter Hamill Architects to conduct ecological surveys in relation to a planning application to construct additional buildings at the Castill Laithe Abattoir, Clitheroe, Lancashire, BB7 4LH .

Aims of Survey

1.2 The aims of the survey were:

- To provide sufficient information on the potential effects of the proposed development on protected species to allow the ecological impact of the proposal to be considered in full by the consenting authority;
- In particular, to assess the potential impacts of development on bats, badgers, otter, water voles and great crested newts;
- To provide appropriate mitigation, recommendations and enhancement measures for potentially impacted species; and,
- To determine whether European Protected Species licences (issued by Natural England) for development purposes will be required in respect of bats, otters or newts at the site, and also whether they would be likely to be granted if sought.

1.3 The site was visited on 11-12th May and 13-14th May 2013, and all surveys conducted according to Natural England specifications. The area surveyed is shown in Figure 1.



Figure 1-1: Existing site plan for Dunbia Sawley with area surveyed outlined in red

Surveyor & Author Expertise

Dr Daniel Bennett

- 1.4 The surveys were undertaken by Dr Daniel Bennett assisted by Patricia Tabasuares and Darron C. Gates. Daniel has been conducting mammal surveys for Corvus Consulting for four years, and internationally for 22 years.
- 1.5 He gained a first class honours degree in Zoology from the University of Aberdeen and a PhD in herpetology from the University of Leeds. Much of his research has been concerned with developing and refining methodologies for the non-intrusive and non-destructive survey of a variety of animal groups including bats, non-volant mammals, reptiles, amphibians and some invertebrate groups.
- 1.6 He is the author of the Royal Geographical Society guide to field techniques for reptiles and amphibians and has given numerous international workshops on bat, reptile and amphibian survey techniques to the British Petroleum Conservation Award winners the University of the Philippines (Dilliman and Los Banos), the University of Cape Coast, Ghana, the University of Legon, Ghana, Leeds University, UK, Aberdeen University, UK and elsewhere.
- 1.7 His work has included collaborations with the Soviet all Union Institute of Nature Conservation (Desert Biosphere Division), Ghana Wildlife Department, Madagascar National Parks (formally Angap) and many universities, institutions and NGOs worldwide. He holds current Natural England licences to disturb bats and great crested newts for scientific and survey purposes.

Dr James K. O'Neill

- 1.8 Dr. O'Neill is the Managing Director of Corvus Consulting; he holds a first class Honours degree in Zoology from Aberdeen University and a Ph.D. in Bat Ecology & Conservation from Queen's University, Belfast. Dr O'Neill is accepted as expert in ecological matters by the Northern Ireland Environment Agency (UK), Scottish Natural Heritage (UK), Natural England (UK) & the National Parks & Wildlife Service (ROI) and holds a wide variety of mammal and herpetological licences from those bodies.
- 1.9 He is a member of the Irish Government's Commission for Energy Regulation Expert EIA Review Panel and advises that Government on the quality, robustness and legality of EIA works carried out in support of energy infrastructure works in the Republic of Ireland. He is an expert in spatial environmental planning, EcIA, EIA & SEA and has considerable experience of mitigation design and the requirements and derogation tests imposed by Articles 12 and 16 of the Habitats Directive.
- 1.10 Dr. O'Neill has been elected as an Eminent Member of the Royal Institute of Chartered Surveyors (RICS) by the members of that organisation, and is a Fellow of that Institution.

Weather Data

1.11 Surveys were conducted on the following dates. Weather conditions are provided below.

Table 1-1: Survey times, durations and weather conditions.

Date	From	Until	Air Temp °C	Water Temp °C	Wind	Rain	Cloud Cover
11-May-13	21:00	22:45	11-9°C	10°C	Sporadic gusts	Light, intermittent, heavy after 22:30	100%
13-May-13	21:00	23:30	12-9°C	10°C	Light breeze	Nil	0
14-May-13	03:00	05:00	8°C	10°C	Light breeze	Nil	30%

2 PLANNING POLICY FRAMEWORK, LEGISLATIVE PROTECTION FOR ECOLOGY

Planning Policy Framework

- 2.1 The National Planning Policy Framework is chiefly intended to provide guidance for local planning authorities on the content of their Local Plans, but the Framework is also a material consideration in the determination of individual planning applications. We note that while the NPPF has replaced much existing planning policy guidance (including Planning Policy Statement 9: Biological and Geological Conservation); Government circular 06/05: Biodiversity and Geological Conservation - Statutory Obligations and Their Impact within the Planning System, which accompanied, PPS9 remains valid.
- 2.2 The NPPF places significant weight on the concept of sustainable development, and requires the planning system to achieve a number of functions, including the improvement of biodiversity. The NPPF reaffirms the protection previously afforded to valued ecological receptors by PPS9, and provides more emphasis in respect of ecological networks, requiring their active creation rather than simply maintenance and repair.
- 2.3 The protection afforded to protected species wildlife on proposed development sites is largely unchanged by the NPPF. Prior commitments in respect of obligations to avoid, mitigate and compensate for significant harm to biodiversity remain extant.

- 2.4 These obligations are outlined in relation to legally protected species in ODPM Circular 06/2005 (Biodiversity and Geological conservation – Statutory obligations and their impact within the planning system). The circular states:-

“95. Particular species of flora and fauna within England are subject to special protection, normally because of their vulnerable conservation status. For example, a species may be endangered or suffering decline in numbers or range, either within the UK or the European Union, or may be the victim of persecution or cruelty (such as that inflicted on badgers or the collection of the eggs of birds).”

‘97. The two principal pieces of legislation protecting wild species are Part I of the Wildlife and Countryside Act 1981 and the Habitats Regulations. Furthermore, some animals are protected under their own legislation (for example, the Protection of Badgers Act 1992).’

‘98. The presence of a protected species is a material consideration when a planning authority is considering a development proposal that, if carried out, would be likely to result in harm to the species or its habitat. Local authorities should consult English Nature before granting planning permission. They should consider attaching appropriate planning conditions or entering into planning obligations under which the developer would take steps to secure the long-term protection of the species. They should also advise developers that they must comply with any statutory species’ protection provisions affecting the site concerned. For European protected species (i.e. those species protected under the Habitats Regulations) further strict provisions apply, as explained below, to which planning authorities must have regard.’

‘99. It is essential that the presence or otherwise of protected species, and the extent that they may be affected by the proposed development, is established before the planning permission is granted, otherwise all relevant material considerations may not have been addressed in making the decision. The need to ensure ecological surveys are carried out should therefore only be left to coverage under planning conditions in exceptional circumstances, with the result that the surveys are carried out after planning permission has been granted. However, bearing in mind the delay and cost that may be involved, developers should not be required to undertake surveys for protected species unless there is a reasonable likelihood of the species being present and affected by the development. Where this is the case, the survey should be completed and any necessary measures to protect the species should be in place, through conditions and/or planning obligations, before the permission is granted. In appropriate circumstances the permission may also impose a condition preventing the development from proceeding without the prior acquisition of a licence under the procedure set out in section C below.”

[Our emphasis]

- 2.5 Priority species are those species which have been identified which require conservation action because of their decline, rarity and importance in a UK context. In relation to Priority Species: ODPM Circular 06/2005 states:

'84. The potential effects of a development, on habitats or species listed as priorities in the UK Biodiversity Action Plan (BAP), and by Local Biodiversity Partnerships, together with policies in the England Biodiversity Strategy, are capable of being a material consideration in the preparation of regional spatial strategies and local development documents and the making of planning decisions.'

- 2.6 Bats, Great crested newts and otters are subject to the 'Doctrine of Strict Protection' under Annex IV of the Habitats Directive. The Habitats Directive is transposed into the law of England by means of the Conservation of Habitats and Species Regulations 2010
- 2.7 The Regulations establish a protective regime for the species of animal and plant that are listed, respectively, in Schedule 2 and Schedule 5 of the Regulations. These species are the "European Protected Species" (EPS) to which the Regulations apply.
- 2.8 It is important to bear in mind that the protective regime established by the Regulations applies to EPS wherever they occur. It is not limited in its effect merely to specific, designated areas such as Natura 2000 sites.
- 2.9 Within the regime, the regulations give particular effect to the provisions of Article 12 of the Directive, by creating the following offences:

'Protection of certain wild animals: offences

41.—(1) A person who—

- (a) deliberately captures, injures or kills any wild animal of a European protected species,
- (b) deliberately disturbs wild animals of any such species,
- (c) deliberately takes or destroys the eggs of such an animal, or
- (d) damages or destroys a breeding site or resting place of such an animal, is guilty of an offence.

(2) For the purposes of paragraph (1)(b), disturbance of animals includes in particular any disturbance which is likely—

(a) to impair their ability—

- (i) to survive, to breed or reproduce, or to rear or nurture their young, or
- (ii) in the case of animals of a hibernating or migratory species, to hibernate or migrate; or
- (b) to affect significantly the local distribution or abundance of the species to which they belong.'

- 2.10 UK Government Policy, the Habitats Directive and Conservation Regulations thus require that where impacts upon bats, otters or Great crested newts may arise due to development proposals, an impact assessment must be carried out, prior to consent, to ascertain the likely impact of the proposed development on bats and any potential roosts that may be present in the area.
- 2.11 A further requirement is that the proposed development should not significantly impact upon the ecology of the species present, for example by significantly increasing artificial light levels in the vicinity of bat roosts.
- 2.12 Where impacts may arise, Regulation 9(5) of the Conservation Regulations is engaged. This duty requires all "competent authorities" (public bodies) to "have regard to the Habitats Directive in the exercise of its functions."
- 2.13 In order to discharge its regulation 9(5) duty a Local Planning Authority (LPA) must consider in relation to a planning application:

(i) whether any criminal offence under the 2010 Regulations against any European Protected Species is likely to be committed; and

(ii) if one or more such offences is likely to be committed, whether the LPA can be satisfied that the three Habitats Directive "derogation tests" are met. Only if the LPA is satisfied that all three tests are met may planning permission be granted. These three tests are:

- i. the development must be for one of the reasons listed in regulation 53(2) of the 2010 Regulations. This includes imperative reasons of overriding public interest of a social or economic nature or of a public health and safety nature
- ii. there must be no satisfactory alternative and,
- iii. favourable conservation status of the European Protected Species in their natural range must be maintained.

- 2.14 These tests are the three tests that Natural England must apply when considering whether to grant a developer a European Protected Species licence to a project to proceed following a grant of planning permission. Even though Natural England, as the licensing authority, has to apply these tests in relation to a licence application these tests must also be considered by the LPA when granting planning permission. This is due to the LPA's regulation 9(5) duty.

3 BATS

- 3.1 As noted, bats, their roosts and resting sites are European Protected Species and subject to the doctrine of strict protection imposed by that Directive. A bat roost potential survey and bat activity surveys (dusk and dawn) were carried out to determine whether the proposals could give rise to impacts upon them.

- 3.2 The objectives of the survey were:

- To identify if there are any historical records of bat roosts within the vicinity of the site;
- To identify how bats are utilising the site;

- To identify the species of bats utilising the site; and
- 3.3 To inform this survey the National Biodiversity Network's Gateway at <http://data.nbn.org.uk/> - was checked for records of protected species recorded near the site.
- 3.4 The NBN indicated that the following bat species have been recorded within 2km of the proposed development site:
- Common pipistrelle bat (*Pipistrellus pipistrellus*)
- 3.5 Foraging, breeding and allied activities of the following bat species were observed within 500m of the proposal site by Corvus surveyors in 2012.
- Common pipistrelle bat (*Pipistrellus pipistrellus*)
 - Soprano pipistrelle bat (*Pipistrellus pygmaeus*)
 - Brown Long-eared bat (*Plecotus auritus*)
 - Myotis Spp.

Survey Methodology

- 3.6 The roost potential of the site was assessed by carrying out bat roost potential surveys of the site during daylight hours.
- 3.7 Bat activity at the site was assessed by covering the entire site and environs during the period when bats may be active, watching and listening to bats using the equipment listed below. Surveyors attempted to cover as much of the site as possible at all times that bats were likely to be active.
- 3.8 The following equipment was used for bat surveys at the site:
- Night Vision Equipment (Yukon Advanced Optics 3rd generation)
 - Sony HDR-SR11 video camera with nightvision facility.
 - Broad Spectrum Real Time Ultrasound Recorder (Dodotronic Ultramic 250 and netbook)
 - 2x heterodyne bat detectors (Pettersson D240X, Magenta Bat 4)
 - 1x Time Expansion bat detector (Pettersson D240X)
 - Torches with red/NIR filters.
- 3.9 Bat surveys were conducted from 21:00 until 22:45 on 11th May 2013, from 21:00 until 23:30 on 13th May 2013 and from 03:00 until 05:00 on 14th May 2013.
- 3.10 Climatic data during the surveys is given in Table 1-1.

Bat Roost Potential Survey

- 3.11 All features at the site that have the potential to be used by roosting bats were assessed on the afternoon of 11th May 2013.

Results of bat roost potential survey.

- 3.12 The buildings on the site are of modern industrial design and have low potential for roosting bats (Figure 3-1). Tree lines bordering the abattoir site contain trees with similar low potential for roosting bats. A group of trees forming a line running northeast-southwest and bordering the proposed development site (Figures 3-2 & 3-4) contain cracks, splits and cavities and have been assessed as having good potential for roosting bats. This tree line was monitored using a video camera with night vision and an Ultramic microphone attached to a laptop computer between 21:00 and 22:30 on the evenings of 11th and 13th of May 2013, and between 0300 and 0500 on the morning of May 14th 2013. No bats were recorded emerging from or entering potential roost sites in these trees.



Figure 3-1: Existing buildings at Dunbia, Sawley



Figure 3-2: Site plan for Dunbia Sawley with trees considered to have good roosting potential for bats outlined in green



Figure 3-3: Tree line with good potential for roosting bats at Dunbia, Sawley

Bat activity surveys

- 3.13 Two surveyors recorded bat activity at the site between 21:00 and 22:45 on the evening of 11 May 2013, from 21:00 to 23:30 on 13th May and from 03:00 to 05:00 on 14th May 2013, using the equipment listed above. The survey included the proposed development area and the adjacent effluent lagoons and tree lines (Figure 1-1).
- 3.14 Common pipistrelle bats were recorded foraging around security lights within the proposed development area on the evenings of May 11th and May 13th. The maximum numbers of bats observed simultaneously was two.

Common pipistrelle bats were also observed foraging along a tree line at the southern boundary of the development site (Figure 5). No bats were recorded foraging over the effluent lagoons. The following species of bats were recorded at the site:

Common pipistrelle bats - *Pipistrellus pipistrellus*



Figure 3-4: Recorded foraging of common pipistrelle bats (*Pipistrellus pipistrellus*) shown in green.

Other species

- 3.15 Other species of bats that were not recorded during the surveys but could be reasonably expected to use the site for foraging purposes are Daubentons bats (*Myotis daubentonii*) and soprano pipistrelles (*Pipistrellus pygmaeus*).

Conclusions: Bats

- 3.16 No bat roosts, areas of significant roosting potential or important foraging areas will be impacted by the proposed development.
- 3.17 As a precautionary measure a planning condition limiting additional illumination of the southern tree line may be prudent as this area may be of local importance as a commuting route. Should such a condition be implemented, no impact upon bats is predicted.

4 GREAT CRESTED NEWTS

- 4.1 As noted, great crested newts, their breeding and resting sites are European Protected Species and subject to the doctrine of strict protection imposed by that Directive. The species is also fully protected by Schedule 5 of the Wildlife and Countryside Act 1981 (as amended).
- 4.2 No suitable habitat for great crested newts occurs within the area of proposed development so no loss of foraging habitat is likely should the development proceed.
- 4.3 However great crested newts have been recorded on neighbouring lands and the eastern area of the abattoir site contains five effluent lagoons, the furthest of which (350m from the proposal site) are considered to have the potential to be breeding habitat for great crested newts (as Dunbia Environmental staff have observed male and female adult of the species within these lagoons during the breeding period).
- 4.4 Accordingly, surveys were conducted in accordance with Natural England guidelines (2001) to determine if great crested newts occurred in these lagoons, how newts were using the habitat (if present) and to make estimates of the size of the population (if present).
- 4.5 The survey was conducted according to the guidelines provided by Natural England (2001).

Survey Methodology

- 4.6 The following methods were employed.

1. Bottle trapping
2. Torchlight surveys
3. Egg searches
4. Netting

- 4.7 Examination of the effluent lagoons indicated that the three higher lagoons were unsuitable for supporting amphibian populations because of anoxic conditions and the total absence of invertebrate life and aquatic vegetation. Of the two lower lagoons (Ponds T3 and T4), only one (Pond T4) was considered to have reasonable likelihood of supporting amphibians (Figure 4-1).



Figure 4-1: Lagoon margins where bottle traps were set shown in blue.

Torchlight surveys

- 4.8 The accessible margins of both surveyed lagoons were searched for great crested newts between 22:00 and 23:00 on the evenings of 11th and 13th May using torches with output in excess of 50,000 candlepower. In both these lagoons the turbidity of the water was such that torchlight penetrated <5cm below the surface and were therefore considered ineffective.

Bottle trapping.

- 4.9 Standard 1.5 litre bottle traps were set at 1m intervals along the accessible edge of the lagoons where water depth was sufficient. At Pond T4 a total of 86 bottle traps were set and at Pond T3, 24 bottle traps were set (Figures 4-1 to 4-3. Traps were set on the afternoon of May 13th and recovered

between 05:00 and 06:00 on May 14th. Only traps set at the lowest lagoon caught visible invertebrates, and no traps caught adult or larval amphibians at either lagoon.



Figure 4-2: Pond T4 at Dunbia, Sawley



Figure 4-3: Pond T3 at Dunbia Sawley

Egg searches

- 4.10 Vegetation in the two surveyed lagoons was examined for the presence of newt eggs along all accessible margins on the afternoon of May 11. No characteristically folded leaves were found, and no newt eggs were recorded.

Netting

- 4.11 Netting was conducted along all accessible margins of the two surveyed lagoons for at least 15 minutes per 50m of accessible shoreline on the evenings of May 11th and May 13th. Neither adult nor larval amphibian were found, but strings of common toad (*Bufo bufo*) eggs were found at the southeast corner of Pond T4 (Figure 4-4).

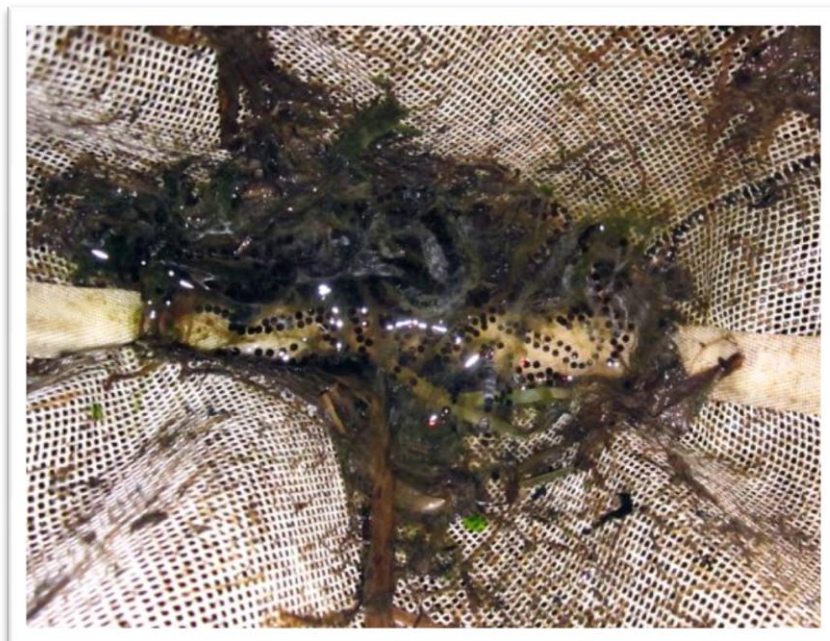


Figure 4-4: Toad spawn from Pond T4 at Dunbia, Sawley

Great Crested Newts: Conclusion

- 4.12 No evidence of great crested newts was found at any of the lagoons in proximity to the proposed development.
- 4.13 With the exception of the lowest lagoon (T4), none appear capable of supporting amphibians at any life stage.
- 4.14 It is noted that the furthest lagoons to the east of the site have the potential to host breeding populations of newts, however given the physical separation (c. 350m) between the proposal site and these lagoons, the unsuitability of habitats within the proposed development area in respect of resting, foraging or breeding newts, no impact is predicted upon this species should the proposal proceed.
- 4.15 In the unlikely event that great crested newts are encountered at the proposed development site, all construction work must cease immediately and the advice of a suitably qualified person sought.

5 BADGERS

Relevant legislation

- 5.1 Badgers are protected by the Protection of Badgers Act 1992.
- 5.2 Under this Act, it is an offence to:
- Wilfully kill, injure or take a badger, or to attempt to do so;
 - Cruelly ill treat a badger;
 - Intentionally or recklessly interfere with a badger sett by:
 - (a) damaging a sett or any part of one;
 - (b) destroying a sett;
 - (c) obstructing access to or any entrance of a sett;
 - (d) causing a dog to enter a sett; or (e) disturbing a badger when it is occupying a sett.

Relevant guidelines from Natural England - badgers

- 5.3 Advice on badgers and the development process is contained within Natural England publication IN75. BADGERS AND DEVELOPMENT. A Guide to Best Practice and Licensing. Interim guidance document, revised December 2011¹, which should be read in conjunction with this document.

Survey Methodology -badgers

- 5.4 A survey of the entire site and a 30m surrounding buffer zone was conducted by Dr Daniel Bennett, which involved a thorough search for the following field signs and evidence of the presence of badgers:

¹ <http://publications.naturalengland.org.uk/publication/73034?category=19010>

- Setts (underground structures displaying signs of current or recent use and occupation);
- Paths & trails (networks of paths linking setts with foraging habitat);
- Paw prints & tracks;
- Guard hairs;
- Snuffle holes & feeding scrapes (vegetation or soft soil turned over during foraging);
- Scratching posts (claw marks on tree trunks, fallen trees etc.);
- Breach points (gaps in fences and hedges or crossing points over roads);
- Dung pits (single faeces deposits placed in a small excavation); and
- Latrines (collection of faecal deposits used to mark territorial boundaries).

5.5 All tracks, trails and paths identified were followed to locate setts and other field signs; the immediate vicinity of all latrines located was searched for further signs of territorial evidence. In areas where no access was possible, for example due to the presence of dense impenetrable scrub, an assessment of the likelihood of a sett being present was based on the presence or absence of badger trails entering the area, along with other field signs.

5.6 All setts and sett entrance holes identified were classified according to the criteria specified in Table 2-1 and Table 2-2 below; the condition of entrance holes provides a reliable guide to the level of current and recent exploitation and occupation of a sett by badgers.

Table 5-1: Classification of Badger setts

Type of Sett	Description
Main (M)	Several entrances; large spoil heaps and conspicuous trails leading from and between sett entrances. Associated with continuous use.
Annexe (A)	Several entrances; usually less than 150m from the main sett. Generally smaller than the main sett, not necessarily occupied all the time.
Subsidiary (S)	Typically more than 50m from the main sett with an average of 2 – 3 entrances. Intermittent use is common with no obvious trails linking to other setts.
Outlier (O)	Small (average 1 – 2) entrances and usually some distance from the main sett. Not linked to the main sett by trails and only used periodically.

Table 5-2: Classification of entrance holes

Entrance Type	Description
Well used	Regularly used with recent excavated spoil.
Partially used	Not regularly used, usually with debris in the entrance and overgrown vegetation surrounding/blocking the entrance. Has the potential for reoccupation with minimal clearance.
Disused	Entrance completely blocked with vegetation and/or debris. Reoccupation will require significant clearance.

Results of Badger survey

- 5.7 No evidence of badger setts was found during the surveys and no evidence of badger activity was found within 30m of the development site.
- 5.8 The site has an intact perimeter fence that contains no breaches large enough for an adult or sub-adult badger to pass through. A road killed badger was observed on the A59 approximately 1km west of the site, indicating that the species occurs locally.

Conclusion- Badgers

- 5.9 Although badgers occur locally, no evidence was found that they occur on or in direct proximity to the proposed development site, and the intact fence around the abattoir site prevents badgers from accessing the site.
- 5.10 It is considered that the proposed development will not adversely affect local badger populations, and no licensing or conditions on development are required in this instance.

6 OTTER

- 6.1 As noted, otter, their roosts and resting sites are European Protected Species and subject to the doctrine of strict protection imposed by that Directive. An otter habitat suitability assessment and survey were carried out to determine whether the proposals could give rise to impacts upon them.
- 6.2 No habitats suitable for otter are present in proximity to the proposal site. The lagoons do not provide foraging resources for the species and no holts or other resting sites were observed during surveys.
- 6.3 No impact is predicted upon this species should proposals proceed.

7 WATER VOLE

- 7.1 Since April 1998 the water vole has received legal protection through its inclusion in Schedule 5 of the Wildlife & Countryside Act 1981 (as amended) in respect of section 9(4) only. This section of the Act protects the water vole's places of shelter or protection, but does not protect the voles themselves. The water vole has received this limited protection in recognition of the significant decline that this species has undergone in recent decades and also in recognition that habitat loss and destruction has played a much greater part in this decline than direct persecution.
- 7.2 Legal protection makes it an offence to intentionally or recklessly:
- damage, destroy or obstruct access to any structure or place which water voles use for shelter or protection;
 - disturb water voles while they are using such a place
- 7.3 As water voles are rarely seen, surveys are based on the presence of characteristic signs. Site-specific searches were carried out all all waterbodies within the areas indicated at Figure 1-1 and

involved a close examination of all waterway and pond banks up to two metres from the water's edge.

7.4 The following signs were sought: faeces, latrines, feeding stations, burrows and 'lawns'.

7.5 No signs of the species were observed and no impact is predicted upon this species.

8 CONCLUSION

8.1 Detailed bat, amphibian, badger, otter, and water vole surveys were carried out and an around the proposal site.

8.2 Of these species, only bats were observed within the survey area. No impact is predicted upon bats providing the southern tree line is not illuminated.

8.3 No significant impacts are predicted upon the remainder of the species which were the subject of current surveys.

8.4 No offences are likely to occur and no protected species licences are likely to be required to permit the proposals to proceed.