

ROYAL ORDNANCE, BISHOPTON



OUTLINE PLANNING APPLICATION FOR THE REGENERATION
OF THE SITE TO FORM A MIXED USE COMMUNITY GROWTH AREA

ENVIRONMENTAL STATEMENT ADDENDUM REPORT

October 2006

ROYAL ORDNANCE SITE, BISHOPTON

REMEDICATION AND RECLAMATION EARTHWORKS

**ENVIRONMENTAL STATEMENT
ADDENDUM REPORT**

October 2006

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1 Introduction

- 1.1 The Addendum Report supplements and clarifies the Environmental Statement submitted in support of planning application reference 06/0602/PP. It relates, specifically, to European Protected Species.
- 1.2 The following is a summary of the ecological information gathered over the summer of 2006 for the former Royal Ordnance site, Bishopton. The work was commissioned to clarify the status of bats and otters, in particular. Attention was focused, for the former, on establishing the location of any bat roosts on site, and, for the latter, to the recent increased activity of the otter within an area designated for the planned village extension and the potential impacts of remediation and reclamation earthworks on them.
- 1.3 Bats surveys were undertaken by Nocturne, a local bat survey consultancy and by Starling Learning, a local Ecological Consultancy and J. Green, a specialist in small mammal survey.

2 Summary Survey and Findings

- 2.1 The bat survey was carried out between July and September 2006. The survey remit was to assess further the use of the site by bats (building on previous surveys) and to identify any roost sites. The work comprised a series of car and dawn and dusk surveys to further assess bat activity, including car survey within and at the perimeter of the site. The area surveyed by car and specific static surveys can be found in Appendices 1 and 2 of Nocturne's Bat Survey, BAE Systems, Royal Ordnance, Bishopton 2006 (Appendix 1).
- 2.2 The results indicate that a large pipistrelle maternity roost in Dargavel House accounted for the majority of the site activity and that other activity could be traced to the village of Bishopton. With the qualification that it is extremely difficult to be accurate in tracing the roost of Daubenton's bats (which were recorded on site), in particular, no evidence of other roosts was found.
- 2.3 The otter survey was carried out by J. Greenlees of Starling Learning. Again, the work builds on a succession of earlier work that shows increasing activity within the centre of the site following decrease in industrial activity. The survey areas were systematically searched for evidence of use by otters, in particular, for:
 - Faeces ("spraints")
 - Otters shelters (holts or couches)
 - Footprints
 - Sightings.
- 2.4 The results of this survey are given in Starling Learning's Update Ecological Survey (2006) (Appendix 2). Because of the significance of the presence of this animal at the heart of the proposed village extension, J Green, a small mammals surveyor with extensive knowledge and experience in the survey of otters was commissioned to confirm the findings and to formulate a mitigation strategy. The results of this work are given in his report (Appendix 3). In summary, in addition to activity along Dargavel Burn, an otter holt and couches were found around the 'fire' or 'brick' ponds near the site entrance.

3 Recommendations

Bats

3.1 Dargavel House will be unaffected by the proposed development and the remediation and reclamation earthworks. The emphasis has, therefore, been placed on best-practice methodology in examining all buildings before decontamination and demolition and all trees with potential bat roosts before felling or tree works. In order to maintain/enhance the status of bats on the site, it is proposed that:

- Habitat and commuting routes are maintained sufficient to support the existing bat population
- Additional new habitat and commuting routes, including linear water bodies, marginal vegetation and swales, are provided.
- Artificial roost sites/hibernacula are provided
- Appropriate mitigation measures are formulated where roost sites are found in the course of the works.

Otters

3.2 There is, currently, no development remediation/reclamation earthworks that conflict with the maintenance of otter holts or couches. However, should this situation change in the course of the redevelopment, then appropriate steps will be taken following discussion and licensing. The mitigation strategy is, therefore, to:

- Avoid direct disturbance of otters
- Maintain sheltered travelling routes for the free movement of this animal
- Enhance/create new habitat for otters within a planned, extensive SuDS, restricted reprofiling of Dargavel Burn
- Manage/enhance an area of habitat within the Georgetown area of the Bishopton site (which is remote from the main site activity) for the benefit otters.

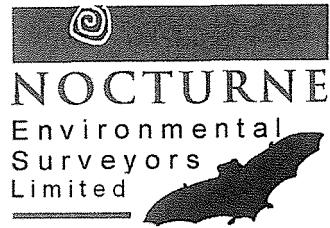
3.3 For both bats and otters, flexibility will be allowed for within the habitat management/creation programme to allow for adjustment following a review of an on-going monitoring regime, with advice provided via a Steering Group.

Appendices

- 1 Bat Survey, Nocturne 2006**
- 2 Update Ecological Survey 2006**
- 3 Otter Survey, Jim Green 2006**

Appendix 1

Bat Survey, Nocturne



BAT SURVEY

BAE SYSTEMS ROYAL ORDANANCE SITE BISHOPTON, RENFREWSHIRE

**FOR CASS ASSOCIATES
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1 Introduction

Nocturne Environmental Surveyors Ltd was asked by Cass Associates to carry out a survey of the Bishopton BAE Systems site for bats in June 2005. Induction was carried out on site on the 10th September 2005

1.1 Background

Maps of the site were provided by BAE Systems. These are quite comprehensive showing every numbered building on the site and the access routes and water bodies. We also received an ecological survey sheet 715/109 that indicated Site Structures with a potential to support a bat roost dated 4.11.03.

Copies of two previous bat survey's by C Balling in 2002 and R Stebbings in 1995, were requested, but were unavailable. These reports will be required prior to resurveying in spring 2006.

Nocturne understands that Pipistrelle species, *Pipistrellus pipistrellus* & *P pygmaeus* as well as, Daubenton's (*Myotis daubentonii*) and Brown long-eared (*Plecotus auritus*). have been recorded on the site but have no survey report evidence of this. There is verbal indication that there is a substantial roost in the building 70/100 and the surrounding woodland. It is understood that this building is to be retained and at the time of survey was outwith the authorised survey area. This could be verified in 2006 with a survey of the adjacent woodland if required.

1.2 Remit

Due to the late start in the season for bat surveying, a scoping survey was proposed which contained the following:

1. Using the existing Buildings survey information, as well as the previous Bat Survey provided by Cass Associates an assessment would be made of each group of buildings to determine which are suitable for bats and would require further surveying.
2. Following Bat Conservation Trust protocol for evening car surveys, the site, using the existing road network would be surveyed to establish presence /absence and species using the site. This would require the use of the following equipment:
 - Frequency Division Bat Detectors (which will allow recording of all species of bats echolocating)
 - Mini Disc Recorders
 - Palm Top Computer

This survey will provide mapped information in relation to species and distribution on the site

3. Daytime visit and desktop research of proposed buffer zone to determine suitable habitat for displaced bats.
4. Car survey as per description 2
5. Detailed description of mitigation measures for loss of feeding and roosting habitat.
6. Methodology for surveying buildings and trees. And only those trees close to buildings will be included.
7. Daytime survey to assess water courses and open water for potential roost and feeding areas. Those which are considered suitable will have an evening survey carried out.
8. The report will be available in electronic, hard copy and CD format.

In addition to the above BAE Systems requested a detailed survey and report for building number 28/237 in October to enable them to carry out demolition. The report is an attachment to this report.

1.3 Important considerations in the interpretation of bat survey results

There are 10 species of bats resident in Scotland. All are small weighing from 5-35 grams in body weight. About 8 species are known to roost in buildings and the others such as Noctule (*Nyctalus noctula*) and Leisler's (*Nyctalus leisleri*) prefer to use holes in trees, or crevices in the bark of old trees. Whatever type of roost is used, there may be difficulties in detecting bats during daytime, if the species hides away within dark crevices. Crevice dwelling bats, which can be difficult to find include both phonic types of Pipistrelle spp and Myotis sp. Other species such as Plecotus sp tend to be easily seen as they hang freely in open spaces.

Large maternity colonies of bats congregate in summer and tend to produce audible squeaks. Their accumulated droppings and urine give off pungent, ammoniated aroma. They are generally detectable with careful searching, even if they are well hidden. Small groups, or single bats, are often very difficult or even impossible to detect in daytime.

Surveying for bats around potential sites, at or after dusk, will often reveal the presence of flying bats emerging from roosts in which they were undetectable in daytime due to their occupation of hidden crevices. With the use of a bat detector it is often possible to identify the species, or group of species to which it belongs without the need to catch a specimen.

Bats may not be discovered at one time of the year, even though they use the habitat at other times. Hence, survey results carried out only at one time of the year may not discover the true bat potential of the habitat.

Whilst every reasonable effort is made to locate bats during a survey, it is impossible to guarantee that crevice dwelling species are absent. The destructive removal of tiles and/or slates and cavity walls etc., would be necessary to prove that bats are not present. No responsibility can be taken for the discovery of bats in such locations after a survey has been carried out.

1.4 Methodology

Daytime surveys were carried out inspecting building types within the permitted access areas. There are areas of mature trees on the site that could support bats for roosts, feeding corridors and flight routes. There were too many trees to survey individually and a tree survey should be carried out once the trees have been tagged and marked for felling.

Dargavel House would appear to be a suitable for a bat roost but was not surveyed as it was outwith the authorised survey area and is being retained. A more comprehensive survey could be carried out at a more favourable time of year in 2006.

A daytime car survey was carried out of the buffer zone to identify suitable roost sites and feeding habitats. An evening survey was not carried out due to lack of ideal weather conditions.

Fixed point evening surveys were carried out of the main water bodies and the inhabited office buildings.

Car surveys were carried along the main routes.

2. Results

Surveys were carried out on the:

23rd September - day and evening.

24th September - daytime survey

7th October - evening survey

8th September - daytime survey of the buffer zone.

2.1 Buildings surveyed on site:

28/228 28/225 28/224. 28/23IE 28/229D 28/238Q 28/209A 28/210A 28/273 28/208
28/2 28/213A 28/913 28 /2245 6B 28/228/225 28/238A 28/238P 28/234. 28/323A 28/
28/517 36/022 328B 28/346 28/113 28/152P 28/114 28/104C 28/104D 28/352B
40/2 (24) 40/2 (31).
24/225.24/20BC. 24/208B. 24/239P
36/044.
60/213
50/211.
31/021
37/010 37/064A 37/005 37/038B 37/006 36/005 36/021 37/002 37/004 36/003 36/002
36/002A 38/003A 37/055
38/019 8/102 08/103 8/105 37/052 37/026

25/106B 25/105B 25/108 25/102A 22/124 25/127 37/025
 25/102 25/138F 37/011 22/108A 25/138A 22/155
 22/125 - Pill box in the field could be a possible hibernacula
 22/135 22/128H 22/102H Q/138 22/115 22/112 22/110 22/109 22/108
 22/126 22/103A 37/106
 25/132 221/07 30/503 30/511 30/506 36/023
 25/106A 22/129 13/009 25/130 25/129 25/164 25/131 25/119 35/ 538 25/105A
 41/106 41/126
 36/002A 38/003A 26/38B
 28/110 36/010 36/013 36/024
 28/117 28/131B 44/228 28/128 28/127 28/131D 28/124 4A 28/138D 28/29A

There was no evidence of bats found in any of these buildings or indication that bats had used the building as a roost site.

Bat passes were recorded in the area of the administration block. Pipistrelle spp were recorded near the main laboratory.

Daubenton's and pipistrelle spp were recorded feeding over the settling tanks by building 36/044 and over the Dargavel ponds 4/ 011A , B& C.

2.2 The water courses were surveyed during the day to identify suitability for roosts and feeding corridors

Point	Description	Features to indicate bat use
Pond C	Willow trees & shrubs	Likely bat foraging area
2	Dargavel Burn	Unlikely some pollution
3 Pond A	Mature shrubs	Likely bat foraging
4 Pond B	Willow trees & shrubs	Likely bat foraging area
5 34/274	Wash tank	Unlikely
6	Dried out pond	Unlikely
7	Dried out pond	Unlikely
8	Settling pond dried out	Foraging area
9	Settling pond dried out	Unlikely
10	Burn under road Overgrown vegetation	Unlikely
11	Burn, farm boundary	likely
12	Burn under bridge slow moving	Likely, trees along banks. Good foraging area.

2.3 Below are the results of the evening car survey carried out along the main routes within the site. Survey from 18.52 – 20.04

Point/description	Pass/ activity	Species
1 Glenshinoch Road	1	Pipistrelle spp
2 As above	1	As above
3 As above	2 feeding	As above
4 As above	Several passes	Pipistrelle 55kHz

5 NS42601		Pipistrelle 55kHz
6 /7 NS42603	1	Pipistrelle spp
8 Glenshinnoch road	1 several passes	Pipistrelle 55kHz
9 As above		Pipistrelle spp
10 Glenshinnoch road		Pipistrelle spp
11 28/329E		Pipistrelle 55kHz
12		Pipistrelle 55kHz
13 Beech road 34/229	Some distance away	Pipistrelle spp
14 Main drive 24/213		Pipistrelle spp

2.4 Survey carried out in the 2km Buffer Zone around the site.

Throughout the area the landscape is predominantly farmland of rough pasture, arable crops, with broken hedgerows and scattered single mature trees. Some of these features are linked to woodlands and roadside hedgerows.

The village of Bishopton has a housing mix of pre, post war and new houses. The school has an asphalt flat roof. All these buildings have potential for bat roosts

Point	Description	Features to indicate possible bat roost
1	North Mains Farm	Potential building roost (PBR)
2	South Mains Farm cottages Ardgriffe Manor	PBR
3	Woodland Broadleaf NS422 665	Foraging area
4	River Gryffe	Feeding area
5	New housing Craigends	PBR
6	Hedgerows on B790	Wildlife corridor/linear feature
7	Turningshaw Farm & cottages	PBR
8	Hedgerows along roadside	Linear route
9	Barochan Moss- coniferous trees some birch	Foraging area
10	Small mixed woodland NS 420 688	Foraging area
11	Trees bordering landfill site	Linear route
12	Mature woodland mixed & scrub	Foraging area
13	Boghall cottage NS 413 698	PBR
14	Micklefield Farm & cottages	PBR
15	Mixed woodland NS 4070	Foraging area
16	Formakin House & woodland	PBR Known bat roosts & PBR
17	Cottage leading up to DRUM	PBR
18	Hedgerows & scattered trees NS 409 716	Wildlife corridor/ linear feature
19	Mixed broadleaf woodland & hedges	Feeding linear feature
20	Various farmhouses & cottages	PBR
21	Cottage by equestrian centre	Known bat foraging area
22	Woodland by above cottage	Feeding area
23	Hedges along Bishopton road	Linear feature
24	Bishopton Residential buildings	Good PBR

25	Trees scrub along railway line	Wildlife corridor
26	Mature trees	Possible feeding area
27	Hedges & scattered trees in farmland	Foraging area
28	Houston House estate mature mixed woodland	PBR feeding corridor
29	Various cottages	PBR
30	Hedges mature sycamore	Foraging area.

3. Summary and Conclusion

- 3.1 No roosting bats or evidence of bats using any of the buildings that are unoccupied was found during the daytime survey.
- 3.2 The dusk surveys confirmed that bat species; Pipistrelle spp and Daubenton's are present on the site, using the open water and corridors of mature trees as feeding corridors.
- 3.3 The occupied main buildings by the main entrance appear to support a small pipistrelle spp roost.
- 3.4 The unoccupied buildings with flat roofs are generally unsuitable for bats, there are no openings cracks or crevices. The tunnels didn't appear to have suitable crevices, though require further surveying during summer months.
- 3.5 Unoccupied building with slate roofs should be surveyed again during the summer months.
- 3.6 Any occupied and heated building that are within the proposed development area require an internal survey and further external dusk surveys to pin point any roosts.

4. Bats and the Law

All bats are protected by the Wildlife and Countryside Act (Schedule 5) 1981 (WACA1981). They are also included in Schedule 2 of the Conservation Regulations 1994.

The Act and Regulations include provisions it illegal to:

Kill, injure, catch or keep bats.
Damage, destroy or obstruct bat roosts.
Disturb bats whilst they are roosting, for example by entering known roosts or hibernation sites.
Sell, barter or exchange bats live or dead.

It is a legal requirement to consult Scottish Natural Heritage (SNH) before you do anything that may affect bats and their roosts. This may include:

Blocking, filling or installing grilles over old mines or tunnels
Building, alteration or maintenance work.
Getting rid of unwanted bat colonies
Removing hollow or dead /dying trees.
Re- roofing.
Remedial timber treatment.
Rewiring or plumbing in roofs.
Treatment of wasps, bees or cluster flies.

Remember that because bats can potentially return to the same roost every year, bat roosts are protected even if there are not bats there all the year round.

The law allows you to tend disabled bats, kill seriously injured bats and disturb bats if they are in the living space of a house.

Activities such as catching, ringing or photographing bats, or disturb them whilst roosting, can be licensed by SNH provided they are for scientific, educational or conservation purposes.

These laws are not designed to prevent work but to minimise its impact on the long-term survival of bats.

For further details see sections 9-11, 16-27, and 69 of the WACA 1981.

If Bats are found:

If bats are uninjured, allow them to fly away.

If bats are injured or sluggish remove to a dry, empty, dark box. **Any one handling bats must use protective gloves.** Keep the box cool and still. Do not give food or drink. Call for assistance.

In all cases where bats are found to occupy trees or buildings, inform Scottish Natural Heritage (SNH) or the Nocturne Environmental Surveyors (the contact numbers are at the end of the report)

4.1 Addresses and Contacts

Scottish Natural Heritage
Caspian House
Mariner Court
8 South Avenue
Clydebank Business Park
Clydebank
G81 2NR

Tel: 0141 951 4488

Bat Conservation Trust
15 Cloisters House
8 Battersea Park Road
London
SW8 4BG

Tel: 020 7627 2629

Nocturne Environmental Surveyors Ltd
9 Middlepenny Road
Langbank
Renfrewshire.

Tel: 01475 540578 or 01505 843 679.

Appendix: report attached BAE Bishopton 28/237

Reference: R Ransome Bat Pro Ltd

Appendix 2

Update Ecological Survey 2006

**Bishopton Ordnance Factory
Protected Species Update**

1. Introduction

A series of surveys were carried out in spring and summer 2006 to update records of protected species known to use the Bishopton Royal Ordnance Factory. The extent of the survey work and methodologies is outlined in Table 1 below.

Survey Work	Methodology
<p>Mammal survey</p> <p>Badger <i>Meles meles</i></p> <p>Otter <i>Lutra lutra</i></p> <p>Water Vole <i>Arvicola terrestris</i></p>	<p>Previously recorded setts were all visited to ascertain if still in use. Evidence of Badgers at each site was noted: pathways made by Badgers in and out of the grassland, wood and scrub, droppings, footprints and digging and bedding at setts.</p> <p>The line of the new proposed fence around the Environmental Testing Facility was also surveyed and Badger paths marked on the map. This will enable decisions to be made about siting Badger tunnels in the fence.</p> <p>All signs of Otter were recorded: tracks, spraints and couches and also possible Otter holts. Particular attention was paid to the islands and large boulders in mid-stream. A concentrated search was carried out for areas suitable for a holt especially around the three fire ponds where Otter activity had appeared most concentrated.</p> <p>During the otter survey signs of Water Vole presence including latrines, feeding stations, burrows, runways in vegetation and footprints were looked for.</p>
<p>Amphibians</p> <p>Great Crested Newt <i>Triturus cristatus</i></p>	<p>Ponds thought to be suitable for Great Crested Newts near the ETF were visited at night and the torch counting method used. Hunts were also made during daylight hours under possible refuge sites around the ponds.</p>
<p>Reptiles</p> <p>Possible reptiles were considered to be Lizard , Adder <i>Vipera berus</i> and Slow Worms <i>Anguis fragilis</i></p>	<p>Favoured areas were searched such as under piles of logs and stones, in gullies, on well drained south-facing slopes, in grassland, woodland edges, hedgerow bases, sun traps in small open areas and under industrial debris such as corrugated iron sheets. Artificial refuges (sheets of corrugated iron) were put out and searched.</p>
<p>Bird Survey</p> <p>Barn Owl <i>Tyto alba</i></p> <p>Kingfisher <i>Alcedo atthis</i></p> <p>Peregrine <i>Falco peregrinus</i></p> <p>Crossbills <i>Loxia curvirostra</i></p>	<p>An evening visit was made to look for Barn Owls and a search made of a selection of buildings to check for pellets.</p> <p>During the Otter survey, the banks of all watercourses were checked for possible Kingfisher nests.</p> <p>During all visits for other survey work, all protected bird species records were noted. A visit was made to the adjacent Reilly Quarry to investigate this as a possible nest site.</p> <p>A few of the conifer woodlands were visited and Crossbill records noted</p>

2. Results

2.1 Otter

Otter signs were again found to be common around the ponds and on the watercourses on the much of the site. Findings are detailed below in Table 2 and shown on the Otter map.

Table 2. Evidence of Otters

Site	Otter evidence	Description
Dargavel pond A NS 43601 70080 NS 43490 70130 NS 43497 70111 NS 43421 70120 NS 43401 70100 NS 43666 70037 NS 43655 70121 NS 43645 70129	spraints path spraints spraints Footprints, spraints spraints Spraints Path	Track leading from Pond C to Pond A. On roots of old willow On wall of sluice On branches of willow Fresh spraints on old willow Track leading between Pond A and Pond C
Dargavel pond B NS 43446 70129 NS 43414 70167 NS 43414 70167 NS 43406 70259 NS 43563 70288	Spraint and footprints Lying up area Spraint and footprints Spraints, lying up area Spraints, hole	On sluice Hole in hollow of old willow, lots of spraints, smell of Otter. Lots of spraints, old and fresh, a popular lying up area on branches of old willow Lots of spraints, hole under roots of willow, looked like a possibility for a holt
NS 43523 70276 NS 43618 70176 NS 43478 70149	spraints path spraints	On flat branches of willow leading into water Track joining Pond B and Pond C
Dargavel pond C NS 43616 70117 NS 43562 70140 NS 43516 70143 NS 43522 70172 NS 43522 70174 NS 43537 70136	Spraint, couch footprints Lots of fresh spraints path Several spraints Holt	Under large old willow Under willow leading under an old wooden pallet Track leading from Pond C to pond B. Very mature willow with old branches in water. The entrance hole to the holt is close to the water's edge and goes deep under the willow into the bank opening into a chamber. There are a lot of spraints nearby, old and new and food remains. Tracks lead from the holt into the water. Hairs were found

NS 43546 70138	Spraint, footprints	within the holt. Spraint on old log, prints leading into pond
NS 43398 70116	spraints	Under bridge
NS 41122 70435	spraints	Where Dargavel enters site
NS 41253 70490	spraints	Under bridge where Dargavel enters the factory site
NS 44102 67887	Spraints and footprints	Under bridge on Dargavel
NS 43934 68098	spraints	
NS 43867 68110	spraints	
NS 45256 67545	spraints	Under bridge where Dargavel leaves site
NS 43776 70199	spraints	Beside bridge, Craigton burn
NS 41464 70266	Spraints and footprints	Under bridge and on ledge
NS 43257 701 04	Spraints, footprints	Under bridge
NS 42888 70419	spraints	Under bridge
NS43006 70202	Spraints, couch	Under bridge

2.1.1 The most concentrated areas of use were found to be the three Dargavel fire ponds, Ponds A, B and C. These have a good food supply as the *Clyde River Foundation* found them to contain high numbers of fish, and there are also high numbers of frogs and toads and also some waterfowl. The tree lined banks and large amounts of dead wood and debris make this an ideal location for Otters. No holt was found initially however as this seemed such a good site a more concentrated search was carried out. Waders were worn to allow access to the waters edge as it is very difficult to reach certain areas of the pond due to thick brambles, thick tree branches and a sharply sloping edge to the pond. During this search a holt was discovered. The large mature willows are of great significance to the Otters at this site. One provides the holt and spraints were found on every mature willow around the ponds. The branches lean into the water providing safe places to hide, quick easy access into the water and many resting up places.

2.1.2 The Dargavel and the Craigton burns continue to show signs of Otters along their entire length. Spraints are found under many of the bridges and there are a number of slides and couches in the vegetation.

2.2 Badger

All the previously recorded setts were still in use. In addition two new outlier setts were added to the list. These are described in Table 3 and shown on the Badger map.

Details of evidence	Grid Ref	Sett category	Entrances	Status	Notes
West Glenshinnoch Sett	NS 41737 70625	Likely Main	6	Active	Hair, latrine, many paths
Sett	NS 41813 70588	Sub	2	Active	Hair.
Sett	NS 419 706	outlier	2	Active	Hair, latrine
Sett	NS 421 706	outlier	1	Active	Hair

Newton Road sett	NS427 712	Likely Main	18 holes	Active	Hair, latrine, banging ?
Sett	NS 426 710	sub	6 holes	Active	Hair, sharing with rabbits
Sett	NS 433 712	outlier	2 holes	Active	Paths lead on and off site may belong to Newton road sett or outsiders
Craigton road sett	NS 423 705	Main ?	4 holes	Active	Hair, latrine paths
Northbrae station sett	NS 423 695	Outlier ?	2 Holes	Active	Hair, latrine
Barochan moss sett	NS 424 684	Main	12 holes	Active	Hair, Latrine, paths into factory and pasture
Sett	NS 425 686	sub	3 holes	Active	
Sett	NS 424 684	sub	4 holes	Active	Hair, latrine
Sett	NS 424 683	Disused sett	5 holes	Inactive	
Sett	NS 424 682	outlier	1 hole	Active	Hair
Sett	NS 424 687	outlier	1 hole	Active	Hair
Dargavel sett	NS 435 692	Main	13 holes	Active	Hair, latrine, active paths
Picrite sett	NS 439 698	Main	11 holes	Active	Hair, latrine, paths
Grey clay sett	NS 449 681	Main	9 holes	Active	Possible disturbance sticks placed over entrance.
Raised road sett	NS 447 677	Main	48 holes	Active	Hair, latrine, extensive collapse due to substrate.
Building sett	NS 437 678	Main	13 holes	Active	Badgers tail found.
Path	NS 43260 70810				Path leading off-site to birch road, possible sett offsite?

Path	NS 43222 70889				Linked to NS 43185 70853
Feeding area	NS 43185 70853				
Trails, feeding signs	Building 25/104				Extensive trails
Sett	NS 43251 71117	Outlier	1 or 2	Active	Path follows fence Building 37/024
Path	At building 24/141				
Sett	NS 42631 71153	Main	18 holes	Active	Hair found, latrine. Extensive digging, possible rabbit warren taken over by Badgers
Sett	NS 42678 71000	Main/sub?	6 holes	Active	Sharing with rabbit warren in old building digging into roof
Possible sett	NS 42678 71000	Possible sub sett	2 holes	Active	One Badger dropping and lots of digging but may be just digging up rabbits.
Sett	NS 43328 69226		2 holes	Active	Under yew tree
Latrine	NS 43304 69211				
Sett	NS 43483 69275	Partial use			Possibly used by rabbits
Sett	NS 34381 69255		13 holes	Active	Connected to 43483 69275 by tracks. Latrine southwest of sett
Sett	NS 43468 69163	Partial use	5 holes	Active	
Sett	NS 43522 69221		4 holes	Active	
Latrine	NS 43101 69797				Large latrine

Latrine	NS 43997 68871				Large latrine under Larch tree
Sett	NS 42252 69425			Active	Hairs, bedding and latrine also found
Sett	NS 42165 69432			Active	Sharing with rabbits
Hole in perimeter fence and Badger path	NS 41477 69718				
Path	NS 41231 69925				Very well used path at side of spruce plantation.
Dropping, Badger hairs	NS 41896 70178				Lots of trails, smell strongly of Badger, suspect sett is nearby

2.2.1 Badger paths were common on the route of the proposed ETF fence especially near to setts. These paths are shown on the Badger paths/ETF fence line map. Badger gates should be placed at many of the paths at regular intervals.

2.3 Water Vole

A few signs of Water Vole were recorded mainly in similar areas to before and this species appears to still be present in low numbers. These are described in Table 3. below and shown on the Water Vole map.

Table 4. Water Vole Evidence

Location	Evidence
NS 42971 70274	Burrows, runs, feeding remains and latrine
NS 43257 70155	Burrows, runs, latrine
NS43823 70341	Burrows, runs and latrines
NS 43401 69268	Burrows, runs, latrine

2.4 Great Crested Newt

Two ponds near to the ETF appeared the most suitable for this species. The pond ranged from approximately 120 cm deep to much of it drying up, there were suitable refuge areas around, water plants and no fish recorded. However no Great Crested Newts were recorded and only Palmate Newts *Triturus helveticus* were found.

2.5 Reptiles

Despite what would appear to be very suitable habitat, no reptiles have been located.

2.6 Barn Owl

In previous years Barn Owl has been shown to be breeding on site, perhaps up to three breeding pairs. No nest site was found however only a selection of the buildings were searched. Barn Owl pellets were found in the following buildings shown in Table 5. Pellets are also shown on the Barn Owl pellet location map. Birds seem to vary their roost site and a mixture of fresh and old pellets have been found in the various buildings. Anecdotal records from site security guards show that birds are most frequently seen to the north west of the site near to the Reilly Road.

Table 5.

Building	Grid Reference
28/206A	NS435 682
28/107A	NS 424 700
29/104	NS422 703
30/506	NS428 707
22/115	NS427 709
22/109	NS426 709
28/222	NS441 681
37/025	NS429 712
80/002	NS418 698
32/208	NS425 689

2.7 Kingfisher

Kingfisher, also a Schedule I species has been recorded in the past, however it is in the opinion of Starling Learning that it is more likely to nest on the River Gryfe. There are records of a nest site near where the Dargavel joins the Gryfe outside the site and part of the bird's breeding territory may be inside the site, however no birds or nests were recorded during the survey.

2.8 Peregrine

Peregrine has not been recorded nesting on site but there is a possibility due to the suitability of some of the buildings as nest sites. These buildings also have the possibility of acting as a roost site. Although the adjacent Reilly Quarry is noisy during the day, at night it has the possibility of acting as a roost site. One bird was recorded hunting over the site in July 2006, and it is believed that the main use of the site is probably as a hunting ground.

2.9 Crossbill

Birds were recorded frequently in several of the conifer plantations.

3. Discussion

3.1 The most important site for Otters within the factory appear to be the three Dargavel ponds. The holt is located on the banks of Pond C and they are all vital to the Otters in terms of food and shelter. The thick vegetation should be retained on the banks and the dead trees retained in the water and 'tidying' of burn edges and ponds would be detrimental to Otters. It is recommended that access around the ponds should be limited as much as possible. The existing pathways through the ponds could be severed and turned into islands to deter fishermen and dog walkers. Recreation on the ponds should be discouraged or be of low impact e.g. (bird hide). The watercourses remain important feeding areas for them. Large-scale demolition of the site may cause the Otters to abandon the site in the short term. Areas of bankside vegetation such as the Bramble,

Hawthorn, Blackthorn and tall herb meadow are important in giving Otters confidence to move freely around the site.

3.2 The site remains an important stronghold for Badgers and from the increase in setts and anecdotal evidence from security guards it appears that they have increased their range and numbers in recent years.

3.3 Water Voles appear to be present in low numbers. There is scope for enhancing the site for this species.

3.4 Concern for Kingfishers is low and even if the birds use the site as part of their breeding territory it will be at the south end of the site well away from the proposed development area. It is difficult to ascertain the exact use of the site by Peregrine. They do not appear to be nesting but may be roosting but this would be difficult to prove. Birds are certainly using the site for feeding. The number of Barn Owls is also difficult to ascertain. It seems inevitable that the birds will breed on site as the habitat is very suitable and use of the buildings as roost sites is widespread. All buildings should be checked for possible roosts before demolition. It is recommended that some conifer plantation habitat is maintained for this species.

Appendix 3

Otter Survey, Dr Jim Green 2006

**THE HISTORY, HABITAT, CURRENT STATUS AND ECOLOGY OF
OTTERS AT THE FORMER ROYAL ORDNANCE SITE, BISHOPTON**

&

**THE IMPACTS OF THE PROPOSED REDEVELOPMENT OF THE
FORMER ROYAL ORDNANCE SITE, BISHOPTON ON OTTERS AND
PROPOSED MITIGATION**

for

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THE HISTORY, HABITAT, CURRENT STATUS AND ECOLOGY OF OTTERS AT THE FORMER ROYAL ORDNANCE SITE, BISHOPTON

1 Historic Distribution

1.1 Otter distribution around Bishopton has been recorded in three national surveys conducted at seven-yearly intervals between 1977 and 1994. The results indicate that in the first of these surveys otters were almost entirely absent from and around Greater Glasgow as a result of organochlorine pollution. They were also severely reduced in distribution throughout the Central Lowlands as a whole. The nearest otter activity to Bishopton at that time involved a small sub-population centred upon the upper Black Cart Water around Lochwinnoch but no signs of presence were discernable on the lower river, the entire River Gryffe and White Cart Water or the Clyde estuary.

1.2 During the second survey, as a result of improvements in water quality, significant increases in distribution were apparent on the upper and middle Clyde but otter status around Bishopton (and Glasgow, generally) remained much as before. By the third survey, however, dramatic improvements had occurred with otters infiltrating the lower Clyde into central Glasgow and the subpopulation on the Black Cart Water expanding, patchily, onto its adjacent catchments. As a result, in the early 1990s, otter signs in the National Grid 10km squares containing Bishopton (NS46 & 47) occurred at 54% of sites sampled, including the Dargavel Burn. This figure was still substantially lower than the national average of 88% (indicating that local recovery was not complete) but since 1994 there are indications that the lower Clyde population has continued to grow (pers. obs.) and the results of a fourth national survey (in press) are likely to confirm this (R.Strachan; pers.comm.).

1.3 Historically, otters were undoubtedly present at Bishopton at some time prior to the organochlorine-induced decline of the 1960s-70s but their current occupation of the site is a recent phenomenon.

1.4 The otter is a European Protected Species. It is also a priority species on the UK Biodiversity Action Plan and is classified as near-threatened on the Red List of Threatened Species compiled by the World Conservation Union. Scotland is one of few European Community countries with a largely unfragmented otter population.

2. Otter Habitat

2.1. The existing aquatic habitat at Bishopton consists of two modest watercourses, the Dargavel and Craigton Burns; one further, named burn (the Cordite Burn); various waterbodies of varying size and type and a network of interconnected drainage ditches (Figure 1.). In addition, there are sporadic, minor outcrops of wetland and one large wetland, the Barochan Moss. All of these features have the potential to support otters and/or their prey on a seasonal or regular basis.

2.2 The principal watercourse is the Dargavel Burn, which, though natural, has been subject to canalisation and past maintenance. The burn enters the River Gryffe just beyond the southern boundary of the Bishopton site and is the most important conduit for otter passage both through the site and beyond it. The continuity of the burn is

disrupted for a short distance above the Craigton Burn confluence by an offtake supplying water to three Fire Ponds. This has no effect on otter movements but does impact on migratory fish. Otherwise, the watercourse is isolated and undisturbed, flowing through woodland or edged with wetland and herbaceous vegetation that further enhances its security. The water quality is good, supporting a mixed fish community of six species (salmon, brown trout, minnow, three-spined stickleback, eel and lamprey) whilst flounder and stone loach occur just downstream of the site boundary. Migratory species including, apparently, eels are currently restricted to the length of watercourse below the ponds offtake.

2.3 The Craigton Burn flows west from under the railway, between the three Fire (or 'Brick', which were originally excavated for clay) Ponds to its confluence with the mid-section of the Dargavel Burn. This is a slower, deeper watercourse, which has also been subject to canalisation. Bankside vegetation is largely herbaceous and frequently dense, interlinking with a sequence of aquatic, emergent and marginal vegetation beside and within the burn channel. Water quality, unfortunately, is suspect – particularly during floods – and the fish community is depressed as a result. Sticklebacks are widespread; eel and minnow also occur but appear to be restricted in their distribution.

2.4 The Cordite Burn is a minor watercourse entering the Craigton Burn below the Fire Ponds and flowing entirely within the site boundaries. The burn is degraded and culverted at intervals along its length but still supports a limited fish population of sticklebacks and eels.

2.5 The three Fire Ponds form the most substantial bodies of water on site. Water quality is good, in keeping with its derivation from the Dargavel Burn and the ponds, which have developed semi-natural characteristics, are isolated from inputs from the nearby Craigton Burn. Bankside vegetation is generally of limited width and density, particularly around Pond C, but around all three ponds it includes fringes of mature, overhanging willows with complex structures and occasional root or trunk cavities. The intersections between the three ponds are notably overgrown, supporting a dense ground flora of herbaceous plants and brambles as well as hardwoods. Fish diversity is limited to perch (present on two Ponds) and eel (present on one Pond). A wider range of species is reported to have been introduced when the Ponds were stocked and fished by the Bishopton Sports and Social Club. The edges of all three are steep shelving and it may be that a lack of shallow spawning habitat has eliminated some varieties. In addition, their connection with the Craigton Burn through a network of pipes and an overflow may be restricting the capacity of the ponds to be colonised by other fish. Significant numbers of frogs and toads have been recorded on these waterbodies.

2.6 All of the named watercourses are fed by an extensive series of ditches, often brick or stone lined, which drain runoff from hardstandings and buildings dispersed throughout the site. The system is now overgrown and in a state of disrepair, containing limited amounts of water with discontinuous flows. Neither the drains nor the small, static waterbodies present on site are likely to contain otter prey in the form of fish but they may provide seasonal, spawning habitat for amphibians. Palmate newts, frogs and toads have been recorded across the site. Wet woodland, burn margins, marshy grassland and the Barochan Moss are also likely amphibian habitat.

3. Current Status

3.1 Signs of otter were first noted, incidentally, during an environmental survey of the south end of the site by Dr R Stebbings in 1996. These consisted of spraints and a holt on the lower end of the Dargavel Burn. Since then, more systematic surveys by Chris Balling in September/October 2002, by JDC Ecology in Winter 2004/2005 and by Starling Learning in October 2005 and summer 2006 have documented the distribution of otters throughout the site area.

3.2 The current distribution of otter signs at Bishopton is summarised in Figure 2. In addition, there are reports of at least two otter sightings in the survey area; one of a single otter near the Dargavel Fire Ponds and another of two individuals in one of the Ponds.

3.3 In total, some 30 spraint sites have been recorded on site, distributed along the full length of the Dargavel Burn, the lower Cordite Burn and on the Craigton Burn in the vicinity of the Fire Ponds. Otter passage will clearly be occurring between these areas, indicating that the ponds and all primary watercourses on site are utilised more-or-less in full. Spraint sites also include one small pond which has no connection with any watercourse and is c.150m distant from the nearest burn. Further evidence of otters (tracks, paths, slides and otter shelters) is present over a wide area. Over half of all spraint sites are concentrated around the Dargavel Fire Ponds, regularly accompanied by signs of fresh or recent otter activity.

3.4 Most otter survey reports comment on the favourable quality of the bankside vegetation for security along the Bishopton watercourses and remark the presence of lying-up sites. The character and specific location of some sites has not been clarified, particularly along the Dargavel Burn distant from most proposed development, but seven locations have been made explicit, involving both holts (underground shelters) and couches (above-ground sites, usually in dense vegetation). Four of these sites are present around the two Fire Ponds north of the Craigton Burn, including a well used holt. Individual sites have been located, at intervals, over a period of ten years and there is no guarantee that the details of otter shelter have remained unchanged.

4. Otter Ecology

4.1 Otters in freshwater are a wide-ranging species pursuing a largely solitary existence in conditions of naturally low density; a lifestyle which is determined by a specialised diet confined to a limited resource. Freshwater occupies only 2.2% of the Scottish mainland. Otter home ranges contain some 34-63 hectares of open water per individual (dependent upon sex) but occupy 16-22km of watercourse for an adult female to 40+km for an adult male. Such extensive ranges are impossible to defend in their entirety so there is some overlap between neighbouring individuals of both sexes. Within each range there are also favoured areas where activity is maximised out of proportion to its scale. For reasons of prey frequency and vulnerability, female otters favour stillwaters and smaller watercourses. Male otters (30% heavier than the females) concentrate on larger watercourses.

4.2 Otter habitat at Bishopton extends to c.7200m of primary watercourse plus five hectares of stillwater; a substantial total for a single site. In crude terms of scale this maximises at 50% of a female otter range plus 20% of a male range.

4.3 Habitat character suggests that Bishopton will be exploited more frequently by female otters than by males and, consequently, by occasional family groups. There is currently no evidence of breeding on site but with such an elusive creature and the absence of a fixed breeding season this observation is not conclusive.

4.4 Habitat security at Bishopton is particularly high, contrasting with the open banked character and higher levels of disturbance off site along the River Gryffe. Consequently, Bishopton may be providing shelter for otters exploiting the wider riparian zone as well as that on site. The record (Dr R. Stebbings report, 1996) of a holt just inside the southern site boundary supports this notion.

4.5 Food supply on site is diverse and includes a range of species (eel, minnow, perch, stickleback, lamprey) which are vulnerable to otter predation either because they are sluggish, or occur in shoals or are simply widespread. In addition to being vulnerable, eels have a high nutritional value. Most species on site are small but most otter predation, contrary to popular image, involves small items (<15cm long) including, for instance, large numbers of sticklebacks.

4.6 Most otter prey will occur in the form of fish derived from the larger watercourses on site plus the Fire Ponds. Outwith these areas, amphibians are a likely prey group and one which can be highly significant at spawning locations, in spring and to a lesser extent at hibernation sites. No systematic survey of amphibians has yet taken place at Bishopton but they are known to be widespread and there is also limited evidence that otter movements on site are not confined to the major elements of the aquatic habitat.

4.7 Food supply, site security and the frequency of otter signs all suggest that Bishopton may be more valuable to otters than its overall scale indicates. This possibility is also supported by the frequency of shelters within the site area. Otter home ranges dictate the need for large numbers of shelters per individual, typically spaced at about 1500m intervals. In favoured localities shelter interval declines to as little as 150m, possibly to cater for the simultaneous presence of more than one otter. A cluster of shelters has been identified at the Fire Ponds. The situation along the Dargavel Burn is less clear.

4.8 In common with most otter surveys, it is not possible to estimate the otter population of Bishopton with any accuracy. It is likely to involve more than one female, a resident male and occasional transients. It should also be noted that the otter population in Scotland is continuing to expand and that this may affect activity at Bishopton over the coming years. The greatest scope for increase lies in the Central Lowland Belt (see 1.2).

5. Summary

5.1 Otters have recolonised Bishopton in the last two decades and may still be in the process of increase.

5.2 Habitat quality in terms of security, food supply and scale is high and likely to be of local significance. Habitat character is particularly favourable to female otters and, by extension, to otter families.

5.3 Current otter activity occurs regularly on all of the primary watercourses and major waterbodies at Bishopton.

5.4 Seasonal otter activity may also be occurring on some of the minor aquatic habitat but has not been fully recorded.

5.6 Otter behaviour at Bishopton is widespread and includes a centre of activity on the Fire Ponds.

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THE IMPACTS OF THE PROPOSED REDEVELOPMENT OF THE FORMER ROYAL ORDNANCE SITE, BISHOPTON ON OTTERS AND PROPOSED MITIGATION

1. The Development Proposals

1.1 The former Royal Ordnance site, Bishopton occupies an area of c.1000 ha of which approximately 240 ha are proposed for redevelopment as a new village and business park. With the exception of the remaining commercially active area (the Environmental Test Facility, ETF) within the south east of the site, the surrounding area will constitute Public Open Space. It will be managed as a Community Woodland Park, and will incorporate agricultural usage to land managed primarily for its landscape and ecological value. Due to past industrialisation, to attain this objective the wider site area will be subject to considerable remediation to remove contaminated soils, decommission some 2200 widely separated buildings, replace derelict drainage etc. The proposed works, which are scheduled to begin in 2009 and end in 2022, will follow a broad sequence:

- a) decontamination and removal of existing structures to render the site safe.
- b) earthworks to create a development platform and drainage network.
- c) installation of services, infrastructure and buildings.
- d) landscaping operations.

1.2 Most of the remediation works will be confined to terrestrial habitats, eliminating or reducing cover in areas that have remained overgrown and undisturbed for many years. Terrestrial remediation would also affect watercourses through run off, siltation and impacts upon flow rates. Direct impacts upon watercourses will involve the decommissioning of the drainage ditch network and the creation around the lower Dargavel Burn of a flood storage area serviced by flow restriction works on the burn itself.

1.3 Subsequent redevelopment within the site of the proposed village will incorporate the replacement of minor watercourses by a dedicated SuDS network of channels and retention ponds. Outwith the village there will be new crossings over the Dargavel Burn as part of the development of the Woodland Park plus the removal of existing culverts. Fish passes will also be installed to ensure the free movement of fish.

2. Otter Legislation

2.1 As a European Protected Species, the otter is protected by both the Wildlife and Countryside Act (1981) and the Conservation (Natural Habitats etc.) Regulations 1994, as amended by the Nature Conservation (Scotland) Act 2004. Together these make it an offence to intentionally or recklessly disturb an otter anywhere within its natural range or to damage, destroy or obstruct access to an otter shelter, whether intentionally or otherwise.

2.2 Under this legislation damaging or disturbing events may be regarded as legitimate if they arise as the incidental effects of otherwise lawful operations which could not reasonably be avoided. Such instances would require prior consultation with Scottish Natural Heritage. In addition, impacts upon otter shelters would necessitate a licence application to the Scottish Executive which could only be granted if there was no satisfactory alternative to the proposed action; where it was justified on the grounds of overriding public interest and where the outcome would not be detrimental to the conservation status of the species.

2.3 Disturbance of otter shelters is defined by SNH as any novel impact occurring within a minimum of 30m of a protected site. There is a tendency to increase this distance (typically up to 100m) where the impacts are severe or where a shelter is regarded as having high status. Where breeding is suspected SNH might request a temporary cessation of work or an extension of the buffer zone beyond 100m.

3. Impacts upon Otters

3.1 Remediation works will be widespread, diverse and in some cases intrusive. There will be few areas of the site which will not be disturbed to some degree. No precise estimation of the impacts upon otters is possible but it is inevitable that terrestrial remediation, although it is unlikely to impact directly upon otters, will cause substantial disturbance to the species wherever it approaches otter habitat and, more significantly, otter shelters. Terrestrial remediation may also involve losses of amphibians (otter prey) and amphibian habitat, although the significance of such impacts remain to be demonstrated.

3.2 Remediation of minor elements of aquatic habitat (the defunct drainage network, small areas of flood and wetland etc.) may further affect amphibians by damaging spawning grounds. The significance of this impact also remains to be demonstrated.

3.3 Remediation and development within the village will include the loss of the Cordite Burn. This is a degraded headstream with minor otter and fish interest that is entirely confined within the Bishopton site.

3.4 Localised work along the Dargavel Burn will involve the construction of new bridges, the removal of existing culverts (including a barrier to migratory fish) and the creation of a flume to force flooding into the proposed compensation area. Compensation space will be created by reducing the ground level to either side of the Dargavel channel. Construction will cause disturbance and the loss of bankside habitat. It also risks pollution and interference with otter movements along the Dargavel Burn – the key otter corridor at Bishopton - with implications for otter activity beyond, as well as within the site boundaries. At present, no otter shelters are obviously impacted but the protection of such sites will be a primary concern when detailed plans are available.

3.5 After construction the Dargavel Burn flume will cause localised increases in current speed which may have minor implications for bedform, aquatic vegetation and fish diversity.

3.6 Within the village complex the most significant impacts will affect the Fire Ponds, occurring both during and after construction. Four otter shelters are spaced around the Ponds of which three are distributed along the western and northern margins of Pond B. Landscaping, roads and buildings are scheduled to approach all three ponds. A fourth shelter on the south bank of Pond A is relatively remote (+100m) from construction or eventual habitation and will be less disturbed.

3.7 Otters are vulnerable to road traffic accidents and have suffered fatalities at a variety of sites on local river catchments, including one near-site where the M8 crosses the River Gryffe. The risk level is greatest in conditions of high traffic speed and density but does occur on minor tracks and appears to be accentuated where there are temporary diversions of waterways and in-channel works. During construction there will be a low level, disseminated risk which will require further study. After construction the risk will increase within and around the village, encouraged by the presence of the Ponds and the SUDS network.

4. Proposed Mitigation

4.1 Construction processes and the areas which they will impact are currently only broadly defined and will require further detail in order to target mitigation measures accurately. Identifying the extent to which construction and remediation processes may be tailored (in time or space) to minimise impacts upon protected species and habitats is central to the mitigation strategy. This, in turn, may require more detailed otter surveys in sensitive localities. The integration of remediation, development, conservation and mitigation issues will be assisted by a GIS-based Management Plan with a regularly updated database available to site engineers and to site ecologists.

4.2 Currently, the following measures are proposed for all works that affect otter habitats:-

- Prior to construction riverbanks will be surveyed for otter shelters to a minimum distance of 100m beyond each scheme boundaries.
- A pre-construction amphibian survey will assess the distribution and status of frogs, toads and newts on site during a minimum of three visits during the spring. The survey will check for foraging and hibernation habitats in addition to spawning sites.
- Contractors will be apprised of their environmental responsibilities and will be required to produce Method Statements for all works (including post-construction drainage) affecting watercourses. Contractors will be required to minimise the length of watercourse affected by construction processes.
- In-burn works will be timed for late summer when salmon redds will not be occupied and salmon fry will be sufficiently mobile to move out of the construction area. Avoiding disturbance to migratory fish will be achieved wherever possible by a process of consultation between site engineers, SEPA, SNH and SEERAD.

- Where no works are planned to take place on riverbanks a 5m wide buffer strip of vegetation will be left to intercept pollutants and silts from working areas. Additional pollution control measures will be subject to SEPA guidelines. These are likely to include the use of remediation ponds for silt control which will later be incorporated into the SUDS design.
- Freshwater monitoring programmes, including the monitoring of otter activity, will be implemented throughout the development period. The design of the programmes will be agreed with SEPA and SNH.
- Specialist advice on protected species will be sought throughout the remediation programme and an Environmental Scientist will be appointed to handle conservation issues and advise consultation, where necessary, with SNH.

4.3 In addition to the above the following procedures are also advised:-

- It is recommended that the pre-remediation and earthworks/construction amphibian survey is coordinated with an otter survey of marginal habitats to determine the extent and significance of amphibian predation at Bishopton.
- During the period of remediation, earthworks and construction, wherever possible along watercourses the 5m buffer strip (to prevent pollution) should be increased (to reduce disturbance), maximising at 30m radius around otter shelters. If the 30m buffer cannot be achieved beside shelters a licence application will need to be made to SEERAD. Reinstatement of a 30m buffer after construction would then be best practise. If this cannot be achieved, the installation of an artificial otter holt in suitable habitat elsewhere on site might be a license condition. It is also probable that a licence would restrict operations to the daytime, commencing two hours after sunrise and ending two hours before sunset.
- During construction a buffer zone of 30m width should extend all round the Fire Ponds (with exception being made for the existing, active access road, where the buffer zone would be narrower) and be temporarily fenced. Access within the zone should be the subject of consultation with the Environmental Scientist. Security lights, if necessary, should be directed away from Pond surfaces and adjacent machinery should not operate during the hours of darkness.
- The existing Pond outflows should be replaced with open channels to permit the free movement of fish to and from the adjacent watercourse.
- After construction human disturbance to three otter shelters around Pond B will be inevitable. This will devalue these structures and may render them defunct. In mitigation, two artificial otter holts should be constructed on the overgrown ridge intersecting Ponds A and B. Subsequently, the ridge should be isolated from human access by having channels cut through at each end.
- There should be a presumption against boating on the Fire Ponds.

- For all operations adjacent to otter habitat, temporarily exposed pipes should be capped at the end of each working day and trenches ramped for easy exit. Chemicals, oils and other hazardous materials should be securely stored away from watercourses.

4.4 Mitigation for the loss of the Cordite Burn will be compensated by the creation of an extensive SuDS network of eight ponds and channels linked into the existing watercourses. It is anticipated the ponds will be colonised, in due course, by sticklebacks and amphibians and will form marginal otter habitat. SUDS ponds beyond the southern and western extremities of the village will be readily accessible to otters. Ponds in the heart of the village will be visited less frequently.

4.5 Mitigation of the flume structure on the lower Dargavel Burn will involve the installation of a fish pass. Fish movements on the upper burn will also be encouraged by removing the existing barrier to migratory fish at the Pond offtake.

4.6 The risk of otter road casualties during construction is low but could occur around temporary waterbodies and new water channels in addition to the existing water catchment. This will be the subject of continuing assessment and mitigation, where necessary, during the construction period. The level of risk post-construction should not be unduly high but it will occur around the SUDS network within the village and at various bridges on existing watercourses. New bridges and culverts will incorporate otter ledges or adjacent underpasses accompanied by otter-proof fencing (to SNH standards) to discourage otters from accessing carriageways. Existing bridges and culverts which do not provide a suitable land passage for otters will also be upgraded.

4.7 The entire length of the Dargavel Burn on site will be developed as a wildlife corridor for a range of protected species, including otters. This will be achieved by enhancing wetland habitats in the flood plain - either by lowering ground levels or allowing the gradual failure of land drainage - to provide a range of fen, marsh and carr habitats which will attract wildlife but restrict movement of humans to managed routes. These areas will be naturally favourable to amphibians in time but could be enhanced in their initial stages by the creation of small ponds.

4.8 Monitoring of otter activity on site will be continued after development has been completed for a period to be agreed with SNH and SEERAD.

5. Residual Impacts

During Remediation, Earthworks and Construction

5.1 The specific residual impacts of redevelopment are impossible to quantify at this stage but the environmental challenges of the remediation stage on are to maintain otter passage along the primary wildlife corridor (the Dargavel Burn) and to retain otter activity on and around the Fire Ponds. Whilst the terrestrial impacts of the proposed scheme will be widespread and often disturbing, direct impacts upon aquatic habitat will be more localised. They will also occur within a large site that is currently remote from additive pressures such as a resident human population or a public road network. The experience of other large developments in Scotland, such as the Skye

Bridge Project, the M74 upgrades or (nearer to hand) the Mid Ross golf development on Loch Lomond, indicate a significant degree of tolerance of general disturbance by otters provided that food sources remains available and habitat continuity is not significantly impaired. In all of these past projects otters have continued to exploit site habitat (visibly, in the case of the Skye Bridge) whilst construction has been in progress. Whether otter activity has matched pre-construction levels is generally impossible to ascertain. At Bishopton it is anticipated that activity will continue along the Dargavel Burn on a regular basis. Some depression of activity on the Fire Ponds is inevitable, particularly when work is taking place on Pond margins.

Post Construction

5.2 Mitigation proposals for the Dargavel Burn should maintain current levels of otter activity long term. The SUDS network will increase the quantity of otter habitat on site though with some risk in the form of road accidents. The big challenge will be to maintain the Fire Ponds as a centre of otter activity when the development is established and occupied. Isolating and enhancing in-pond habitat, as proposed, will assist this process. It is likely that it will also require some degree of support from the local community; possibly by establishing the Ponds as a community nature reserve.

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8th October 2006

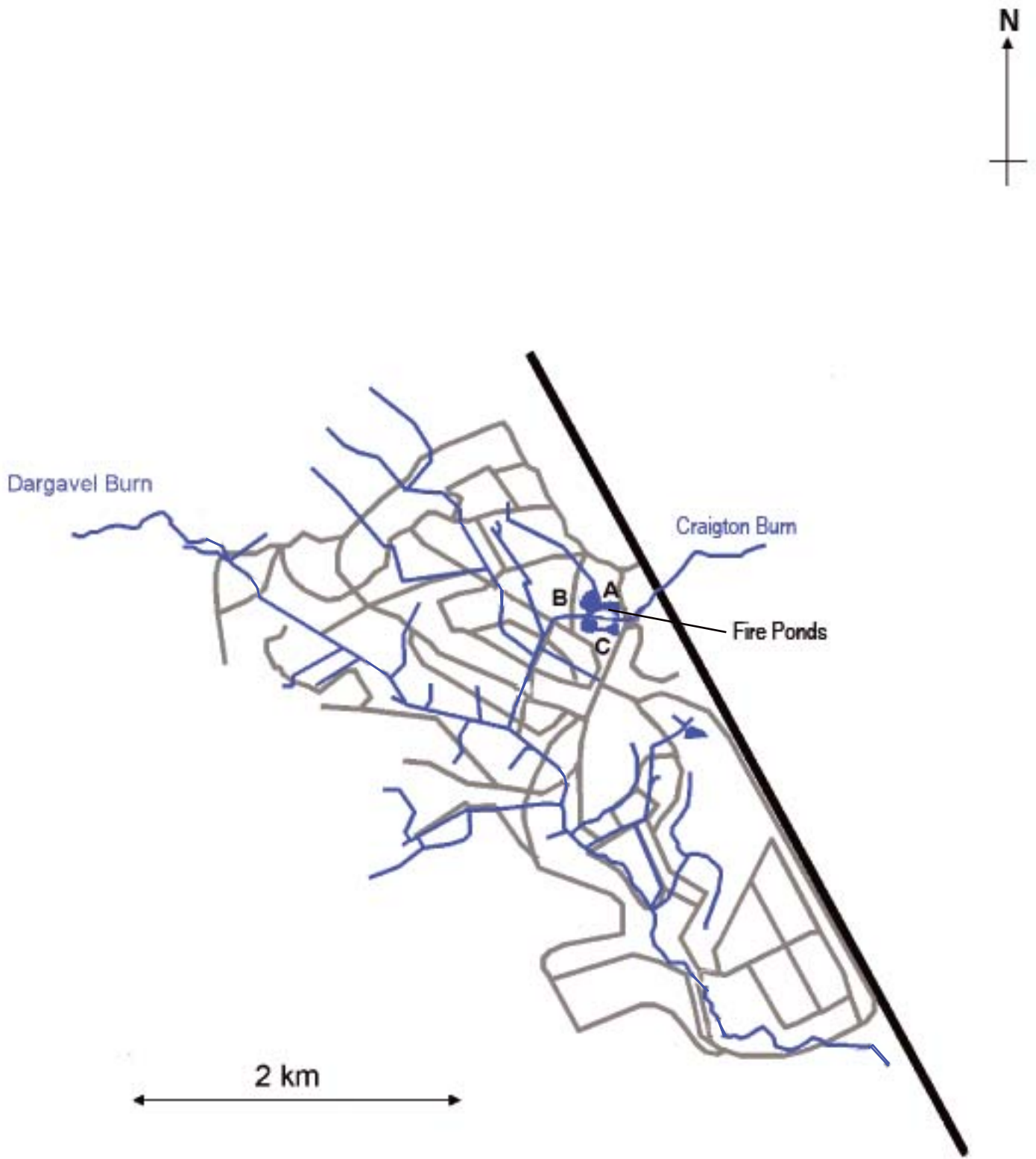


Fig 1 Bishopton Water Bodies



X Holt

● Otter signs

Based on survey
by Starling Learning 2006.

Fig 2 Otter Signs