

ROYAL ORDNANCE, BISHOPTON



REMEDIATION AND RECLAMATION EARTHWORKS

ENVIRONMENTAL STATEMENT

APPENDIX 14.13 2006 OTTER SURVEY, DR J GREEN

October 2006

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

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**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.

6. References

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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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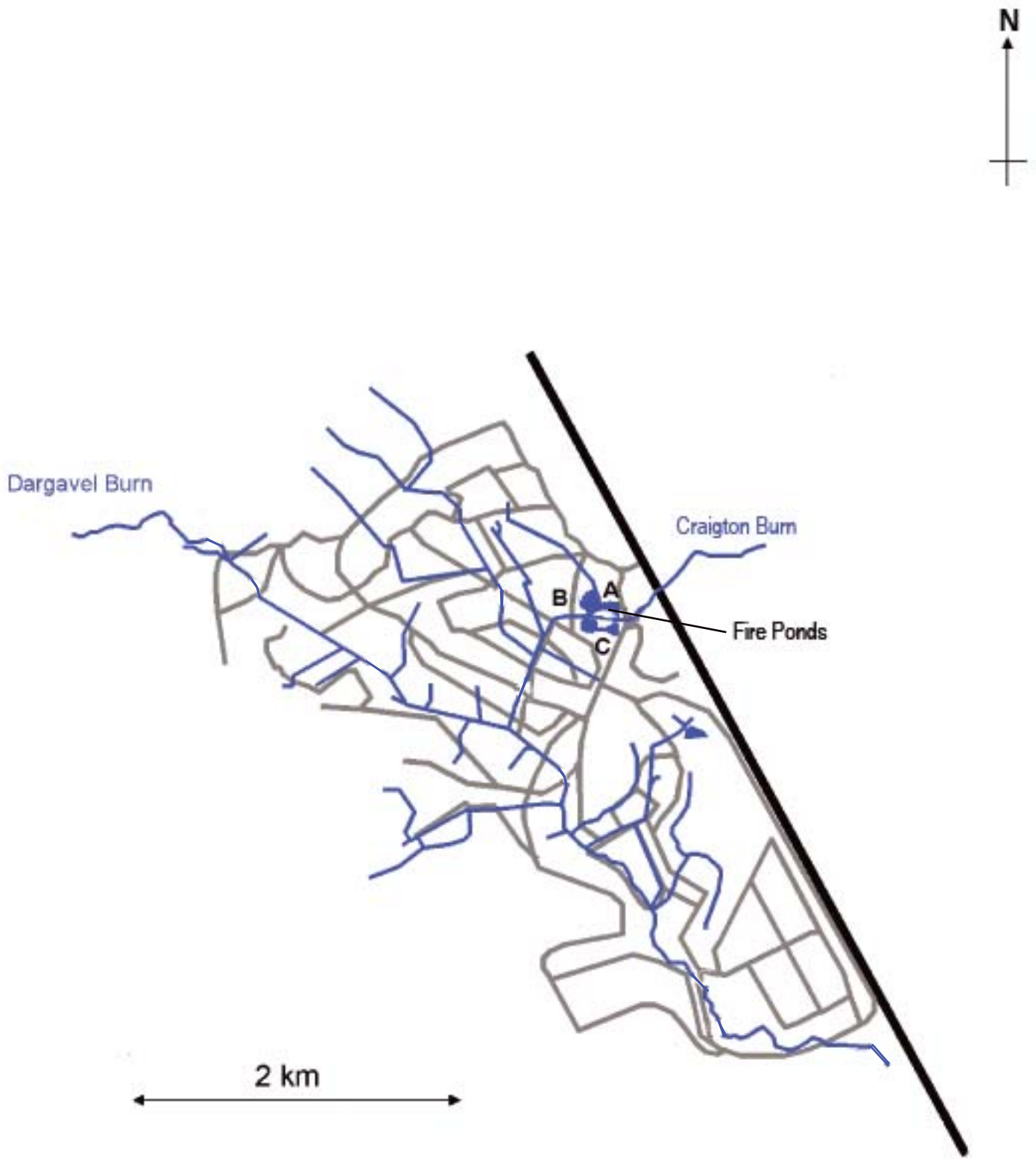


Fig 1 Bishopton Water Bodies



X Holt

● Otter signs

Based on survey
by Starling Learning 2006.

Fig 2 Otter Signs