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Trembling sea-mat
Baseline distribution in England and species action plan

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Trembling sea-mat: baseline distribution in England and species action plan

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Contents

Summary

The trembling sea-mat *Victorella pavida* (Figure 1), a ctenostome bryozoan, is a rare animal species in the United Kingdom. At the present time the only known U.K. site is the brackish lagoon at Swanpool (Figure 1), near Falmouth in Cornwall.

This survey indicates that the trembling sea-mat is still present in Swanpool and, furthermore, that it is abundant in various habitats. The trembling sea-mat has a preference for the submerged stems of the common reed *Phragmites australis* and also for concrete and stone surfaces. In other habitats it was found to be occasional, rare or absent, probably due to reduced salinity or to the presence of varying amounts of silt.

Although trembling-sea mat is abundant at the present time it may be threatened by changes in salinity, silting and the effects of various pollutants in the medium term.

Introduction

The trembling sea-mat was first discovered and described from the Surrey Canal and Victoria Docks, London, in 1870. It has long since disappeared from both of these sites probably due to dockland developments which led to a permanent reduction in the salinity of the water.

In 1968 the trembling sea-mat was rediscovered at Swanpool (Figure 2), near Falmouth in Cornwall (Barnes, Dorey & Little 1971) and was still present in 1985 (Little 1985). Its presence was confirmed by English Nature in November, 1994, prior to the sites designation as a Site of Special Scientific Interest (SSSI). Swanpool is the only British site from which it has been recorded this century, despite an extensive Nature Conservation Council survey of coastal lagoons in the 1980s.

In 1988 the trembling sea-mat was protected by its addition to Schedule 5 of the Wildlife and Countryside Act 1981.

The UK Steering Group report on biodiversity (Anon 1995) placed the trembling sea-mat on the long list of globally threatened species. The report recommends that populations of species on this long list should be monitored where possible and that action plans should be prepared for the species. This is the aim of the present study, namely to

a. survey the site to establish a baseline for future monitoring of *V.pavida*, and

b. review existing site management information and the requirements with respect to the trembling sea-mat to produce a Species Action Plan.

Survey techniques

Sampling was conducted at approximately four metre intervals around the edge of the Pool. In the more accessible, shallower areas this was done on foot, however, the deeper and more unstable areas necessitated the use of a boat and a simple mechanical grab. Survey of the outlet culvert necessitated entry of the 125 metre long culvert from its beach outlet. When sampling the reedbed fringe, three living reeds were selected at random at each sample point. The reeds were then gently pulled up in such a manner so as not to break the stem, and, more importantly to retain part of the rhizome system. After assessment of abundance of any trembling sea-mat present, the stems were pushed back into the mud to the same depth, ensuring also some support from the surrounding reeds. Where possible, efforts were made to penetrate into the dense reedbed to assess the inward/outward extent of the trembling sea-mat.

Suggestion that the trembling sea-mat *Victorella pavida* could be surveyed using scuba diving/snorkelling was not considered possible due to the eutrophic state of the Pool during autumn, the time of year the survey was to be conducted. Furthermore, rainfall at this time results in much silt being carried into the Pool by the stream entering near the north-west corner. Both of these result in very restricted underwater vision. A sizeable population of rats, especially on the western side, and the potential threat of Weil's disease *(Leptospirosis)* together with the confirmed presence of *Salmonella* in the Pool acted as further constraints on diving/snorkelling as a survey technique.

Because of the variable growth habit and of the very small size of the individuals it was difficult to decide on which abundance scale to use to describe the presence of trembling sea-mat . Eventually it was decided to use one of the scales used for surveys of near-shore sublittoral areas in south-west Britain (Rostron 1987). The abundance scale for small colonial species and crustose species is given below:

Abundant (A) - Large confluent colonies with more than 50% cover. More than 100 per 0.01m².

Common (C) - Many small or a few large patches with 10% to 50% cover. One or more per 0.01m².

Frequent (F) - Scattered patches less than 10% cover overall. One or more per 0.1m².

Occasional (O) - Scattered small patches less than 1% cover. One or more per m².

Rare (R) - Widely scattered very small patches or individuals. Less than one per m².

At each sample point a very small amount of suspected trembling sea-mat was removed and taken back to the laboratory for microscopic confirmation and to identify any associated species.

Results

Because of the size of the Pool and the variety of habitats present it is considered preferable to describe the results under the following headings, viz. - i) southern, ii) western, iii) northern and iv) eastern sides, v) outlet and culvert and vi) the main body of the Pool.

1. **Southern side** (photograph P1, slides S2, S3 and S4, figures 4, 5 and 6)

   The southern side is bordered by a Tarmacked area ending in a partly submerged vertical wall. The water depth along this side varies between one and one point five metres. At the base of the wall there are scattered stones. Towards the outlet culvert there is an isolated patch of reeds.

   In places there were confluent patches of trembling sea-mat up to half a metre square in area whilst in other places there were numerous, somewhat smaller, patches. The trembling sea-mat seemed to grow well on this type of substratum, the roughness/texture of the concrete wall presumably making for ease of attachment of this encrusting species. The stones at the base of the wall extend out into the Pool to about one point five metres before giving away to much more silty conditions. The trembling sea-mat was frequent here especially on those stones closest to the wall. Quite understandably the presence of increasing amounts of silt further out from the wall is not conducive to the growth of this small encrusting animal. Trembling sea-mat was abundant on the submerged stems of the isolated patch of common reed. It was observed predominantly attached to the stems of living reeds. Reference to slide S20 shows the typical growth form when found attached to such reed stems. Observation also showed that the trembling sea-mat seemed to have a predilection for growth on that part of the submerged stem just above the rhizome system. Such colonies were brown to brown-black in colour and in some cases extended up to 20cm up the reed stem.

2. **Western side** (photograph P1, slide S18, figures 4, 5 and 6)

   The reedbed was virtually continuous along this side except where the Swanvale/Tregoniggie stream entered the Pool near the north-western corner. The depth of water along the outer fringe of this reedbed varied from half to one point two metres. The substratum along this edge consisted of agglutinous, anoxic mud up to one point five metres thick. Where the Swanvale/Tregoniggie stream entered the mud was substituted for by a mixture of coarse grit and mud. Once again trembling sea-mat was abundant on the lower parts of the submerged reeds stems. This was so for virtually the whole length of the western side excep for the area where the Swanvale/Tregoniggie stream entered the Pool. At this point, and in the immediate area on either side, the trembling sea-mat

was occasional to rare on the reed stems. This may be attributed to the low salinity levels about this freshwater input. The trembling sea-mat was found to be common to abundant, one and a half metres or more into the reedbed.

3. **Eastern side** (photographs P1, P6-8, slides S10-12, figures 4, 5 and 6)

The eastern side side also consists of a virtually continuous bed of reeds. The thickness of the reedbed is, on the whole, much less than that on the western side. The submerged bases of the reeds had the trembling sea-mat attached in abundance. The substratum at the base of the reedbed fringe varied from agglutinous, anoxic silt to small and medium sized stones mixed with silt. In the latter areas the trembling sea-mat was occasional on the stones. At various places along this eastern side the reeds have been cleared. Here there are submerged medium and large sized stones on which the trembling sea-mat is frequent to common. Finally in the south-eastern corner, adjacent to the outlet, is another reed-free area with a substratum consisting of coarse sand with some mud overlain by small to medium sized stones. Also here are several large, submerged, granite kerbs. Trembling sea-mat was frequent to common on the stone surfaces. Once again in places the trembling sea-mat was found to penetrate at least one metre into the reedbed from the fringe.

4. **Northern side** (photographs P9, P11-15, P17, slides S13-15, figures 4, 5 and 6)

The north-eastern and north-western corners of the Pool consist of relatively wide reedbeds on which the trembling sea-mat was abundant. Once again it extended at least one metre into the reedbed from the fringe. Also present is a stone and concrete jetty on the submerged sides of which the trembling sea-mat was common. It was also frequent to common on the submerged roots of nearby tree stumps on the Pool edge. The substratum at this end of the Pool consisted of small and medium sized stones with some mud. Trembling sea-mat was frequent to common here but decreased in abundance with increasing depth due, presumably, to increasing amounts of silt.

5. **Outlet and Culvert** (photographs P2-5, slides S5 - 8, figure 6)

The trembling sea-mat was found to be abundant on the vertical external and internal walls of the outlet. On the top surface of the walls it was common to abundant. On several facets of the wall it formed an almost continuous sheet of growth.

Conditions inside the culvert made it virtually impossible to made an accurate assessment of abundance. Samples were taken at about four metre intervals for a total distance of about 24 metres from the inner outlet wall. Relative abundance was gauged using touch (velvet texture). Trembling sea mat was deemed to be abundant below the water level up to 12 metres into the tunnel and thereafter common up to 24 metres.

6. **Main body of the Pool**

A very large proportion of the Pool's substratum consists of accumulated, aggultinous, anoxic mud with, what seemed to be, a relatively high concentration of hydrogen sulphide. In places the mud/silt was two metres or more deep, such as at the reed fringe on the western side. Obviously the trembling sea mat was absent from this type of substratum.

7. **Other animals**

Submerged invertebrate diversity, both infaunal and aquatic, is low in Swanpool with only six or seven permanent species occuring but this is typical of brackish conditions (Barnes, Dorey & Little 1971). During the survey this fact was confirmed. This study did not look at associated species in any detail, however, relatively large shoals of young thick-lipped grey mullet *Chelon labrosus* were observed on numerous occasions. During October and November vast numbers of the brackish water species of prawn *Palaemonetes varians* were present, especially on the Pool margins. The colonial protozoan *Carchesium polypinum* was commonly found attached to the trembling sea-mat taken for microscopic examination.

Acknowledgements

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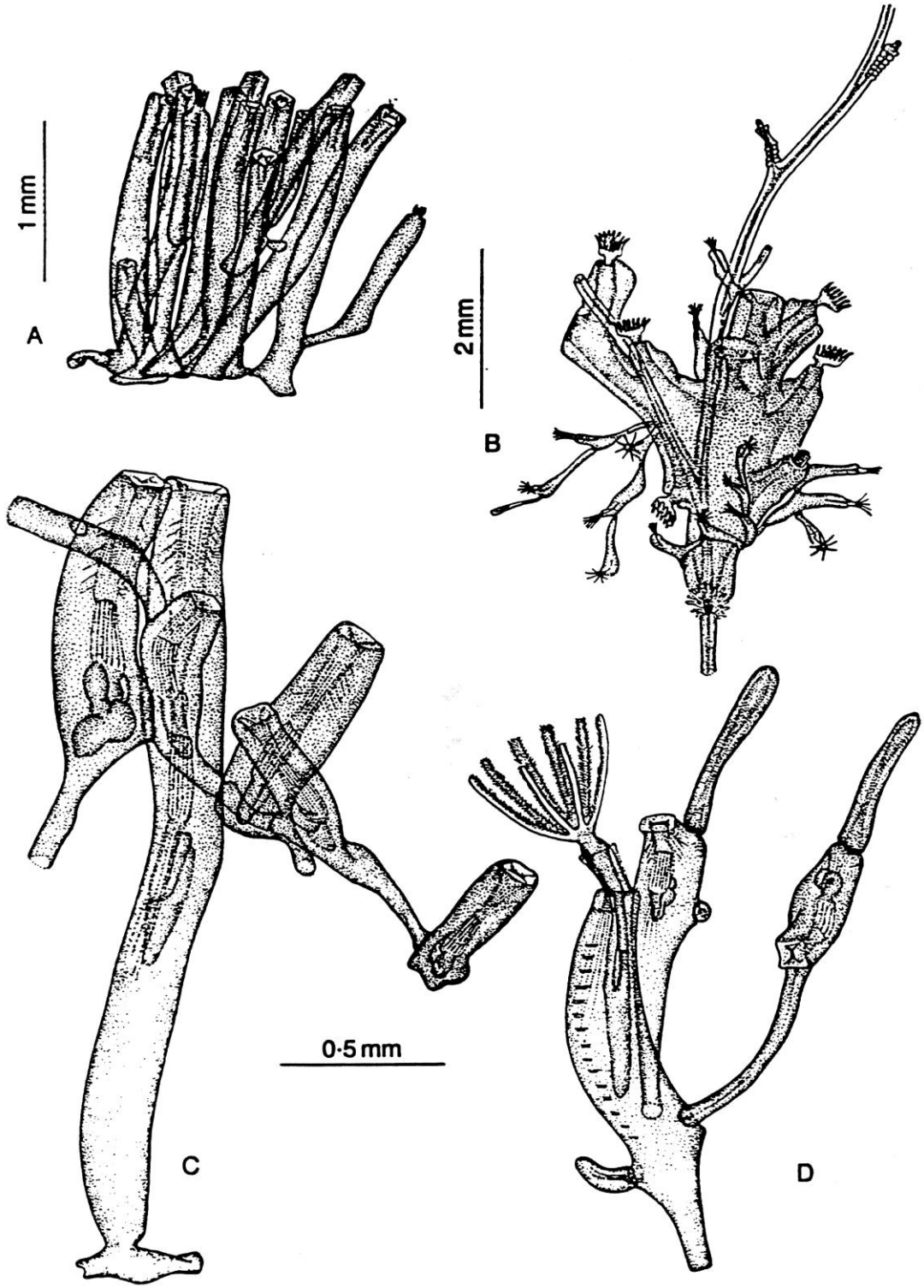


Figure 1. *Victorella pavida*. A: part of the dense colony, from the Po Valley, Italy. B: a diffuse colony growing on the phylactolaemate *Plumatella repens*, from Surrey Docks. C: detail of the Po Valley specimen, showing basal and peristomial budding. D: detail of the Surrey Docks specimen (Hayward 1985).

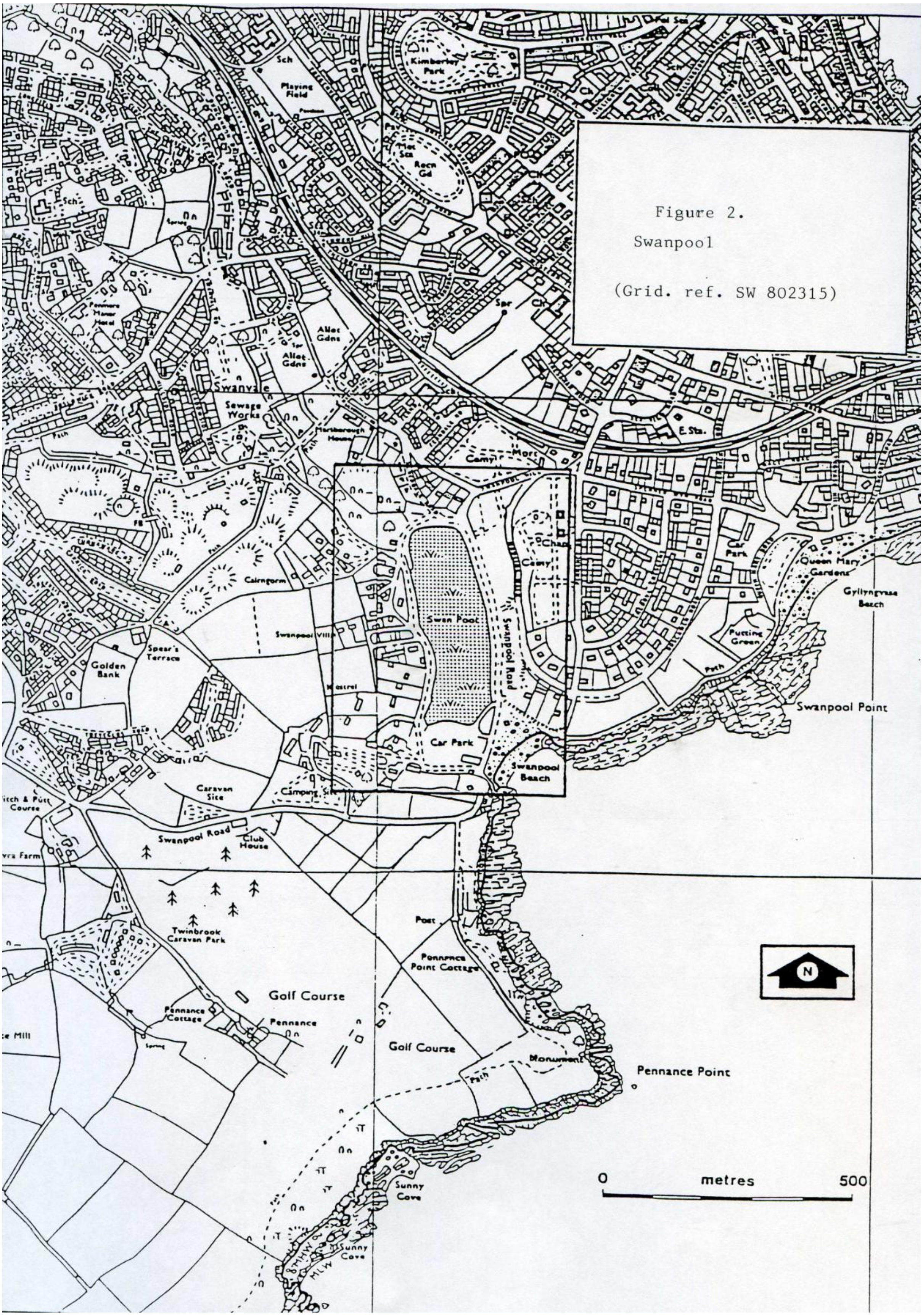
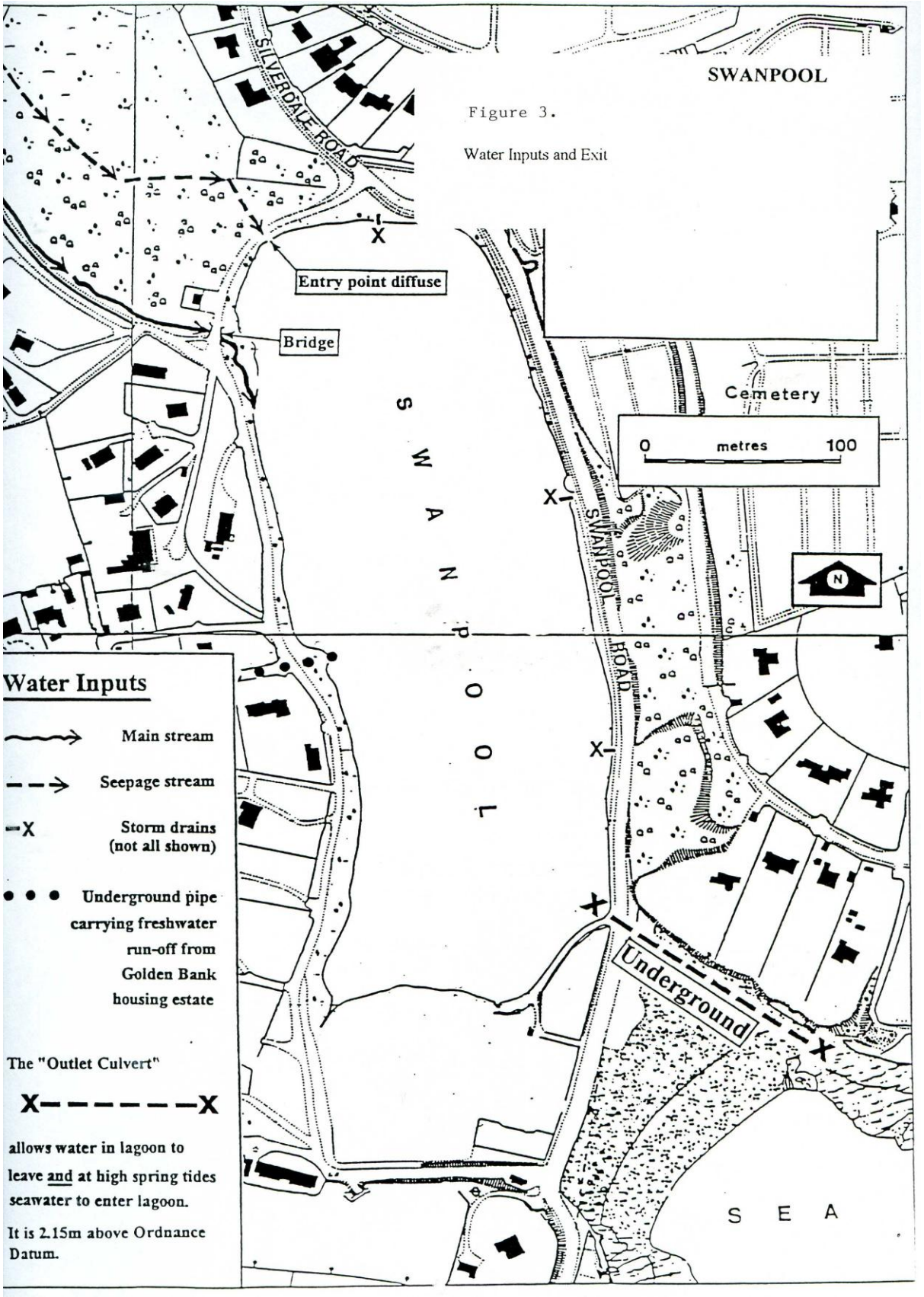


Figure 2.
Swanpool

(Grid. ref. SW 802315)

Figure 3.

Water Inputs and Exit



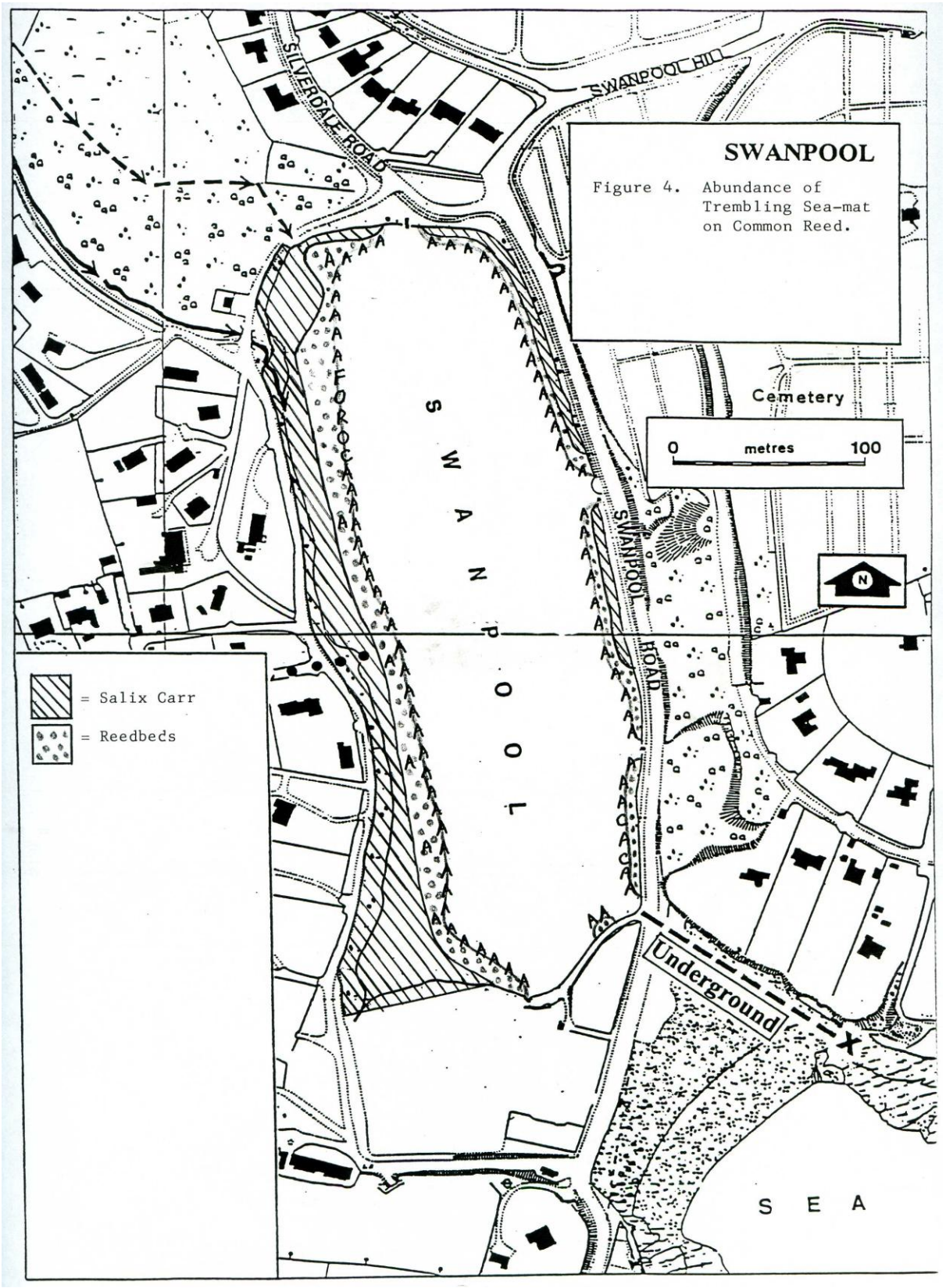
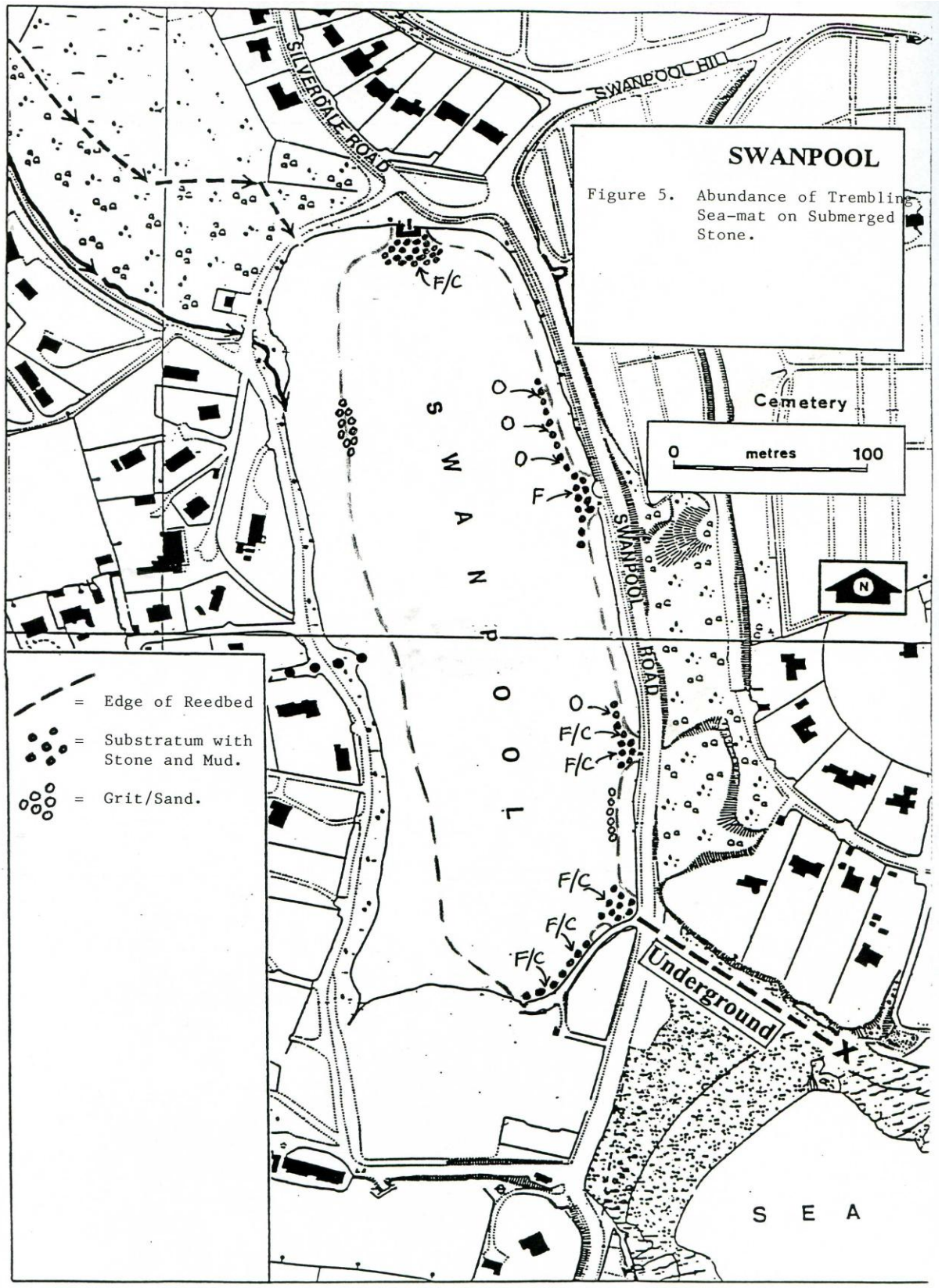
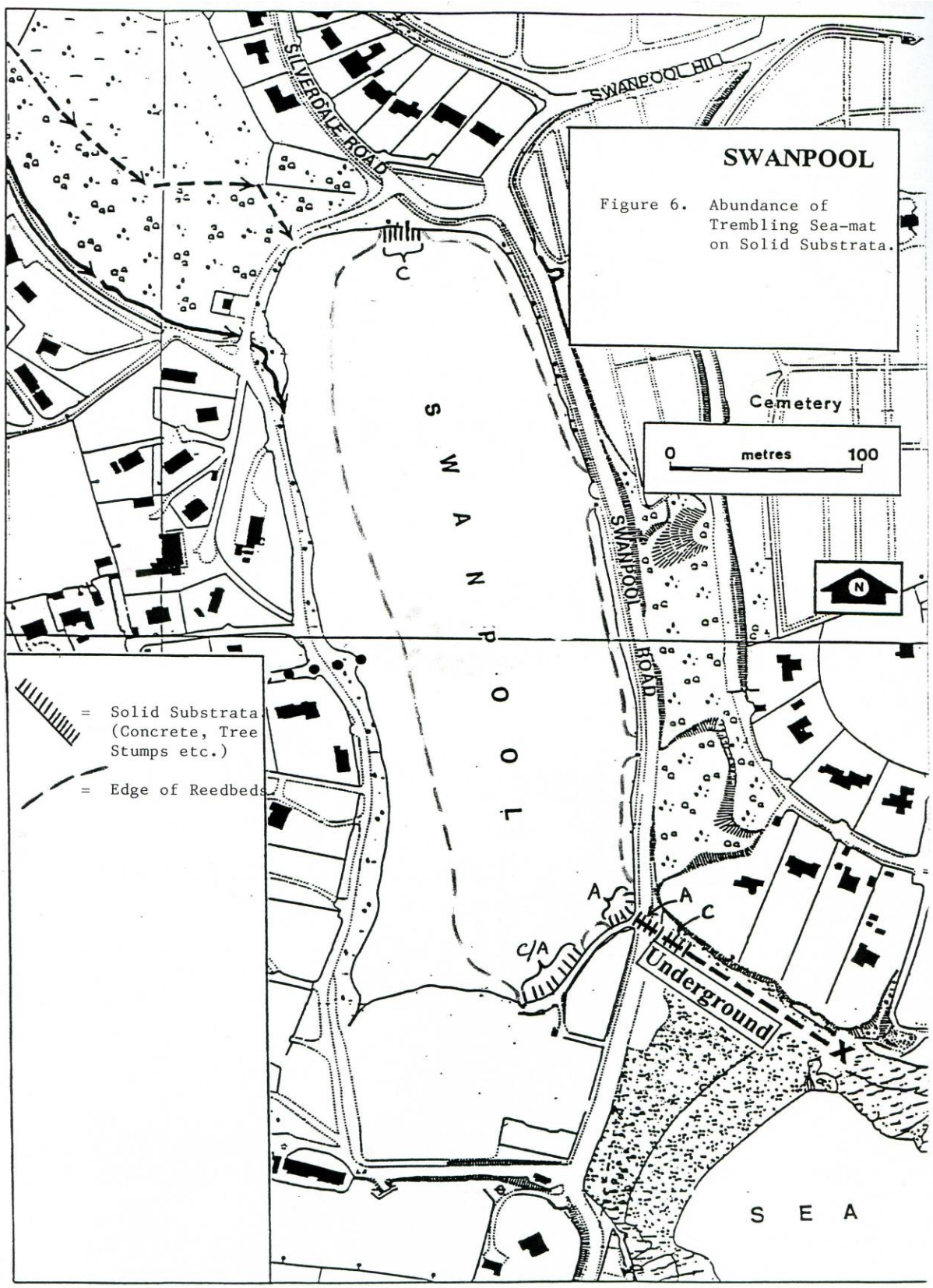
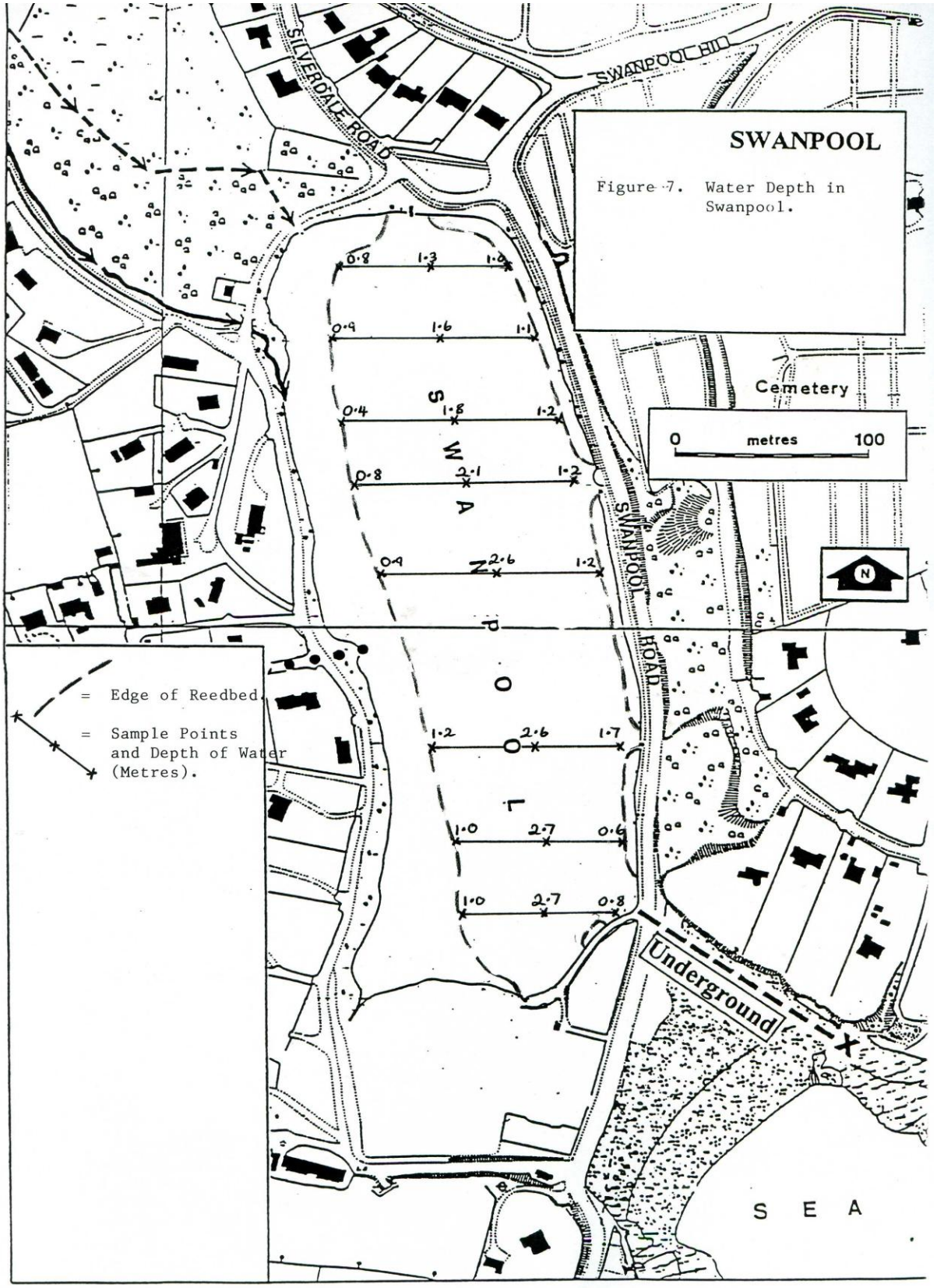


Figure 4. Abundance of Trembling Sea-mat on Common Reed.


SWANPOOL
Figure 5. Abundance of Trembling Sea-mat on Submerged Stone.
SILVERDALE ROAD
SWANPOOL HILL
F/C
O
O
O
F
S W A N P O O L
Cemetery
0 metres 100
N
SWANPOOL ROAD
O
F/C
F/C
F/C
F/C
F/C
Underground
S E A
= Edge of Reedbed
= Substratum with Stone and Mud.
= Grit/Sand.


SWANPOOL
Figure 6. Abundance of Trembling Sea-mat on Solid Substrata.
SILVERDALE ROAD
SWANPOOL HILL
SWANPOOL
SWANPOOL ROAD
Cemetery
0 metres 100
N
= Solid Substrata (Concrete, Tree Stumps etc.)
= Edge of Reedbeds
C
A
A
C
C/A
Underground
X
SEA



SWANPOOL

Figure 7. Water Depth in Swanpool.

Appendix 1. Photograph and Slide Catalogue

This appendix relates to a series of slides and print photographs taken during the survey. These are held by English Nature Marine Team.

Photographs

P1 General view of Swanpool looking north and showing extensive reedbeds on its western and eastern sides.

P2 The south-east corner of the Pool showing outlet point into culvert.

P3 Outlet point showing lockable grid in position.

P4 Culvert, approximately 130 metres long, opening onto Swanpool beach. Note the bolted gate to prevent unauthorized entry.

P5 As for P4 but illustrating an average outflow of water from the Pool.

P6 Stony substratum and granite kerbs adjacent to the outlet point.

P7 Eastern side of the Pool to show the extensive reed.

P8 Storm drain leading from road verge into the Pool on the eastern edge.

P9 General view of Swanpool looking south.

P10 One of several Carrick District Council signs, this one at the north end, warning of blue-green algal blooms in the Pool.

P11 Large storm drain entering into the Pool, from the housing estate area at the northern end.

P12 General view to show the storm drain, semi-submerged tree stumps and stone/concrete jetty at the northern end.

P13 Close-up view of the large storm drain entry point and semi-submerged tree stumps at the northern end.

P14 Close-up of the submerged roots of a tree stump at the northern end.

P15 Storm drain entry point at northern end to show "algal slime" growing and indicating a nutrient-rich input.

P16 Input fluid from northern storm drain reacting with the pondwater producing a degree of turbidity.

P17 Concrete and stone jetty at northern end, also beginning of extensive reedbed in the north-western corner of the Pool.

P18 The Swanvale/Tregoniggie stream, the major freshwater input into the Pool.

P19 The Swanvale/Tregoniggie stream running down the western edge of the Pool before entering into the Pool proper.

P20 Extensive reedbed on the western side and in the south-western corner of the Pool. Behind the reedbed is an extensive area of Salix carr.

P21 Extensive area of the car-park and waste ground at the southern/south-western end of the Pool.

P22 *Victorella pavida,* part of colony (x6).

Slides

S1 General view of Swanpool also showing the car-park area adjacent to the Pool.

S2 General view of Swanpool looking north showing the tarmaced area at the south end of the Pool.

S3 Edge of tarmaced area at the southern end of the Pool.

S4 Tarmaced area at southern end also showing an area of reeds towards the south-east near the outlet.

S5 Outlet in the south-eastern corner looking towards the tarmaced area and a small isolated patch of reeds.

S6 Outlet in south-eastern corner showing also the nearby blue-green alga; warning sign and a storm drain discharging water from the nearby road.

S7 130 metre-long culvert leading from the Pool outlet to the lower beach.

S8 End of culvert at near high tide. Note the bolted grill to prevent unauthorized entry.

S9 One of several signs warning of blue-green alga.

S10 Extensive area of reeds running almost uninterrupted, along the eastern edge of the Pool.

S11 Gap in the reeds along the eastern edge. A storm drain leads from the verge of the road into the Pool.

S12 An area of lichen-encrusted Willow trees on the north-eastern side of the Pool.

S13 Jetty constructed of stone and concrete, at the northern end of the Pool.

S14 Partially submerged roots of tree stumps at the northern end of the Pool.

S15 Partially submerged roots of tree stumps, main storm drain and reeds at the northern end of the Pool.

S16 Silt-laden Swanvale/Tregoniggie stream, the main freshwater input which enters into the north-western area of the pool.

S17 View of the silt-laden water flowing towards the entry point into the Pool.

S18 View of the near continuous bed of reeds along the western side of the Pool. Note the extensive area of willow-carr behind the reeds.

S19 The extensive area of the car-park and waste ground at the southern/south-western end of the pool.

S20 A black-brown mass of *Victorella pavida* at the base of a reed (mass approximately 15cm high).

S21 *Victorella pavida*, part of a colony (magnification x 6).

S22 *Victorella pavida*, part of a colony (magnification x 12).

S23 *Victorella pavida*, part of a colony (magnification x 25).

Appendix 2. Species Action Plan for trembling sea-mat *Victorella pavida*

Summary

The trembling sea-mat, a ctenostome bryozoan, is a rare species in the United Kingdom. Originally discovered and described from the Surrey Canal and the Victoria Docks, London, in 1870, it has subsequently disappeared from these sites due to dockland developments which led to a permanent reduction in salinity of the water. At the present time the only known British site is the brackish water lagoon at Swanpool, near Falmouth in Cornwall. This species is abundant here but may be threatened by changes in salinity, silting and the effects of various pollutants.

1. Priority Statement

Trembling sea-mat *Victorella pavida* is a rare animal species that is known from only one site in the United Kingdom and has been designated as a Red Data Book species (JNCC 1991). The UK Steering Group on biodiversity (Anon 1995) placed the trembling sea-mat on the long list of globally threatened species. At Swanpool changes in salinity, silting and pollution threaten the trembling sea-mat. This being so, the conservation of the trembling sea-mat is, therefore, a high priority.

2. Action Plan Objectives

Objective 1: In the short term to establish a baseline distribution map of this species at the Swanpool site. Refer to attached report.

Objective 2: In the short term, to establish a monitoring programme at the site covering biological and physical/environmental parameters.

Objective 3: In the medium term, to investigate the habitat requirements and autecology of the species in order to ensure that the management of the site is optimal.

Objective 4: In the long term, to ensure that the site remains protected and that the existing population remains secure.

Objective 5: To research and implement where appropriate, the possibilty of introduction/re-introduction of trembling sea-mat to other sites.

3. Legal Status

In 1988 the trembling sea-mat was protected by its addition to Schedule 5 of the Wildlife and Countryside Act 1981.

4. Biological Assessment

4.1 Introduction

Trembling sea-mat is a rare species in the UK. It has only ever been recorded from three sites in Britain. Discovered and described from the Surrey Canal and Victoria Docks, London, in 1870, it has since disappeared from both of these sites. In 1968 it was rediscovered in the brackish water lagoon at Swanpool, near Falmouth in Cornwall. It still exists here and is abundant in certain habitats.

4.2 Ecology

The trembling sea-mat appears to be tolerant of low and fluctuating salinities and even of virtually fresh water. Experimentation (Menon & Nair 1967) has shown that during wet season colonies of the trembling sea-mat flourished in salinities of 3.2 ppt to 10 ppt. During the dry season the optimum salinity was in the range 18/23 ppt. Soon after the installation and repositioning of a new outlet culvert at Swanpool in 1983, the salinity was found to vary from between 3.1 ppt at the surface to 26 ppt at 3 metres. Italian and Indian biologists have suggested that its life cycle and reproductive pattern are partly governed by seasonal variation in salinity and temperature (Carrada, Sacchi and Rigillo 1965; Menon & Nair 1967). Carrada, Sacchi and Rigillo (1965); studied the ecology of the trembling sea-mat in the lagoons of Naples and found that intense periods of growth in the spring were followed by low growth, high reproduction and the production of 'hibernacula' (resistant overwintering or dispersive bodies) during the summer drought.

The trembling sea-mat grows on submerged stones, wood and water plants. Stones have been stated as the main substrate in Swanpool, however, a recent survey found that the trembling sea-mat also has a predilection for the submerged stems of the common reed *Phragmites australis* and for concrete surfaces as well as stones.

The trembling sea-mat is often found in association with the hydroid *Cordylophora lacustris* or with the phylactolaematous bryozoan *Plumatella repens*. In Swanpool it is known to be associated with the latter species and also with the colonial protozoan Carchesium polypinum.

4.3 Distribution and population

4.3.1 United Kingdom

Swanpool is the only extant site from which the trembling sea-mat has been recorded this century, despite an extensive NCC Survey of coastal lagoons in the 1980s (Smith & Laffoley 1992). At Swanpool it is abundant in certain types of habitat.

4.3.2 International distribution

Soon after its discovery in London, in 1870, it was subsequently reported from numerous estuarine localities along the southern shores of the North Sea on the European mainland (Hayward 1985). The current status of the trembling sea-mat at these sites is unknown. It is stated to be common in estuarine and lagoonal habitats in the Mediterranean, for example in the area of Naples and in the valley of the Po (Carrada, Sacchi & Rigillo 1965). It has also been recorded from India (Menor & Nair 1967), the Black Sea, the Baltic, from Brazil, the eastern United States and Japan (Hayward 1985).

4.4 Limiting factors

4.4.1 Habitat rarity

Importance: high

Saline lagoons are a rare type of habitat covering only about 1300 ha in Britain (figure from Costed Habitat Action Pan for lagoons). Ecologically Swanpool has been classified as one of the eleven most important saline lagoons in Britain (Davidson *et al* 1991). Natural brackish lagoons normally evolve to become freshwater lagoons but, in the case of Swanpool, this has not happened due to the outlet culvert at it south-eastern corner.

4.4.2 Site vulnerability

Importance: high

The higher salinity regime present in Swanpool since the installation of a larger diameter, higher level culvert in 1983 has probably benefited the trembling sea-mat population. Counteracting this increased salinity is the increased freshwater run-off which was diverted into Swanpool, by South West Water, from a housing development of 350 new homes at Golden Bank also in 1983. More recently two new housing developments have received planning permission and building has already begun (Fig. 1). The Swanvale site has permission for 50 units for rental, whereas Golden Bank has plans for 45 houses in phase one. In addition this latter site has residential consent for a further 200 plus houses on the east-facing slopes overlooking, and in close proximity to, Swanpool (Figure 1). This outline consent was renewed by Wainhomes in October 1996. The effects of any increased freshwater run-off from these sites, especially if full development proceeds, on the hydrology of Swanpool is difficult to assess. The resulting decrease in salinity might have a detrimental effect on the trembling sea-mat population.

After rain, the Swanvale/Tregoniggie stream entering the Pool in the north-west corner is heavily laden with silt. Increased silt imput may also result from the greater amount of water run-off from the new roads etc. associated with the housing developments at Swanvale and Golden Bank. Trembling sea-mat populations, especially those on stones on the substratum, would be at risk from smothering in the longer term.

Pollution is a major problem in saline lagoons in the UK (Davidson *et al* 1991). Swanpool, unlike many other lagoons, is fortunate to have an efficient outlet system which, to some extent, alleviates this problem. Entering the Pool from the main road on the eastern side are several storm drains. After rain, the discharge into the Pool shows the characteristic iridescence associated with oil residues. There is a similar, larger, storm drain at the northern end of the Pool. Discharge from this is nutrient-rich and produces turbidity on entering the Pool. Most of the pollution, however, is mediated via the Swanvale/Tregoniggie stream. Local residents (K.Peppin pers.comm.) have regularly detected paint, oil and drilling lubricant residues and detergents (including washing powders) in this steam. The sources of these pollutants may be linked to industrial/residential estates in the stream's catchment. The detection of traces of oil in the ground water between the oil depot west of the site and the stream (K.Peppin pers.comm.) may also be a problem in the longer term.

Water quality measurements for 1993/1994 (National Rivers Authority) indicate that the Pool is eutrophic with high levels of nitrate and phosphate ions (Gowenlock 1994).

4.4.3 Degradation of habitat

Importance: medium/high

A major proportion of the trembling-sea mat population is found on the submerged stems of the common reed *Phragmites australis* which grows around the Pool edge. The area of reedbed has decreased markedly since 1945 due to succession to woodland (willow carr). It has also been past practice in recent years to control reed growth by spraying.

5. Resumé of Conservation Action to Date

Swanpool lagoon has been designated as an SSSI (Site of Special Scientific Interest) and has LNR (Local Nature Reserve) status. It lies within the 'Swan Valley Park' designated for recreation and nature conservation in the Falmouth and Penryn Local Plan (Cornwall County Council 1987).

6. Proposed Action

The proposed Actions with recommendations for the appropriate bodies to undertake these actions are set out below. Although individual responsibilities have been suggested, a co-

ordinated programme of Action involving a range of statutory and non-statutory interests would be most appropriate for delivering the Action Plan objectives.

6.1 Policy and legislative

Action: Developments causing significant adverse impacts to the site should be prevented. (Statutory Agencies).

6.2 Site safeguards

- ❑ Action: Maintain the shingle bar and outlet culvert should be adequately maintained (Carrick District Council).

- ❑ Action: Monitor water quality in the lagoon and in the Swanvale/Tregoniggie stream (Environment Agency).

- ❑ Action: Investigate sources and impacts of pollutants entering Swanpool lagoon and identifiy opportunities for reducing and ameliorating pollutant imput (Environment Agency, Carrick District Council).

- ❑ Action: Respond to developments in the catchment area which may alter that in 6.2.2 (Environment Agency and Carrick District Council).

- ❑ Action: Monitor siltation rates.

- ❑ Action: Monitor the extent of the reedbed and woodland habitats using aerial photographs as these become available (Cornwall County Council and Cornwall Wildlife Trust).

- ❑ Action: Manage woodland and reedbeds to maintain their current extent (Carrick District Council).

- ❑ Action: Ensure that there is not a return to the regime of reed growth control by spraying (Carrick District Council).

- ❑ Action: Proposed control of Japanese Knotweed, and other troublesome weeds adjacent to the Pool, by spraying with `Roundup' should be carefully controlled and avoided if causing significant deterioration to the Pool (Carrick District Council).

- ❑ Action: Maintain the culvert where the road runs over the inlet stream in the north-western corner of the Poll (Cornwall Highways Department).

- ❑ Action: Ensure that the existing silt traps, associated with the underground pipe, carrying freshwater run-off from Golden Bank into the Pool, are regularly inspected and maintained.

- ❑ Action: Investigate sources and impacts of pollutants entering Swanpool lagoon and identify opportunities for reducing and ameliorating pollutant input. (Environment Agency, Carrick District Council).

6.3 Advisory

- ❑ Action: The freeholder (Carrick District Council) and tenant (Mr P Nichols, Nonsuch Farm, Polpenwith, Constantine) should be made aware of the importance of Swanpool

as a saline lagoonal habitat. Both parties should also be adequately informed of the significance of Swanpool with reference to the presence of the trembling sea-mat and to factors that could possibly effect its population size. (English Nature).

6.4 Communication

- ❑ Action: Investigate opportunities for interpretation/publicity in relation to Swanpool lagoon and the trembling sea-mat (Carrick District Council, Cornwall Wildlife Trust, English Nature).

6.5 International

- ❑ Action: Promote European cooperation in the conservation of the trembling sea-mat by the exchange of information on habitat requirements and the status of populations elsewhere (JNCC).

6.6 Future research and monitoring

- ❑ Action: Autecological research to understand more about the requirements of the trembling sea-mat (English Nature).

- ❑ Action: Carry out research into the current salinity regime at Swanpool. Urgent. (English Nature).

- ❑ Action: Carry out research into the rate of siltation in the Pool (English Nature).

Action: Investigate other saline lagoons with the possibility of introducing the trembling sea-mat. This could possibly best be achieved using populations of trembling sea-mat attached to common reed stems (English Nature).

7. Action Plan Review

This action plan should be reviewed initially every year by English Nature in consultation with other Statutory Agencies and relevant experts.

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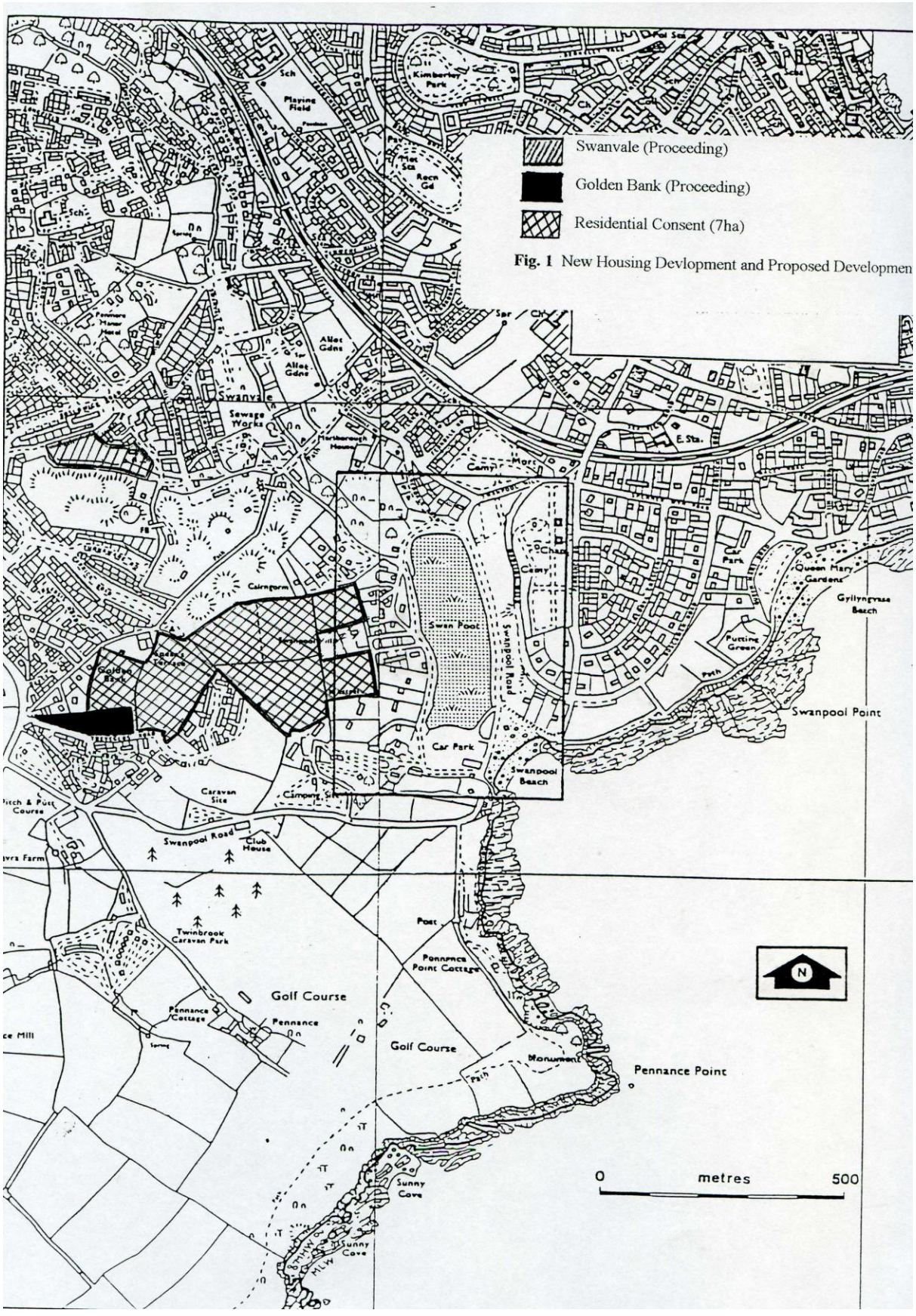

Fig. 1 New Housing Devlopment and Proposed Developmen