



NRA

*National Rivers Authority
South West Region*

ENVIRONMENTAL IMPACT ASSESSMENT

RIVER ALLEN FLOOD ALLEVIATION SCHEME

AUGUST 1992

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ENVIRONMENTAL ASSESSMENT

RIVER ALLEN FAS

INTRODUCTION

The proposed works on the River Allen forms part of the National Rivers Authority's on-going development to provide a flood alleviation scheme for the City of Truro. The overall scheme may be divided into three major elements:-

(a) River Kenwyn

Construction of a holding dam at New Mill and channel and culvert improvements within the City Centre.

This element has now been completed.

(b) Upper Tidal Reaches

An extreme high tide exclusion barrier and sea wall defences centred on Lighterage Quay.

This is presently completing its consultation stage.

(c) River Allen

In the development of this stage three options have been considered:-

- 1) To allow the present level of flood protection to continue.
- 2) To undertake channel improvements, provide a new by-pass culvert, and construct flood defence walls within the City Centre.
- 3) To construct an earth-fill gravity dam at Idless to regulate flows down the Allen, together with some minor channel improvement work within the City.

Of the three options, only 3) was capable of promotion:-

Option 1)

A significant number of properties adjacent to the River Allen in Truro City Centre lie within the flood risk area.

The do nothing option was rejected as the NRA had stated their intention to provide a high degree of flood protection to the whole of Truro.



Option 2)

Several variations of this option have been examined in detail but all were found to be significantly more expensive than Option 3. This option had to be rejected as the benefit was not adequate to justify the estimated costs. It was also recognised that the impact within the Historic Town and Cathedral grounds, coupled with the considerable social disruption, was unacceptable.

Option 3)

The estimated cost of this option is about 65% of that for the least cost version of Option 2.

On the basis of this investigative work the NRA have chosen to promote Option 3). The details of 3) and the predicted environmental impact form the remainder of this report.

PROPOSAL

The purpose of the development is to regulate the discharge of the River Allen at Idless (1.5km upstream of Truro) to ensure that when combined with flows from the downstream catchment area, the capacity of the river channel and culverts in Truro are not exceeded. Flows exceeding channel capacity would be temporarily stored upstream of the dam and released as the flood hydrograph recedes.

The proposed works at Idless will require the construction of an earth-fill gravity dam together with a reinforced concrete release culvert and stilling basin (see appendix 2(i)).

The structure is classified as a Category A Dam, and is designed for stability and the safe discharge of floods up to and including the Probable Maximum Flood (P.M.F.). Hydrological analysis of flood hydrographs have been carried out by the Institute of Hydrology and the P.M.F. is calculated to be 229 cumecs. The 100 year flood for which the scheme is designed to cater for is 34.5 cumecs.

Flood storage contours for return periods up to and including the 100 year flood and the additional number of hours that each field plot can be expected to flood during a 100 year period are shown in Appendix 2(ii).

The dam will stretch for 160m across the valley at a maximum height of 3.5m above existing ground level. The top crest width will be 4m with a 1 in 4 downstream embankment slope. The upstream side will have a slope of 1 in 2.5 with a berm incorporated into the embankment for access. The maximum toe width of the dam will be 33m and will occupy 4000 square metres. The total volume of earthfill used in embankment will be approximately 9000 cubic metres.

The earth-fill will be excavated from an area immediately upstream of the dam (see appendix 2(iii)).

The access route for construction and long term maintenance requirements are also shown in Appendix 2(iv).

IDLESS DAM, TRURO

PROPOSED GENERAL METHOD STATEMENT Nr. 02 27/3/92

1. Set up compound.
2. Erect temporary fencing for extent of working area.
3. Excavate drainage trenches and settling lagoons and bore pumping wells.
4. Construct crossings over trenches using 600 Ø conc. pipes.
5. Clear trees over working area.
6. Temporarily divert river (around eastern flank).
7. Construct temporary access road to culvert works.
8. Construct temporary crossing of river (using Armco, box culvert or similar approved).
9. Extend temp. road along length of proposed release culvert works (on eastern flank of dam area,) and up eastern flank of valley.
10. Excavate topsoil (eastern flank of valley) over area of source of clay and stockpile.
11. Excavate clay material and stockpile ready for reworking.
12. Construct release culvert works (inc. culvert, inlet structure and stilling basin) exporting etc. material to eastern flank of valley.
13. Commence excavation of organic material over western flank of dam and export material to eastern flank of valley.
14. Placement of drainage blanket.
15. Transport reworked clay to western flank of dam for deposition, placing, spreading and compaction at a rate of 0.3m per week.
16. Complete construction of release culvert works.
17. Re-divert river through release culvert and move temporary crossing.
18. Take up access road adjacent to culvert works, and commence excavation of organic material over eastern flank of dam (exporting to eastern flank of valley).
19. Transport reworked clay to eastern flank of dam for deposition, placing, spreading and compaction at a rate of 0.3m per week.
20. Complete filling of dam along entire length of dam at 0.3m per week.
21. Construct revetment system over dam (and place topsoil and seed).

22. Construct permanent access track along berm in dam profile.
23. Landscape eastern flank of valley.
24. Take up temporary access roads, and remove hardcore, and infill drainage trenches and road excavation with original excavated material.
25. Place topsoil to remaining areas.
26. Erect permanent fences and hedges.
27. Complete landscaping (inc. tree planting and seeding).
28. Remove temporary fencing after completion of maintenance period.

CONSTRUCTION OF CUT-OFF:- UNDER INVESTIGATION

OPTION A

Bentonite/Cement Slurry Wall

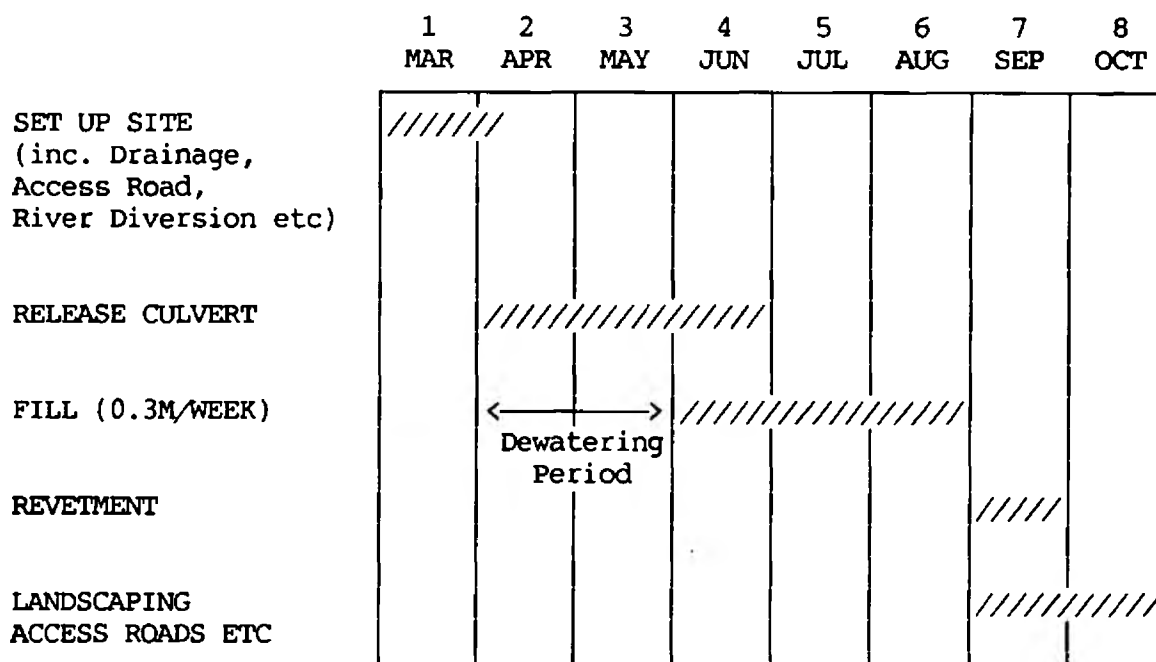
1. Bentonite slurry wall to be constructed after construction of berm but prior to formation of finished permanent access road.
2. Temp. hardcore access road to be used as haulage route during construction of bentonite/cement slurry wall.

OPTION B

Sheet Pile Wall

1. Sheet piles to be driven prior to placement of clay fill, to reduce groundwater and surface water seepage into excavation.

PROPOSED OUTLINE CONSTRUCTION PROGRAMME - NR 02 27/03/92
(Ref. To Method Statement)



STUDY AREA

The area liable to be affected by the proposed works both during the construction phase and its subsequent operation is shown in appendix 1.

BACKGROUND DATA

1988 aerial survey habitat information exists for the whole of the study area (appendix 4(i)).

The left bank of the dam site and much of the left bank inundation zone lies within a Cornwall Nature Conservation Site (CNC CK 80). Full site survey information for (CNC CK 80) is held by the Cornwall Trust for Nature Conservation.

The NRA undertook a brief ecological site survey of the study area a summary of the findings is given within appendix 4(ii).

Fisheries surveys were undertaken by SWW environmental section in 1986.

Invertebrate biological sampling has been undertaken at two sites on the River Allen (Moresh Laundry Bridge and Idless Bridge) as part of the routine biological monitoring programme.

Information collected by SWW and the NRA on water quality and quantity is shown in appendix 3(i) to 3(iii).

ENVIRONMENTAL STATEMENT

General Amenity

There are no statutory public rights of way to the proposed dam site or within the upstream inundation zone. Public access beside the River Allen between the dam and the tidal confluence is restricted to bridge crossings or public roads. An urban fringe section of about 300m to the North of the railway bridge allows people to use the fields adjoining the river. Within the urban section downstream of the railway bridge, pavements run parallel to the river for much of its length.

LANDSCAPE

The study area does not contain any landscape designations. It is recognised however that the river corridor is an important landscape element and the views from the valley sides are of high landscape value.

NATURE CONSERVATION

The river corridor land use is well illustrated in the habitat survey appendix 4(i). The study area is a mixture of improved and unimproved grassland with significant pockets of species, rich marshland and woodland. The interest is enhanced by old leat systems which run parallel to the river for much of its length. The extreme lower section below the railway bridge has little nature conservation interest being an urban area with the river contained within artificial banks.

The river channel is typically three metres wide flowing between vertical earth banks with an average height of 1.0m. Substrate material is predominantly sands and gravels but small patches of cobbles and exposed bed rock exist. The banks have a good tree cover of Ash, Elm, Oak, Hazel and Alder with small areas of Sallows giving a 100% summer canopy cover over the river for much of its length. Plants within the channel are poorly represented presumably limited by heavy shading and mobile substrate.

Invertebrate analysis using kick sample techniques at two sites three times a year has shown a diverse instream fauna indicative of good ecological quality.

Casual observations on other wildlife using the river corridor show that the river is well used by otters and mink. Small mammals appear to have high population densities which in turn supports a good diversity of birds of prey. Dippers also use the river, a nest site exists beneath Idless Bridge.

A more detailed survey of the dam and impoundment area is given in appendix 4(ii).

FISHERIES

Fisheries surveys undertaken at nine sites on the Allen in 1986 found populations of brown trout, eels, bullheads, brook lampreys and minnows. The Allen is known to contain migratory sea trout.

CULTURAL HERITAGE

No scheduled monuments are located within the river corridor. The major areas of cultural interest lie within the Historic Settlement of Truro. Other sites of importance are Moresh Leat; Scawswater Mill and Leat and then the village of Idless, which is mentioned in the Domesday Book. Further details of the Archaeological and Historic Sites are shown in Appendix 5(i) and 5(ii).

WATER QUALITY

The reach of the River Allen upstream from Moresh Laundry Bridge (SW 8268 4505) has a river quality objective by NWC-Class 1B, which it achieved in 1991 (based on data collected from 1989-1990).

The reach upstream from Idless Bridge (SW 8219 4701) has a river quality objective of NWC-Class 1B, which it achieved in 1991, being classified as Class 1A (very good quality) in that period.

The environmental water quality objectives identified for the River Allen are:-

- Aesthetic Quality
- Salmonid Fish
- Other Aquatic Life/Dependant Organisms
- Livestock Watering
- Irrigation of Crops

WATER RESOURCES

There are no major abstractions identified within the effected reach. Water resources information is identified within appendix 3(i).

ENVIRONMENTAL ASSESSMENT

GENERAL AMENITY

- Temporary:** The works are restricted to the dam site and some instream works within the city centre (re-pointing channel walls, silt removal). It is considered that the impact of the construction should be limited to a temporary increase in traffic caused by the construction vehicles.
- Permanent:** There are no identified long term amenity impact resulting from this scheme.

LANDSCAPE

- Temporary:** The presence of the work compound site etc is unlikely to cause public concern. There are few locations from which the dam site may be viewed either from close quarters or from more distant points. The dam area is reasonably well screened by existing hedges and woodland which will be unaffected by the works.
- Permanent:** The completed dam will have a maximum height of 3.5m above existing ground level. It will be of earth construction which will be seeded or turfed to give a finished appearance of a grass bank. A landscape scheme will be implemented to integrate the dam into the existing environment. The experience of the NRA at the New Mill Dam site coupled with the low dam height should ensure that the Idless Dam harmonises well with the existing landscape.

NATURE CONSERVATION

The nature conservation interest of the area has been identified within the environmental statement and appendices. The major impact of the scheme results from the dam construction which will take place partly within a County Conservation site.

- Temporary:** All significant temporary impacts are within the 5.4 hectare site and the disturbance to the immediately surrounding land. The construction is scheduled to take eight months (March - October). There are no known otter holts, badger setts or specially protected bird nesting sites within the surrounds of the construction and works area. The land is however well used by both otters and badgers and some desruption to their normal behaviour patterns is inevitable.
- Permanent:** The construction work will result in the loss of the existing plant and animal communities present in the 5.4 hectare site. Details of the existing land use and conservation value are given in appendix 4(ii).

Investigations by Babbie Shaw and Morton into the permanent changes to the hydrology of the existing wetland sites and the upstream and downstream reaches have indicated that:-

- a) The upstream section above the dam will receive more regular flooding.
- b) Drainage regimes within the upstream right bank wetland will be changed as a result of the construction works. This will mean that the main Juncus marsh and the wetland ditch flora associated with the Mill House Leat could not regenerate.
- c) The Filipendula marsh (CNC site) would not be effected by the construction work or the digging of a borrow pit adjoining the marsh. This refers to existing drainage channels and flush sites it is anticipated that the general flooding would be more frequent.
- d) Downstream of the dam, wetland sites within the floodplain would not be influenced by the scheme as their hydrological regime is independent of the flows within the River Allen.

Influences on the ecology of the downstream channel as a result of the controlled flows is considered to be minimal. Less frequent extreme spate conditions should lead to a more stable substrate and more abundant in-channel plant communities.

The development of management agreements for the existing and newly created wetland sites should ensure the long term protection of these habitats.

Landscape proposals will look to extend areas of woodland and provide additional habitat beside the River Allen.

FISHERIES

- Temporary: Subject to the NRA's standard pollution control measures, and standard working practices to ensure fish passage impact on fisheries interest is minimal.
- Permanent: The loss of a small section of potential spawning areas beneath the dam and the spillway is recognised but is of no significance to fish populations. The incorporation of a MAFF approved fish pass within the culvert and spillway will ensure the free passage of fish during times of low flow. The fisheries section do not recognise any adverse effects on fisheries interest as a result of changes in the natural flow regime downstream of the dam.

CULTURAL HERITAGE

- Temporary: No temporary effects have been recognised as impacting on the cultural value of the site.
- Permanent: The works will effect two leat systems:-

a) Mill House Leat

This will be excavated in part and the dam constructed across it. The leat is not in operation having been infilled upstream of the dam site.

b) Scawswater Leat

The borrow pit for the dam construction material lies beside or within the line of the Scawswater Leat. The leat has been infilled at some time in the past along this section and its presence is not obvious.

The impact on these two leat systems will result in the loss of sections of the redundant water channels and the inability to use the leats in the future to supply water to Mill House and Scawswater Mill. No such rights of entitlement to allow these abstractions have been registered with the NRA.

WATER QUALITY

Temporary: Water quality standards are protected by pollution control measures and approved working practices which will form part of the contract document.

Permanent: There are no recognised long term effects of this scheme on the water quality of the River Allen.

WATER RESOURCES

Temporary: The construction works will not influence any known users of the affected reaches.

Permanent: There are no permanent implications of this scheme to any existing abstraction within the River Allen.

AMELIORATION/ENHANCEMENT MEASURES

GENERAL AMENITY

The nature of the site in relation to its size, location and nature conservation interest provides little scope for the provision of any new amenity or recreational facilities.

LANDSCAPE

An outline landscape scheme is illustrated in appendix 2(iv). Implementation of this will depend on the success of negotiations with existing landowners. A full landscape scheme will be prepared after consultation with interested parties which will be submitted with the planning application.

NATURE CONSERVATION

Mitigation Measures

- (1) All areas not required for operational or construction reasons will be fenced to agricultural stock proof standards prior to any works commencing on site. All such fences will be removed on completion of the construction stage.
- (2) Site clearance of trees and shrubs will take place in early March prior to the nesting season.
- (3) Standard pollution control measures and working practices will be implemented to protect the water environment.
- (4) Reinstatement works and landscape proposals will reflect the existing species and habitat characteristics of the pre-construction site where possible.

ENHANCEMENTS

- (1) The area of Filipendula Marsh will be extended as a result of the excavation works to form the borrow pit.
- (2) Negotiations will be held with the landowners to allow the NRA to enter into a management agreement over the marsh. This should ensure its long term management for the benefit of its nature conservation interest.
- (3) Discussions will be held with the landowner to allow the NRA to replicate the wetland conditions lost at the dam site. The preferred site would be upstream of the dam on the right bank. This will allow the development of a Juncus dominated marsh to replace that lost during the dam construction.
- (4) Landscape proposals would look to extend the existing woodland cover beside the Allen to provide suitable habitat for otters and other wildlife.

FISHERIES

- (1) Instream construction works would avoid times of major salmonid spawning.
- (2) A MAFF approved fish pass to allow the free passage of fish would be incorporated within the dam culvert and spillway.

CULTURAL HERITAGE

An archaeological watching brief will be contracted to oversee and record the operational phases which impact on the two leat systems.

WATER QUALITY

Pollution control measures to include settling lagoons for site drainage will form part of the contract specification.

SUMMARY

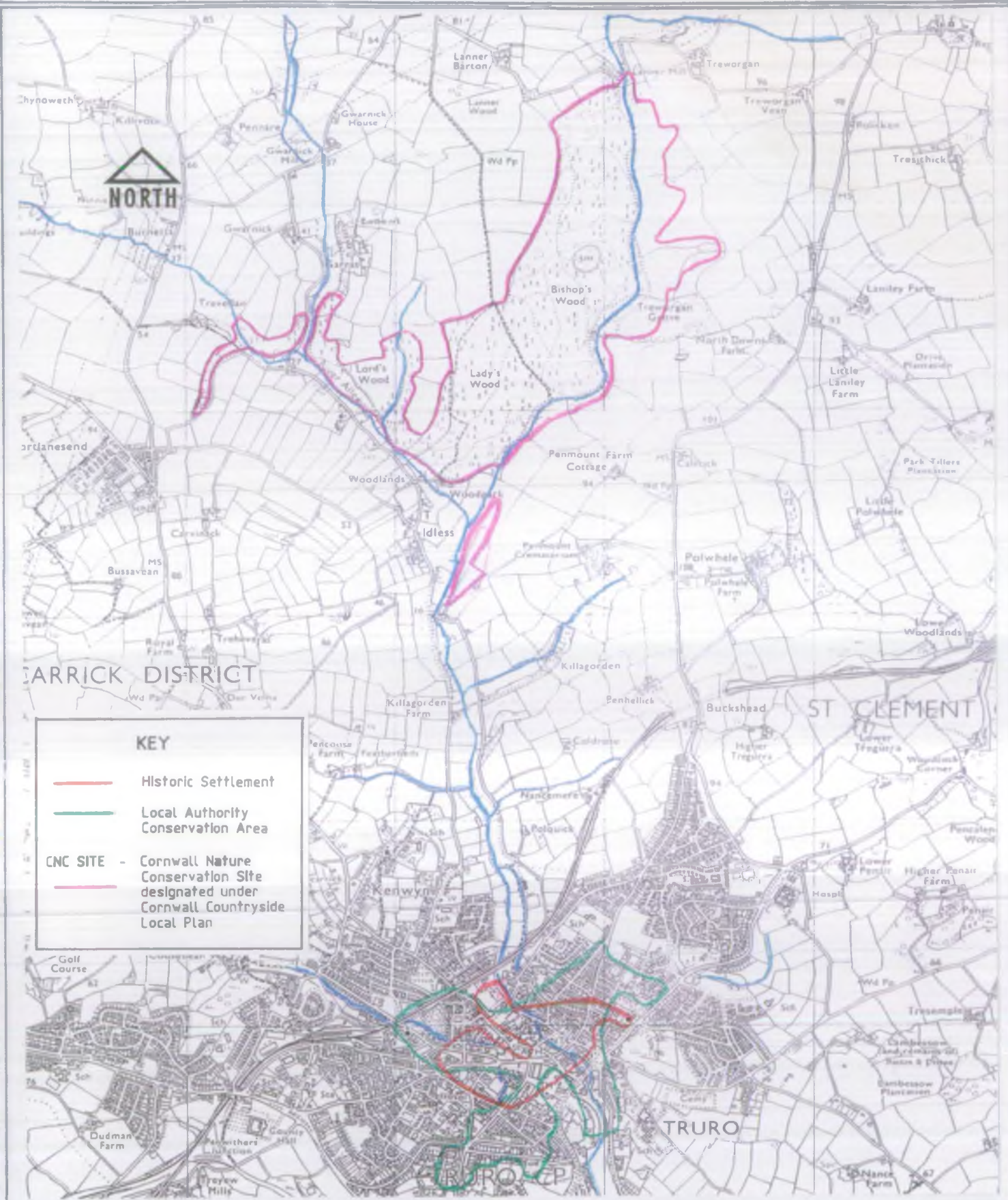
The Idless Dam scheme has been assessed for its predicted effects on the water environment and associated lands. The impact is considered to be restricted to the area above Idless Bridge within the construction site. An area of marshland, willow/alder carr and permanent pasture covering approximately 5.4 hectares would be lost during the construction phase. Part of the land about 0.5 hectare lies within a CNC site designated for its dragonfly importance and species rich marshland. The construction works would also affect two derelict leat systems which are recognised of historic value.

No other significant influences of the works have been identified. Amelioration and enhancement measures have been proposed the details of which are set out in the report.

ACKNOWLEDGEMENTS

The NRA acknowledge the additional information and help provided by the Cornwall Trust for Nature Conservation and the Cornwall Archaeological Unit.

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PROJECT TITLE:

RIVER ALLEN F.A.S.
ENVIRONMENTAL IMPACT ASSESSMENT

DRAWING TITLE:

APPENDIX 1
DESIGNATED LAND USE AND STUDY AREA

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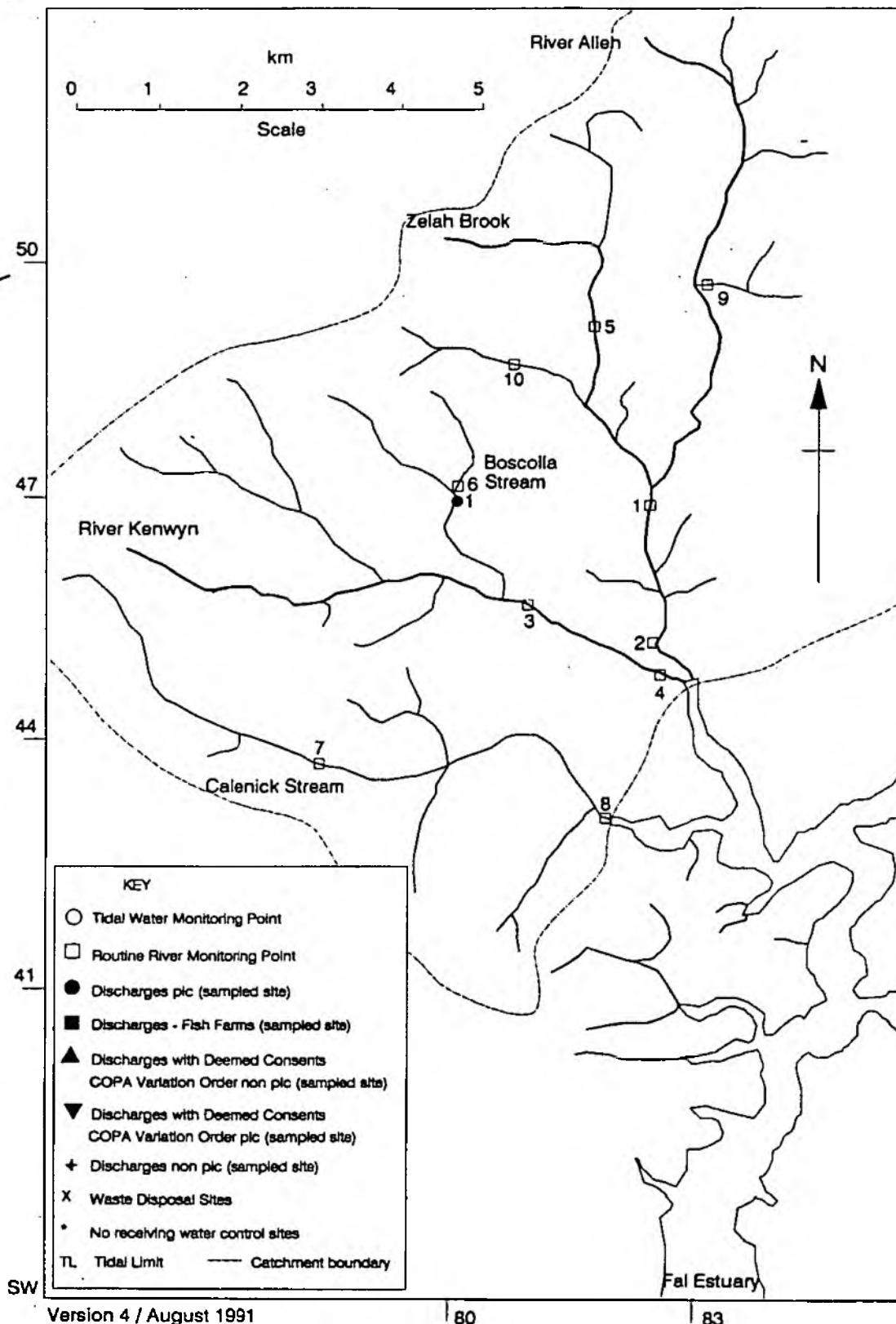
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10/7/92

27/8/92



Kenwyn & Allen Catchments 19D



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PROJECT TITLE:
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DRAWING TITLE:
**APPENDIX 3(C) PLAN OF KENWYN AND
ALLEN CATCHMENTS**

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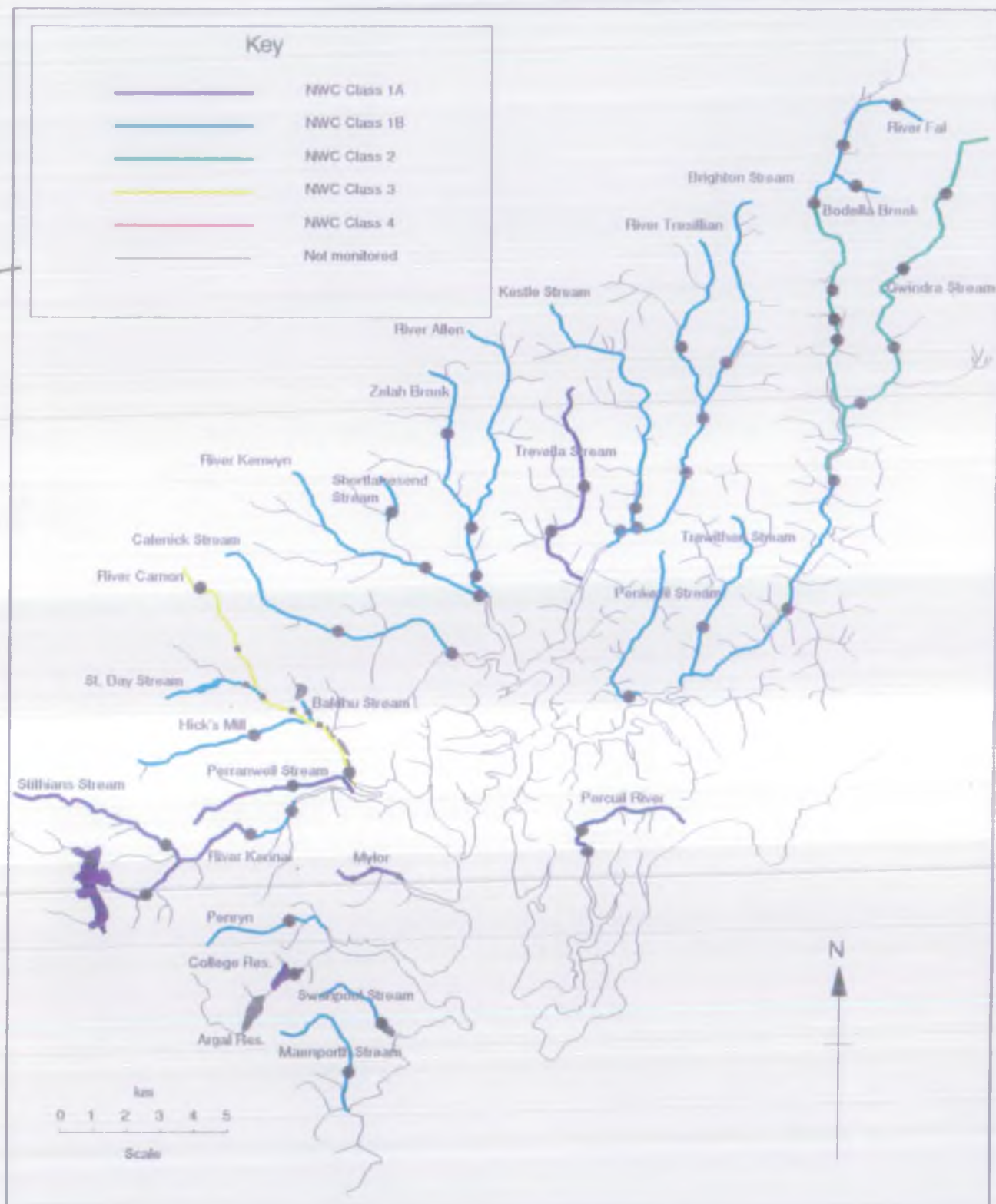
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27/3/92

QA

Fal, Tresillian, Allen, Kenwyn, Carnon & Kennal Catchments River Quality Objectives



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PROJECT TITLE:
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DRAWING TITLE:
**APPENDIX 3(ii)
RIVER QUALITY OBJECTIVES**

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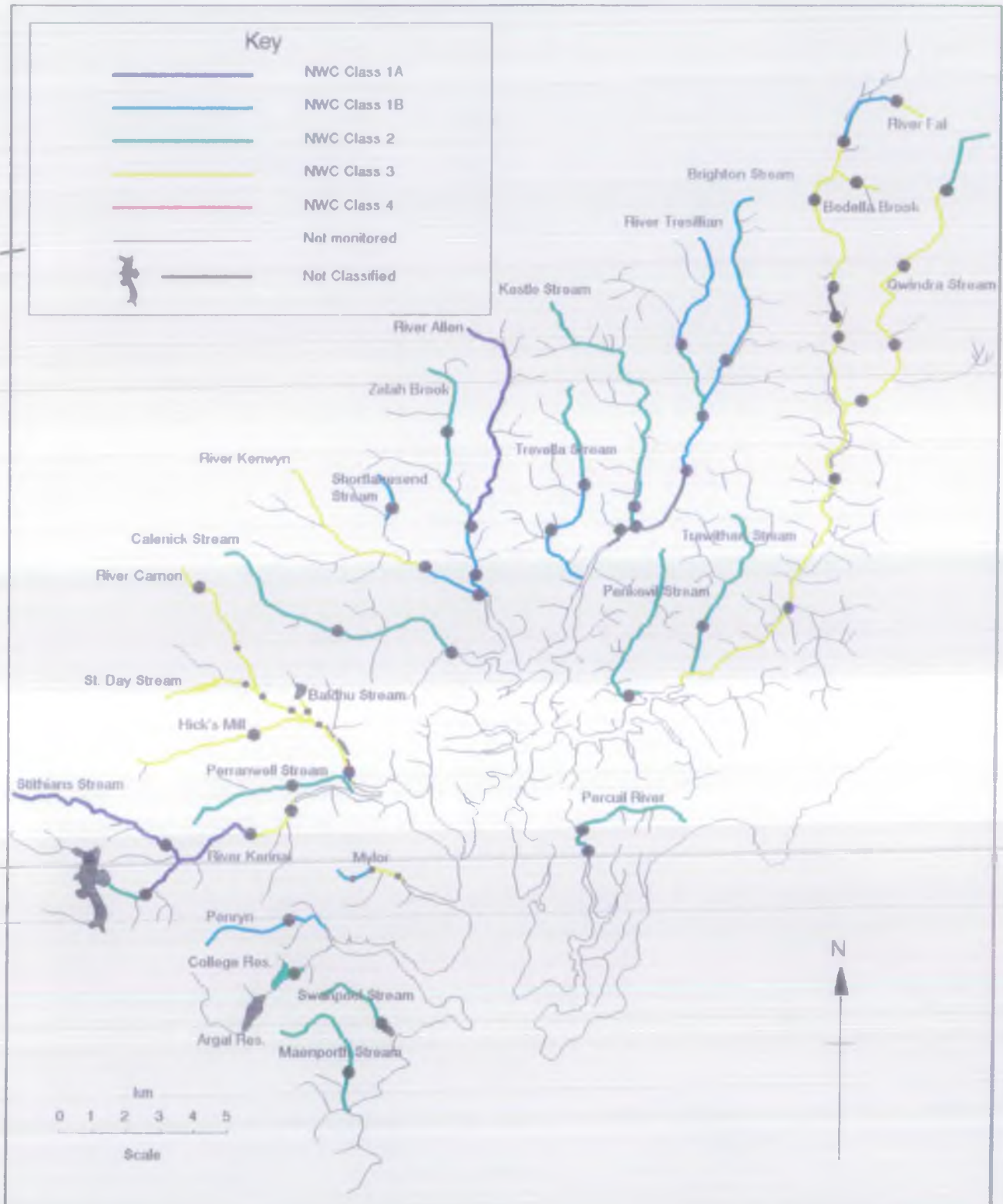
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QA

Fal, Tresillian, Allen, Kenwyn, Carnon & Kennal Catchments Water Quality - 1990



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ENVIRONMENTAL IMPACT ASSESSMENT**

DRAWING TITLE:

**APPENDIX 3 (iii)
WATER QUALITY-1990**

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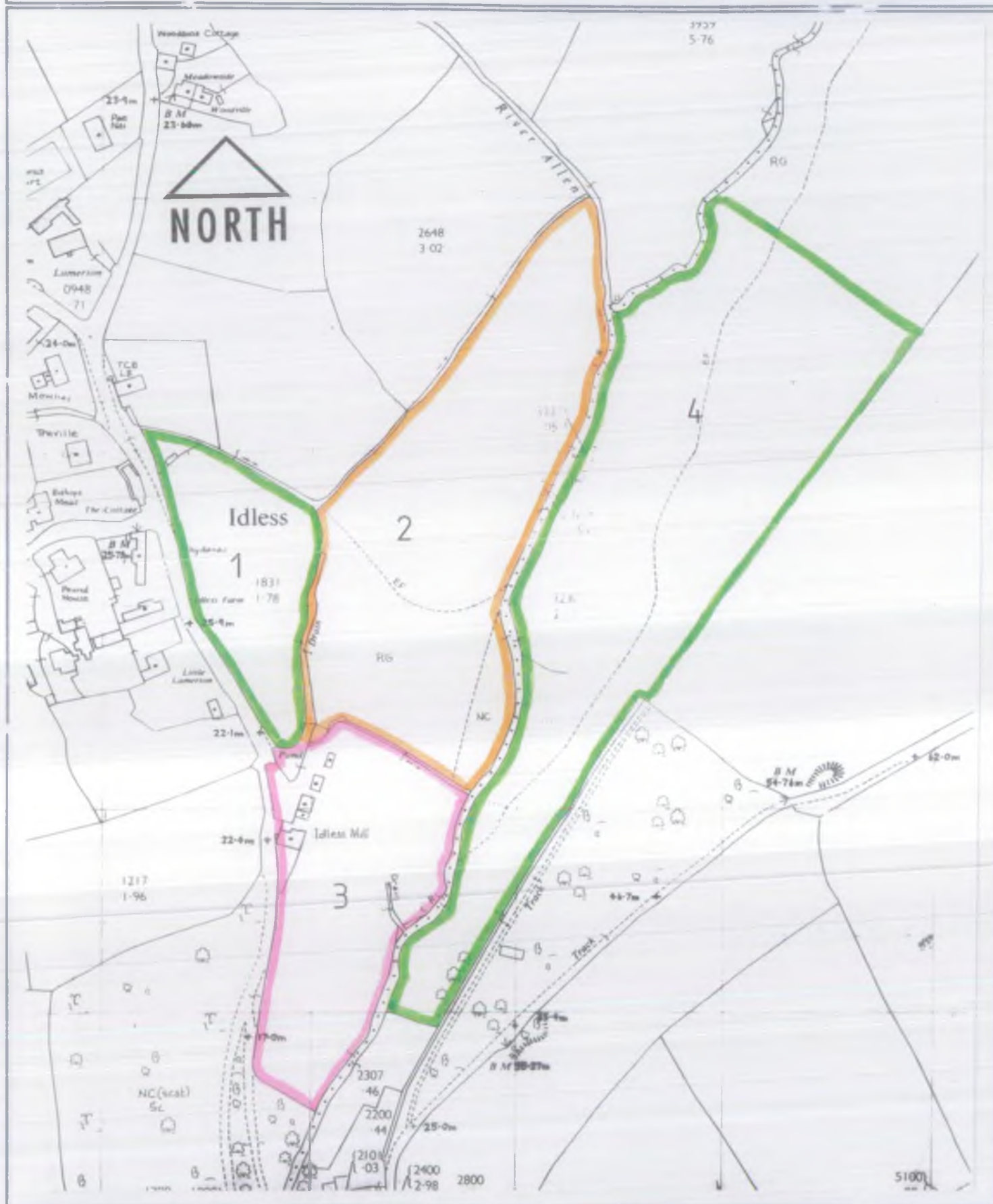
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PROJECT TITLE:

RIVER ALLEN F.A.S ENVIRONMENTAL IMPACT ASSESSMENT

DRAWING TITLE: APPENDIX 4 (ii)
HABITAT SURVEY OF
CONSTRUCTION SITE

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REY

HABITAT SURVEY OF CONSTRUCTION SITE

METHOD

The proposed construction site and immediate surrounds was visited on three occasions and at different seasons during 1991 and 1992. Field notes were made on the habitats and general wildlife interest. The area may be conveniently divided into four main sections (see map).

SECTION 1

This small field of 1.7 acres of improved pasture shows signs of agricultural neglect and is reverting to a more species rich herb and grass community. Scrub encroachment (bramble and elder) is spreading from the hedge boundaries on the south of the site. There has been some tipping of builders waste in the northern corner. The field grades down to the east where the boundary is formed by the derelict Idless Leat. The leat has developed a typical ditch flora as it has silted up. It is presently dominated by *Apium nodiflorum*. No species of notable conservation value were recorded.

Badger runs are evident across the field although no setts were found.

The proposed development will require the use of the whole of this site and will result in the loss of all the existing features. The hedgerows will remain and the grassland may easily be replicated on completion of the work. The loss of this habitat is not considered to be of significance to conservation.

SECTION 2

This large field shows a variety of grassland and wetland habitats, and is surrounded on all sides by watercourses. The field appears to be an improved pasture having a low species diversity and containing a rye grass component. Approximately a third of the area is covered by wetland plant communities typically dominated by *Juncus effusus*. Smaller areas where *Iris pseudacorus* and *Salix cinerea* dominate are also present. The *Juncus* and *Iris* communities have developed on flush sites which are fed from ditch and leat systems. It appears that they have resulted from poor ditch maintenance allowing water to flow across the field to the River Allen. The *Salix carr* with its *Carex paniculata*, *Iris*, *Oenanthe* co-dominated ground flora are of a greater age and is not reliant on the water flow escaping from the ditches.

The *Juncus/Iris* marsh and the *Salix carr* are both habitats well represented within the local catchment of the River Allen. Floristically these wetland communities are good representatives of this type within the area. Site visits and biological records do not show any plant species present which have a high conservation value.

The proposed development will require the loss of all the wetland areas described above, either by direct impact of the dam construction or by the alteration of the existing drainage patterns. It is anticipated that with the co-operation of the land owner a similar area of *Juncus* Marsh can be encouraged to develop at the northern end of the field.

SECTION 3

This area constitutes the garden and surrounds of the Idless Mill. The characteristics of a well managed and landscaped garden means that there is nothing of high nature conservation value within this section. It is however used by both otters and badgers.

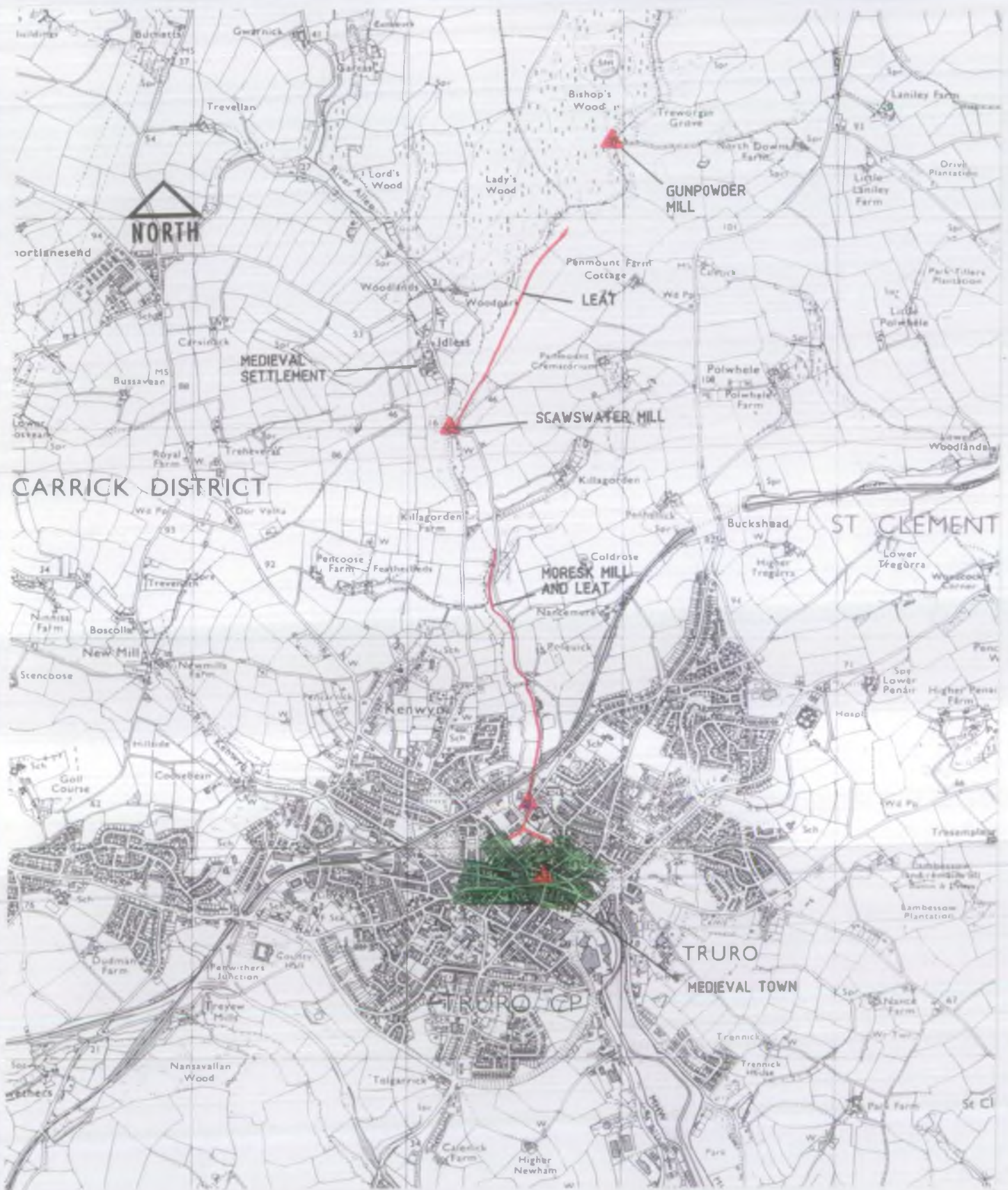
Impact on this area is restricted to the changes in the drainage regime which will result from the dams construction. The proposed obstruction to Idless Leat, now derelict, will be that the mill pond would be dependent on surface water run-off from the road and existing spring issues. The extent of the drainage changes will not be so great as to produce any impacts on standard trees etc within the garden.

SECTION 4

This section comprises a single large field running parallel to the River Allen on the left bank. The eastern section is above the flood plain and is a dry largely improved grassland community. The lower western section within the flood plain is a mosaic of different wetland habitats. The wetland grades from north to south becoming increasingly wetter towards the south. Within this generally wet marsh, flush sites exist in lower areas producing meandering channels which flow through the marsh and join the River Allen. The wettest areas are developing into *Salix carr*, a process which has already occurred at the southern most end of the section.

Much of the marsh is dominated by *Filipendula ulmaria* but the undulating nature of the area produces community stands characterised by *Iris pseudacorus*; *Alopecurus pratensis*; *Juncus effusus* and *Apium nodiflorum*. The river banks are dominated by broadleaved trees *Salix*, *Alnus*, *Quercus* and *Fraxinus*. The wetland components of Section 4 is recognised to be of high species diversity.

The impact of the proposed dam would be limited to the southern end of the marsh. Loss of habitat would be restricted to areas presently occupied by *Salix Carr*. The "Construction" on a borrow pit will provide opportunities to extend the existing marshland and develop long term protection to the site.



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PROJECT TITLE:
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ENVIRONMENTAL IMPACT ASSESSMENT**

DRAWING TITLE:
**APPENDIX 5 (I)
SITES OF HISTORIC INTEREST**

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APPENDIX 5 (II)

SITES OF HISTORIC INTEREST

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NEW