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Flood Risk and Watercourse Improvement Report

Shelfanger Parish Council



June 2022 – Version 2



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Executive Summary

This Flood Risk and Watercourse Improvement Report has been prepared for Shelfanger Parish Council. The Parish Council may distribute this report as appropriate to associated parties.

This report demonstrates the following:

Watercourse Network & Maintenance Responsibilities:

- A watercourse is any natural or artificial channel, above or below ground, through which water flows. This includes covered channels or pipelines (culverts) which continue a watercourse under an artificial obstruction such as a road or bridge. There does not need to be a permanent flow for a feature to be considered a watercourse. Some only have seasonal flow, and these are known as 'ephemeral' watercourses.
- The Shelfanger Parish area has ordinary watercourses and an Environment Agency designated Main River. Except for one ordinary watercourse maintained by the Waveney, Lower Yare and Lothingland Internal Drainage Board (IDB), the maintenance responsibilities fall to the landowner who owns the land in which the water sits (a riparian landowner), unless the landowner has documentation stating otherwise.
- It is not the responsibility of Risk Management Authorities (RMAs) such as Norfolk County Council, the Highways Authority, the Environment Agency or the Parish Council to carry out maintenance to these watercourses.
- A maintenance schedule is provided in **Section 5** of this report. Regular maintenance is important to ensure continuing operation and performance standards of watercourses.

Flood Risk:

- Areas of the Parish are within Environment Agency Flood Zones 1, 2 and 3. Land within Flood Zone 3 has a high risk of river flooding in any given year (1% or greater chance); Flood Zone 2 has a medium risk of river flooding in any given year (between a 1% and 0.1% chance); and Flood Zone 1 has a low risk of river flooding in any given year (a less than 0.1% chance.)
- Areas of the Parish are at low to high risk from surface water flooding. Surface water flooding occurs when high intensity rainfall is unable to enter drainage systems sufficiently rapidly and excess water flows across the ground surface.
- It is recommended that Parishioners familiarise themselves with the published flood maps (see **Section 3**) to understand the sources of flood risk that may affect their land and property.

Watercourse Improvements:

- A watercourse survey has been undertaken and suggested improvement are provided in **Appendix B and C** of this report.

Conclusion:

- Watercourses and other drainage features are an important part of flood risk management. When maintained to a good standard, flooding is only likely to affect the floodplain during more extreme rainfall events. Regular maintenance, by all parties, is vital to ensure flow of water is not impeded and storage capacity is retained.

This Executive Summary contains an overview of the key findings and conclusions in this report. No reliance should be placed on any part of the Executive Summary until the whole of this report has been read. Other sections of the report may contain information which puts into context the findings summarised in the Executive Summary.

1 Introduction

- 1.1 BHA Consulting Ltd (BHA) have been commissioned by Shelfanger Parish Council, to produce a Flood Risk and Watercourse Improvement Report following the severe flooding experienced within the Parish in December 2020.
- 1.2 As we experience more intense and heavy rainfall events, the significance of maintaining and improving the capacity of local drainage systems has never been greater. Surface water drainage systems such as ditches and culverts aim to drain surface water away from the land surface. During average rainfall, drainage should ensure that property, roads, land, people and the environment are safe from flooding. If a system of ditches and culverts is maintained to a good standard, flooding is only likely to affect the floodplain during more extreme rainfall events. Surface water drainage systems can provide storage and attenuation in addition to allowing the flow of water, so their regular maintenance is vital to ensure this storage capacity is maintained.
- 1.3 Keeping ditches and drainage infrastructure well maintained benefits the community. When an area experiences frequent flooding, this becomes a nuisance to the wider public, restricting access and causing a health and safety risk.
- 1.4 This report provides an assessment of existing flood risk within the Parish, suggested watercourse improvements following a site walkover with members of the Parish Council and a maintenance schedule for drainage features to ensure their continuing operation and performance standards.
- 1.5 The following data was reviewed as part of this report:
 - Environment Agency (EA) Published Flood Maps
 - Greater Norwich Area Strategic Flood Risk Assessment (SFRA); South Norfolk Council, JBA Consulting, November 2017
 - British Geological Survey's (BGS) 'Geology of Britain' on-line maps
 - We have also utilised our knowledge of the local area and experience in dealing with similar related matters.

2 Watercourses & Riparian Land Ownership Responsibilities

What is a Watercourse?

- 2.1 Watercourses are an important part of flood risk management. A watercourse is any natural or artificial channel, above or below ground, through which water flows. This could be a river, brook, beck, stream, ditch, drain, cut, or culvert (a covered channel or pipeline which continues a watercourse under an artificial obstruction.) There does not need to be a permanent flow in the channel for a feature to be considered a watercourse. Some only have seasonal flow, and these are known as 'ephemeral' watercourses. In any case all are either a 'Main River' or 'ordinary watercourse'.
- 2.2 **Figure 2.1** below shows the mapped watercourse network within the Shelfanger Parish area. There is a Main River and many ordinary watercourses. Both are regulated in different ways by organisations known as Risk Management Authorities (RMAs). Main Rivers are the largest and most significant; these are regulated by the Environment Agency. All other watercourses are ordinary watercourses regulated by either Norfolk County Council or an Internal Drainage Board. This, however, does not mean the RMAs have any maintenance responsibilities. In most cases maintenance responsibility sits with the riparian landowner.

What is Riparian Ownership?

- 2.3 A riparian landowner owns the land in which the water sits. Where a watercourse falls between the boundaries of two landowners, law assumes each property owner owns the land up to the centre point of the watercourse unless a property owner has documentation stating otherwise. This means that neighbouring landowners are each responsible for the maintenance and water flow within watercourses along property boundaries. This applies even if there is a boundary fence or hedge between your property and the watercourse, and applies to most highway ditches which are discussed in more detail below.
- 2.4 RMAs do not have an obligation to inform you that you are a riparian landowner. All riparian landowners have the same rights and responsibilities.
- 2.5 Riparian landowner responsibilities:
- You must let water flow onto or under your land without any obstruction, pollution or diversion which affects the rights of others.
 - You must accept flood flows through your land, even if these are caused by inadequate capacity downstream. A landowner has no duty in common law to improve the drainage capacity of a watercourse they own. You should keep the banks clear of anything that could cause an obstruction and increase flood risk, either on your land or downstream if it is washed away.

- You must maintain the bed and banks of the watercourse and the trees and shrubs growing on the banks. You should also clear any litter from the channel and banks, even if they did not come from your land.
- You should always leave a development-free edge on the banks of a watercourse. This allows for easy access to the watercourse for maintenance or inspection purposes.
- You must keep any structures, such as culverts, trash screens, and weirs, clear of debris. Failure to do so could result in liability for any damage caused by flooding. Health and safety is paramount when assessing the condition of a culvert. Culverts must not be entered. Small diameter culverts can be maintained with frequent rodding and water jetting, larger diameter culverts may need a CCTV survey to identify a blockage. The Environment Agency policy regarding culverts is provided in **Appendix A**.
- You should not cause obstructions, whether they are temporary or permanent, that would stop fish passing through. You have a legal obligation to notify your relevant RMA if you would like to build or alter a structure that acts as an obstruction to a watercourse.
- Don't use riverbanks to dispose of garden or other waste, where it could be washed into the watercourse. This includes grass cuttings, which pollute the water.
- You must control invasive species such as Japanese Knotweed and Himalayan Balsam. Your local RMA can advise you on how to manage and these species.

2.6 A maintenance schedule is provided in **Section 5** of this report. In addition to the mapped watercourse network there are many unmapped drainage features, including ponds and 'blind ditches' which provide valuable storage areas and connecting tributaries which provide flow corridors. These are also the maintenance responsibility of the riparian land owner.

Highway Drainage

- 2.7 Ditches that run parallel to the highway boundary do not usually form part of the highway (since they do not assist the free passage of people or vehicles along the highway) and remain the responsibility of the adjacent riparian landowner or occupier. However, where the ditches have been designated as forming part of the highway on land owned by the Highways Authority, or where the ditch was constructed for the sole purpose of draining the highway, then the ditch will form part of the highway and will be the responsibility of the Highways Authority.
- 2.8 Most open watercourses are historic and are the maintenance responsibility of riparian landowner, but the Highways Authority has prescriptive powers to drain into them.

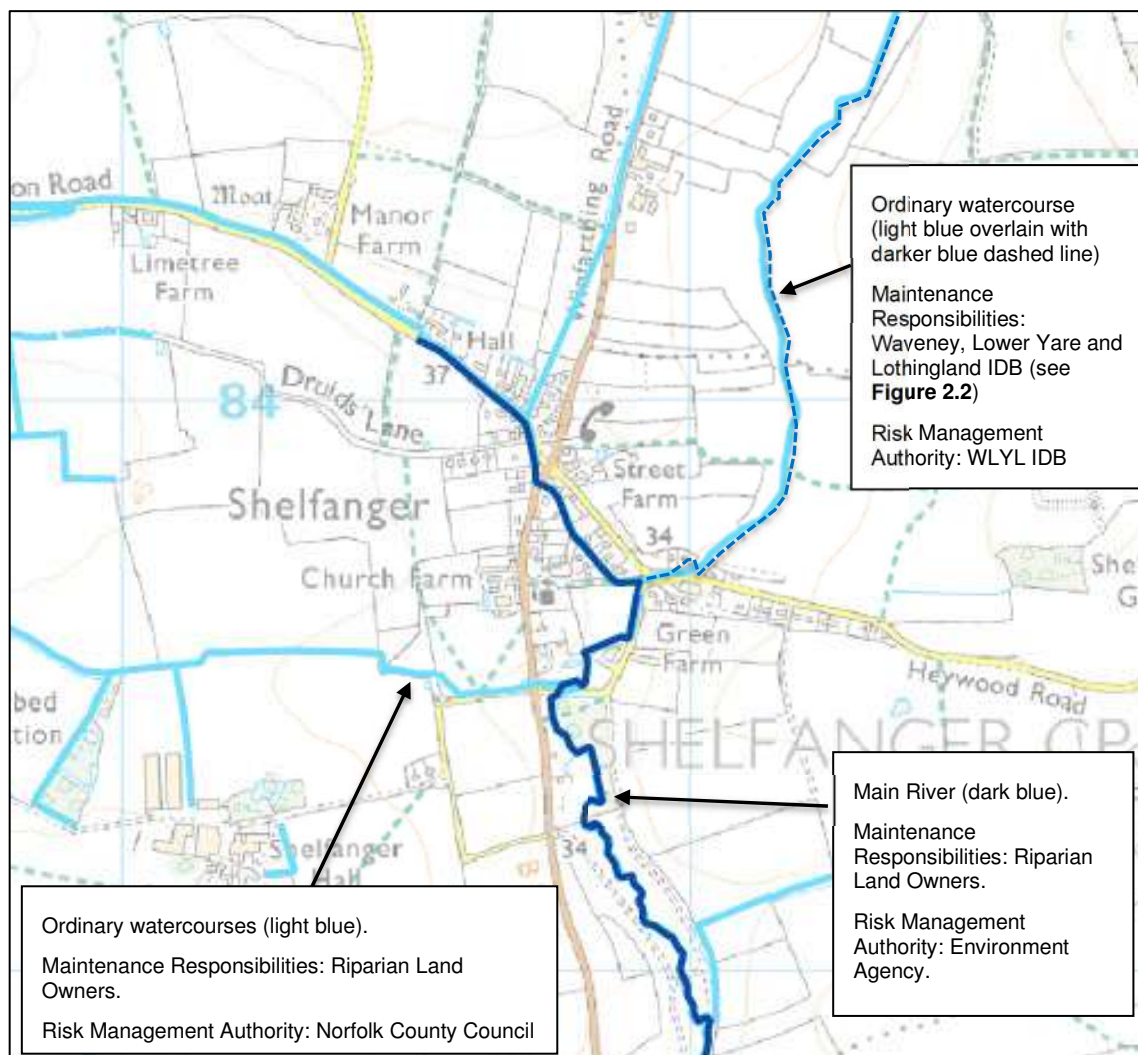


Figure 2.1: Mapped Watercourse Network (Source: Detailed River Network Map, SFRA, Part Index Tile 84)

The Roles of Risk Management Authorities

- 2.9 As a riparian owner you have the right to protect your property from flooding, and your land from erosion. However, consenting and permission for works to watercourses must be agreed with the relevant RMA before you start work. There are certain regulations limiting what can be done to alter a watercourse or its associated structures so that they do not have negative impacts on other people or the environment.

Norfolk County Council Responsibilities

- 2.10 The Land Drainage Act (1991) requires a land owner to seek approval for any works that will alter the flow of an ordinary watercourse, such as culverts or weirs. To apply for Land Drainage Consent contact Norfolk County Council or if the ordinary watercourse is in an IDB area (see information below and **Figure 2.2**), contact the IDB directly. Under the Land Drainage Act 1991 Norfolk County Council has the power to enforce landowners to maintain their section of an

ordinary watercourse. Norfolk County Council also has the power to cleanse and restore the profile of an ordinary watercourse, where it is deemed appropriate, recovering the costs from the riparian landowner.

Environment Agency Responsibilities

- 2.11 The Water Resources Act (1991) and associated bylaws requires a landowner to seek approval for any works that will alter the flow of a Main River. To apply for consent for works in, over, or adjacent to a Main River contact the Environment Agency.

Waveney, Lower Yare & Lothingland IDB Responsibilities

- 2.12 The Waveney, Lower Yare & Lothingland Internal Drainage Board (WLYLIDB) is responsible for drainage of the marshes in the Waveney, part of the Yare and the Lothingland Hundred River valleys. Their principal function is to provide flood protection within the Board's area. Part of their upper catchment area, and associated watercourses, is within Shelfanger, as noted in **Figure 2.2** below.
- 2.13 The Board works closely with landowners, local authorities, Natural England and wildlife conservation bodies to ensure water levels are managed within the district in a manner which seeks to balance the requirements of conservation and productivity.
- 2.14 Maintenance issues with this watercourse should be reported to the IDB direct.

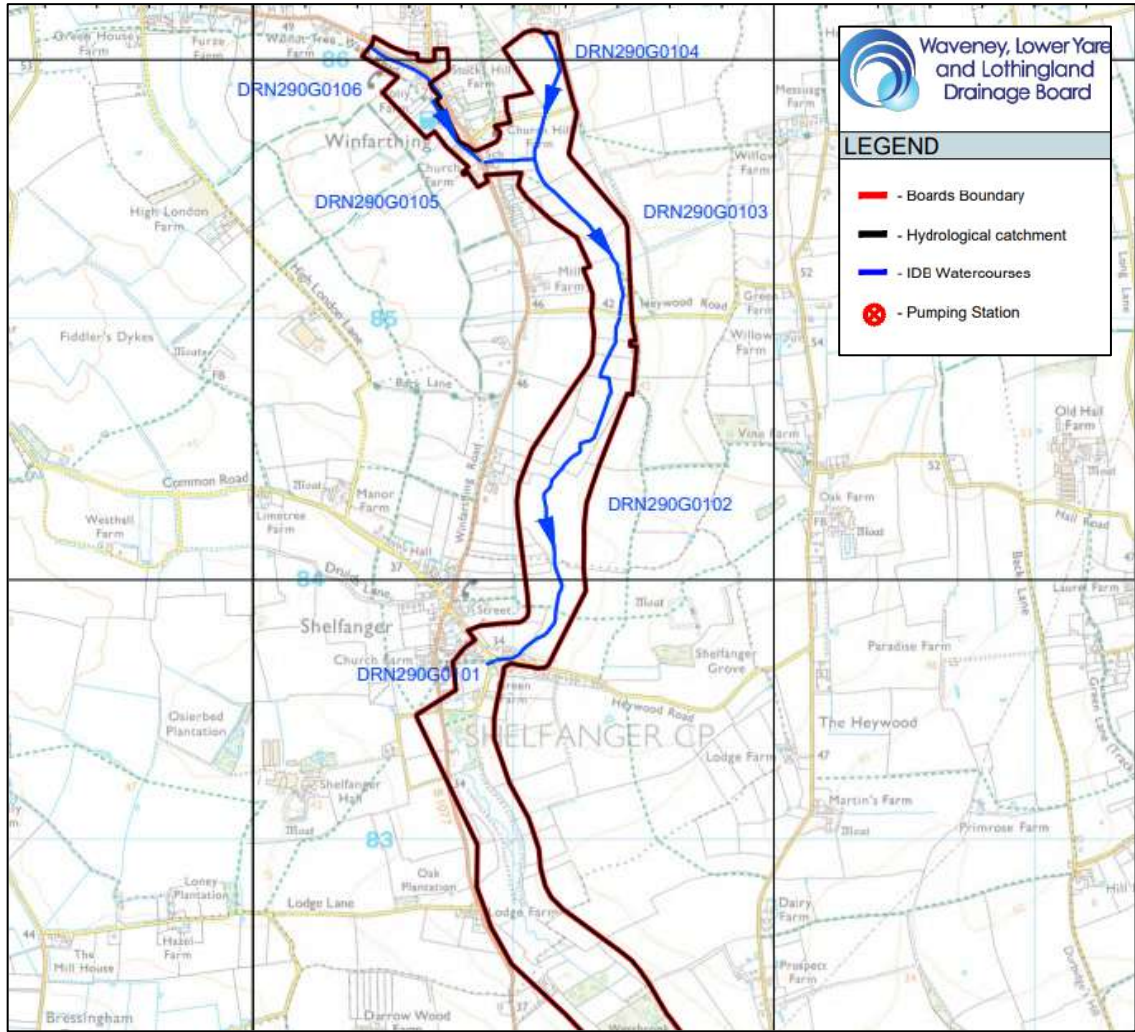


Figure 2.2 Waveney, Lower Yare & Lothingland IBD

3 Sources of Flooding

- 3.1 Published flood risk information, provided by the Environment Agency and from the Greater Norwich SFRA, has been reviewed and is summarised below.
- 3.2 It is recommended that Parishioners familiarise themselves with the sources of flood risk that may affect their land and property.

Environment Agency Flood Map for Planning

- 3.3 The EA Flood Map for Planning is provided below in **Figure 3.1**. The flood zones refer to the probability of river flooding, ignoring the presence and effect of flood defences (if present) in the area. River flooding happens when a river cannot cope with the amount of water draining into it from the surrounding land.
- 3.4 Land within Flood Zone 3 has a 1% or greater chance (high risk) of flooding from rivers in any given year; and within Flood Zone 2 has between a 1% and 0.1% chance (medium risk) of flooding from rivers in any given year and land within Flood Zone 1 has a less than 0.1% chance (low risk) of flooding from rivers in any given year.

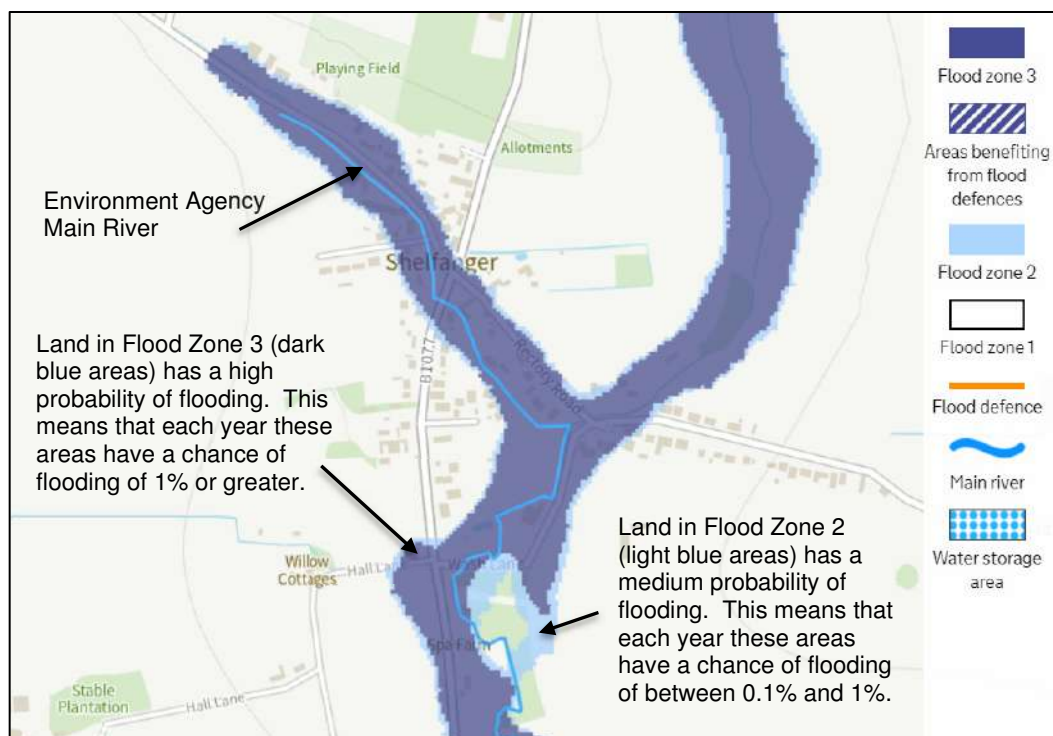


Figure 3.1: Flood Map for Planning (Rivers and Sea) – Undefended Risk

Environment Agency Flood Risk from Rivers or The Sea

3.5 The EA Flood Risk from Rivers or the Sea Map is provided below in **Figures 3.2**. This considers the presence and effect of flood defences (if present) in the area. Rivers in the area are not tidally influenced.

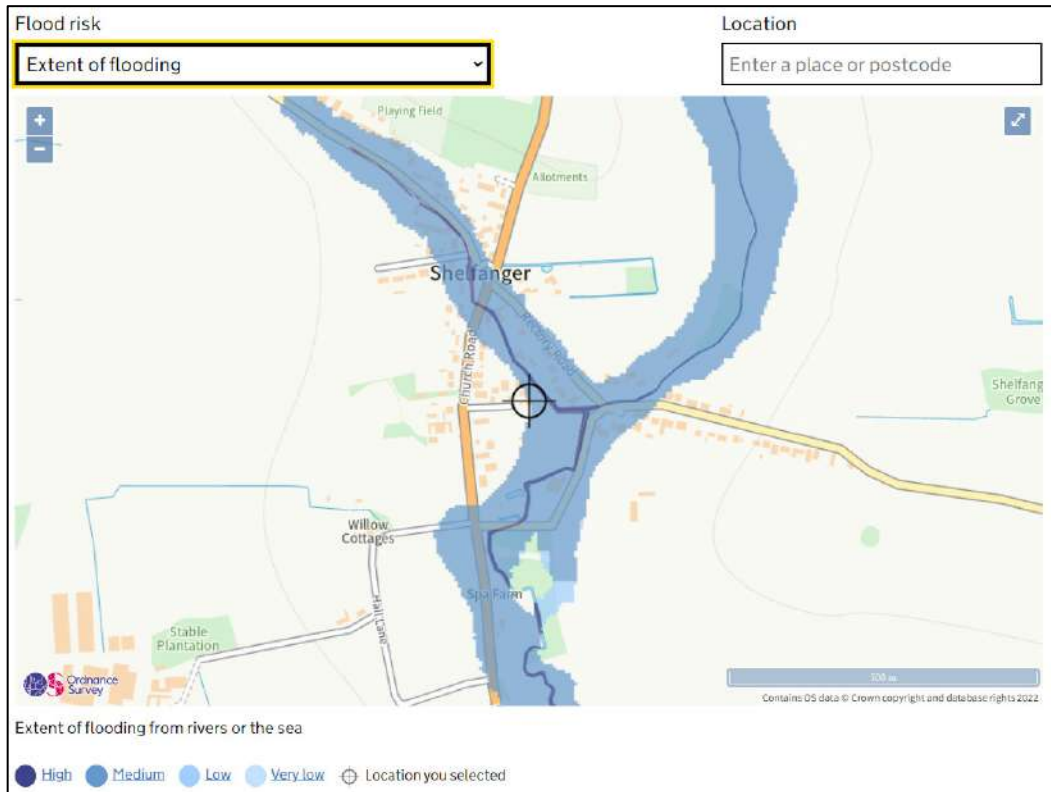


Figure 3.2: EA Flood Risk from Rivers and Sea Map (Defended – reflects the presence and effect of flood defences)

Environment Agency Flood Risk from Surface Water

- 3.6 Extracts from the EA Risk of Flooding from Surface Water maps are provided below in **Figures 3.3a - 3.3c**. Surface water flooding can result when high intensity rainfall falling onto impermeable surfaces (i.e. roofs and paved areas) or low permeability soils and geology (such as clayey soils) is unable to enter drainage systems or soak into the ground sufficiently rapidly. When this happens, the excess water can flow across the ground surface, including adjoining sites, and potentially cause flooding.
- 3.7 Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.

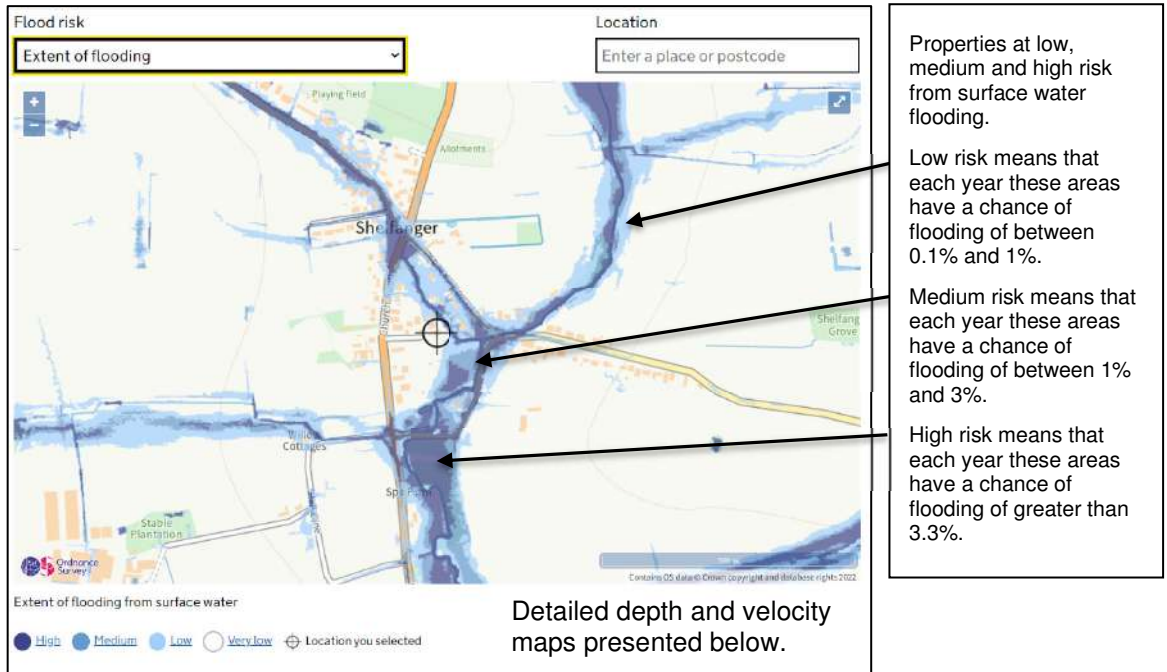


Figure 3.3a: EA Risk of Flooding from Surface Water Map – **Extent of Flooding**

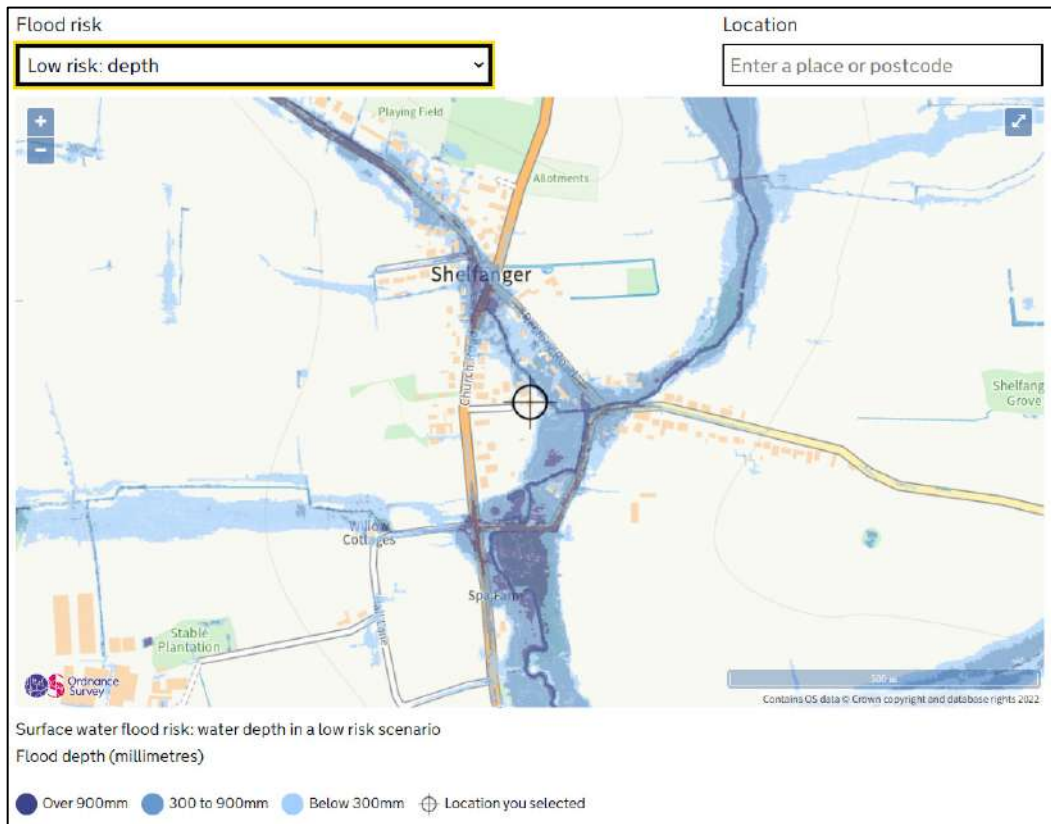


Figure 3.3b: EA Risk of Flooding from Surface Water Map – **Low Risk Depth**

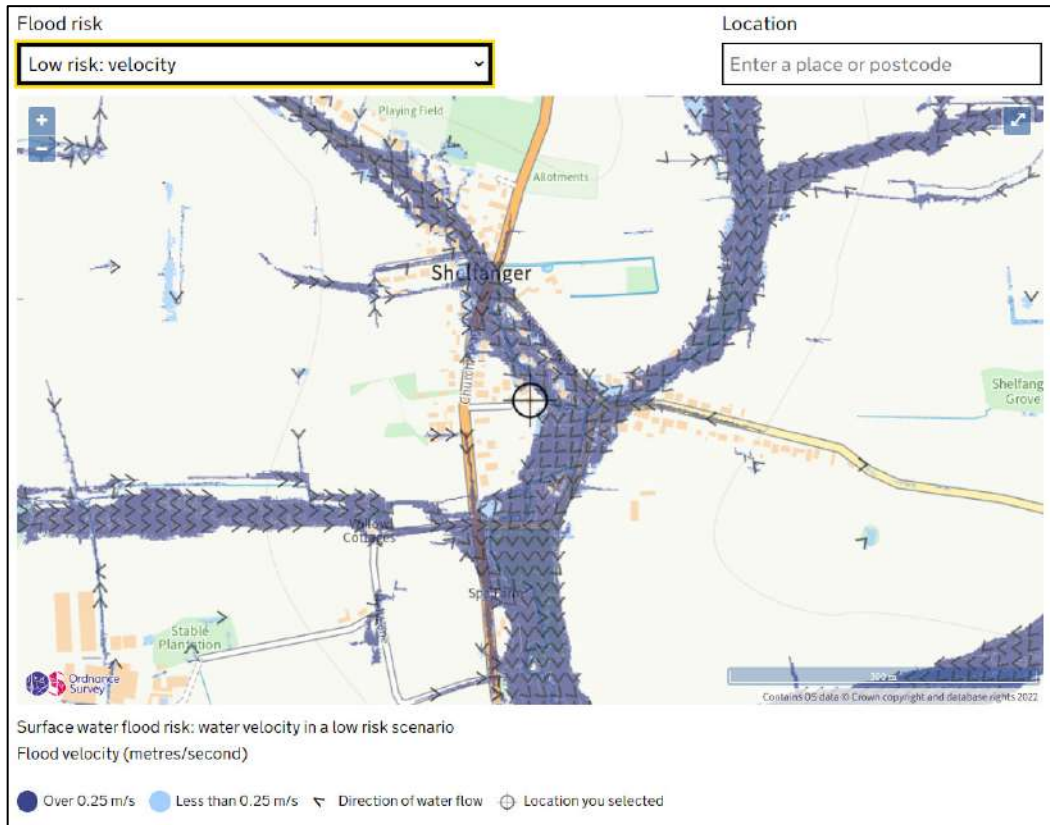


Figure 3.3c: EA Risk of Flooding from Surface Water Map – **Low Risk Velocity**

- 3.8 Detailed mapping of medium and high risk depths and velocities and further information can be found here: <https://flood-warning-information.service.gov.uk/long-term-flood-risk>

Groundwater Flooding

- 3.9 Other sources of flooding can include but are not limited to groundwater, sewer failure (adopted and private sewers), and reservoir failure. Groundwater flooding can occur in areas where the groundwater level is high, when rainfall raises the prevailing groundwater level to an extent such that structures within the ground become at risk of inundation. Typically, this might include basements or drainage infrastructure. Information on specific groundwater flooding is limited but the SFRA provides information on the susceptibility of groundwater flooding and this is presented in **Figure 3.4** below.

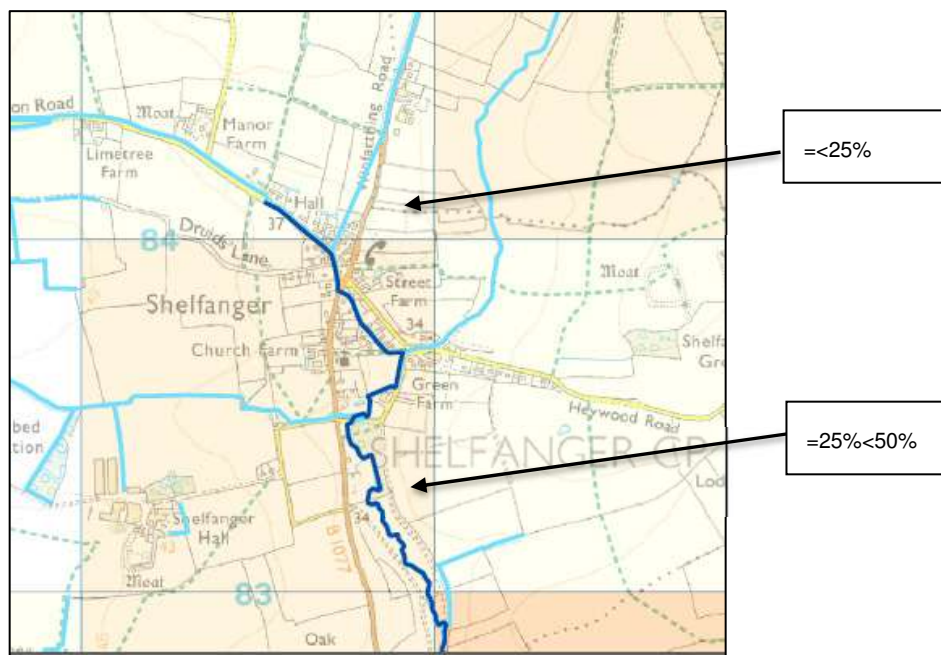


Figure 3.4: Areas Susceptible to Groundwater Flooding (Source: SFRA, Part Index Tile 84)

Foul Water Sewer Flooding

- 3.10 Anglian Water does not have any adopted foul sewer assets within the parish of Shelfanger. Therefore, treatment of domestic sewage either by septic tank or treatment plant is the responsibility of the landowner. Regular maintenance of domestic sewage systems is recommended in line with manufacturer's guidance.

Reservoir Flooding

- 3.11 The EA Risk of Flooding from Reservoirs Map has been consulted and the area is not at risk from reservoir (capacity >25,000m³) flooding.

4 Suggested Watercourse Improvements

Site Walkover

- 4.1 A site walkover was carried out on 18th March 2022 attended by residents and members of the Parish Council and a BHA Consulting Ltd engineer. The walkover comprised assessing and photographing the watercourse from Church Walk to the south of Wash Lane/Church Road, and from the south of Rectory Road to Common Road. Some additional photographs were taken on 27th April 2022.

Suggested Improvements

- 4.2 Photographs taken during the site walkover are provided in **Appendix B** along with suggested improvements and a plan is provided in **Appendix C**.

5 Maintenance & Management of Drainage Features

- 5.1 Drainage features require regular maintenance to ensure continuing operation and performance standards. It is therefore good practice to develop a programme that sets out how often and at what time of the year maintenance work is carried out. Most open ditches require annual maintenance to some degree, but the frequency will be dependent on the amount of material you receive from upstream. The best time of year to undertake major clearance works is in late September/October, in preparation for increased winter flows and once vegetation has already begun to naturally die back. You should inspect your watercourse regularly to ensure no blockage has occurred.
- 5.2 The Maintenance Schedule provided in **Table 5.1** below sets out a schedule for the most common drainage features, including culverted watercourse sections.

Operation and Maintenance Requirements			
Drainage Feature	Maintenance	Action	Frequency
Watercourses - Riparian Ownership	Regular Maintenance	<ul style="list-style-type: none"> Litter & debris removal. Removal of other vegetation & Nuisance plants. Inspect and clear inlets, outlets & overflows of blockages. Inspect banksides, structures & pipework for evidence of physical damage. 	<ul style="list-style-type: none"> Monthly. Monthly or as required during growing season. 6 Monthly. 6 Monthly.
	Occasional Maintenance	<ul style="list-style-type: none"> Prune/ trim tree's & remove cuttings. Remove sediment from base of ditches 	<ul style="list-style-type: none"> Annually (or as required.) As required.
	Remedial Actions	<ul style="list-style-type: none"> Repair erosion or other damage by re-cutting. Repair or re-establish inlet outlet & overflows Re-level uneven surfaces and reinstate design levels. 	<ul style="list-style-type: none"> As required. As required. As required.
Ponds/Wetlands	Regular Maintenance	<ul style="list-style-type: none"> Litter & debris removal. Grass cutting. Trimming of pond vegetation. Inspect & clear inlets, outlets & control structures. Remove sediment from forebay structures if present. 	<ul style="list-style-type: none"> Monthly. As required. Annually or as required. Monthly. Annually.
	Occasional Maintenance	<ul style="list-style-type: none"> Removal of tree saplings or shrub growth within 5m of pond edge. Prune/ trim tree's & remove cuttings (seek advice from arborist for mature trees or trees with TPO's) Review silt accumulations and remove if required. 	<ul style="list-style-type: none"> As required. As required.

	Remedial Actions	<ul style="list-style-type: none"> • Repair or replace inlets, outlets or control structures to design detail. 	<ul style="list-style-type: none"> • As required.
Culverts/Piped Watercourses	Regular Maintenance	<ul style="list-style-type: none"> • Check inlets, outlets, control structures & overflows. 	Monthly or annually as required
	Occasional Maintenance	<ul style="list-style-type: none"> • Jetting or suction to clear silt 	<ul style="list-style-type: none"> • As required
	Remedial Actions	<ul style="list-style-type: none"> • Reinstatement due to damage or silting. • Consider removing piped drainage and replacing with open drainage ditch where practical to provide additional attenuation for storm water. 	<ul style="list-style-type: none"> • As required.

Table 5.1 Maintenance Schedule for Drainage Features

Environmental Considerations

- 5.3 Ditch networks are important ecosystems, often providing both aquatic and terrestrial habitat for a range of species, some of which may be protected under UK and European legislation. Protected wildlife that are frequently observed within and around ditches include: nesting birds, water voles, great crested newts and reptiles. These species are legally protected, and any works should be sensitive of their presence. If you are in any doubt that works may harm a legally protected species, contact a qualified ecologist for advice on how to proceed.
- 5.4 The impacts of ditch maintenance on ecology can be minimised by:
- Timing works sensitively (for example timing vegetation removal between September and March to avoid the nesting season);
 - Using hand tools, rather than heavy machinery to undertake any work affecting the channel or banks;
 - Being aware of the role your ditch plays in habitat connectivity into the wider landscape and leaving bankside and marginal vegetation wherever possible;
 - Depositing any arising's on top of the bank and leaving in situ for at least 24 hours to allow wildlife to disperse before removing;
 - Trimming alternate banks each year;
 - Demonstrating due diligence and acting appropriately if protected species are encountered.

Tools and Equipment

- 5.5 The tools for the job depend on the size of your ditch and the amount of works required. For landowners, the maintenance of ditches is generally best achieved using hand tools, as this is less damaging to habitats. It is better to undertake minor works regularly, such as trimming vegetation and clearance of small blockages and restrictions as they occur, rather than

infrequent major destructive works, such as complete removal of vegetation and silt from all the ditches every few years.

- 5.6 Farmers generally have machinery on site that can clear large stretches of open ditches quickly. If using such machinery, the sensitivity of the ditches must be considered and maintenance should be planned to minimise the impact on the habitats.
- 5.7 For culverts, specialist tools may be needed to carry out inspections using camera surveys or to jet through or rod the culvert to clear blockages. Landowners may choose to appoint drainage companies to carry out inspections and/or maintenance. It is recommended that a range of quotes are obtained in order to achieve best value.

Health & Safety

- 5.8 When carrying out maintenance on an ordinary watercourse the landowner must assess the task that is to be undertaken and ensure that the work may be carried out without putting themselves or others in any form of harm. The dynamic nature of open and culverted watercourses means that landowners are required to assess the risk on a case-by-case basis. The appropriate footwear, clothing and protective wear should be worn by all involved in the maintenance.
- 5.9 Works that will affect the highway, such as road closures for large vehicles, will require adequate notice to be given to the travelling public, warning of the works. Only authorised signs should be used, actual requirements would depend on the specific location. The increased risk of working near a road will need to be considered when carrying out maintenance. If the road will be affected, then you will need to seek advice from the highways authority as an approved contractor will need to carry out the works and a street works license may be required.

Appendix A: Environment Agency Policy Regarding Culverts

ENVIRONMENT AGENCY
POLICY REGARDING CULVERTS
EXPLANATION OF POLICY

MARCH 1999



ENVIRONMENT
AGENCY

1.0 | Purpose

This leaflet provides a detailed explanation of the Environment Agency's policy with regard to culverts. It is intended for use by planning authorities, landowners and developers. The approach is recommended for other drainage authorities in England and Wales.

2.0 | Introduction

The Agency considers it beneficial for watercourses to remain in an open state for both flood defence and environmental purposes. Conserving open watercourses is one of the Agency's major aims and, where possible, the Agency will encourage and promote the removal of culverts in order to restore a more natural river environment.

In considering new development proposals an Agency objective is to retain open watercourses with a corridor of open land on both sides. This maintains a flood channel and creates a valuable environmental feature which can enhance the site. The Agency will encourage developers to incorporate open watercourses within their site design. Such features are of particular importance to wildlife by providing valuable open land in developed areas.

Culverting should not be considered until other options have been thoroughly explored, for example:

- clear open span bridges with existing banks and bed retained;
- revision of site layout to incorporate an open watercourse;
- diversion of the watercourse in an environmentally sympathetic channel and corridor.

It is recognised there are various reasons why in some instances landowners, developers and local authorities believe that open watercourses should be culverted.

However, the Agency considers any benefits are usually outweighed by the potential problems in managing the system, the loss of habitats and difficulty in pollution detection.

Nevertheless, there may be cases where culverting may in practice be unavoidable for example, short lengths for

access purposes or where highways cross watercourses. In such cases the length involved should be restricted to a minimum, the hydraulic and environmental design fully assessed and appropriate mitigating enhancements to the surrounding environment included in the proposal.

3.0 | Agency Policy

The Agency is in general opposed to the culverting of watercourses because of the adverse ecological, flood defence and other effects that are likely to arise.

The Agency will therefore only approve an application to culvert a watercourse if there is no reasonably practicable alternative or if the detrimental effects of culverting would be so minor that they would not justify a more costly alternative. In all cases where it is appropriate to do so adequate mitigation must be provided for damage caused.

Wherever practical the Agency will seek to have culverted watercourses restored to open channels.

4.0 | Reasons for the Policy

The Environment Act 1995 places both general and specific duties on the Agency relating to environmental, recreational and nature conservation matters. The Agency must be mindful of these duties in discharging all its functions, including those relating to flood defence and land drainage. Consequently, the Agency is in general opposed to the culverting of watercourses because of the detrimental effects that are likely to arise. Such effects may be:

- loss of and adverse effects on environmental features and wildlife habitat;
- increased likelihood of flooding due to blockage;
- increased impact of flooding;
- loss of floodwater storage;
- increased difficulties in providing for drainage connections;
- difficulties in the repair, maintenance and replacement of culverts;
- increased health and safety hazards;
- reduced groundwater recharge;
- increased difficulty in detecting the origins of pollution and in monitoring water quality.

4.1 Loss of environmental features

Culverting watercourses has a detrimental impact on the environment. There is a complete loss of environmental features associated with that section of watercourse. The continuity of the river corridor is broken, adversely affecting the landscape and ecological value of the watercourse and inhibiting the migration of some species. An existing or potential amenity is lost for present and future generations.

Culverting results in the removal of species and river features such as pools, riffles, gravel, cobble, sand, silt, marginal/aquatic vegetation, earth banks with associated vegetation, invertebrate communities and fish. Even seasonally dry watercourses provide valuable habitats for many species, such as amphibians and invertebrates.

Culverting is therefore contrary to the Agency's duty to further conservation in relation to its flood defence responsibilities and its aim of contributing to sustainable development.

4.2 Increased likelihood of blockages

Compared with an open channel there is an increased risk of blockage once a culvert is installed. If the blockage is within the culvert, there is much greater difficulty in removing it. For these reasons many culverts have screens installed at their upstream end. These screens themselves are often prone to blockage and require frequent clearance and robust emergency procedures to ensure that they do not in themselves cause flooding.

It is sometimes argued that culverting will reduce the problem of open channels subject to rubbish deposition. The Agency considers that in most cases such short-term advantages are outweighed by the overall disadvantages of culverting and that alternative means should be pursued to address the rubbish problem.

4.3 Increased impact of flooding

The effect of the overland flooding that will occur when a culvert cannot cope with all the flow reaching it is often more serious than flooding from an open watercourse.

4.4 Loss of floodwater storage

Open channels generally provide more storage capacity than a culvert and the detriment will be more significant in relation to longer culverts.

4.5 Increased difficulties in providing for drainage connections

Drainage can be provided more easily with open watercourses into which drain connections can readily be made and the performance of drainage systems visually monitored. Outfalls within culverts are prone to blockage or, in the case of flapped outfalls, can seize up. Maintenance of these outfalls is considerably easier in open channels.

4.6 Difficulties in the repair, maintenance and replacement of culverts

Culverts conceal the presence of a watercourse and can lead to development or unacceptable land-use above or near them. In many urban areas buildings have been constructed above or adjacent to culverts. This means that improving standards of flood protection or accommodating run-off from future developments could be impossible or uneconomic due to the cost of replacing or enlarging existing culverts. There have recently been cases of serious flooding caused by culverts collapsing due to large amounts of materials stockpiled above them.

In urban areas consideration must be given to the need to provide alternative means to deal with flood water over and above that which can be accommodated by the culvert under design conditions. This will also provide contingency arrangements in the event of blockage of the culvert, thereby minimising the risks of flooding to property.

The responsibility for the condition and maintenance of a culvert lies with the landowner or the owner of the culvert unless other agreements are in place. The responsible party must therefore ensure that the culvert and any screens remain in good condition and free from obstructions. Failure to do so could result in liability for any damage caused by flooding.

Access to culverts is generally safe only with the use of special procedures and equipment, making inspection and maintenance both difficult and costly.

4.7 Health and safety hazards

There are dangers associated with natural open watercourses but culverted watercourses can be equally dangerous. Culverting does not remove the risk of drowning or injury. There have been many cases in the

past where children have died or suffered injury after entering culverts and they therefore represent a considerable safety hazard. Water levels can rise suddenly and without notice, and there can be a lack of oxygen or build-up of potentially toxic or explosive gases in culverts.

All these hazards are a danger both to the public and to operatives when maintenance is required.

4.8 Effect on recharge to groundwater

Culverting creates an impermeable bed to a watercourse and increases the speed of water flow, so reducing recharge to groundwater which can be particularly serious in large developments or areas of permeable geology.

4.9 Pollution and effect on water quality

Culverting a watercourse makes the early detection and tracing of pollution sources more difficult, resulting in the adverse impacts being more serious.

There is further impact on water quality due to the loss of the biological processes which are essential for river purification, and there is normally a reduction in oxygenation of water passing through a culvert. Culverting may also result in stagnant water problems, particularly if culvert levels are badly planned or constructed.

(Note: The Agency is not empowered under flood defence legislation to refuse consent purely on the grounds that it makes the detection of pollution more difficult.)

4.10 Culvert removal and river restoration

For the reasons outlined in 4.1 to 4.9 above, the Agency considers that it is good practice to promote the benefits of removing culverts and restoring watercourses to open channels.

5.0 | Exceptions

There are cases where culverting may in practice be unavoidable, such as short lengths for access purposes or where highways cross watercourses. In such cases alternatives such as open span bridges or diversion of the watercourse must have been rigorously considered, the length restricted to the minimum necessary to meet the applicant's objective, and appropriate mitigating environmental enhancements included in the proposal.

Before installing a culvert it is recommended that a risk assessment of the likelihood and consequences of blockage should be carried out and proposals implemented to reduce the risk to acceptable levels.

6.0 | Legal requirements and the need for consent

6.1 Land drainage consent

Any culverting of a watercourse, or the alteration of an existing culvert, requires land drainage consent. On main rivers (for definition see Section 8.0) the prior written consent of the Agency is required under Section 109 of the Water Resources Act 1991. On all other watercourses, except within the district of an internal drainage board (IDB), the Agency's consent is required under Section 23 of the Land Drainage Act 1991. In an IDB district the consent of the IDB is required, again under the Land Drainage Act 1991. On ordinary watercourses consents to the highway authority are granted under Section 339 of the Highway Act 1980.

If a culvert is constructed (or altered) on main river without consent, the Agency may remove, alter or pull down the work and recover its expenses from the person who carried it out. In addition, that person may also be liable to prosecution under the Agency's bylaws. If a culvert is constructed without consent on a watercourse which is not main river, the Agency may serve an abatement notice on the person having the power to remove it. If the notice is not complied with, the person responsible may be prosecuted and the Agency is entitled to carry out the necessary works and recover reasonable costs incurred in doing so.

(Note: More information on main rivers, the location of IDB Districts and Agency bylaws can be obtained from local Agency offices.)

6.2 Other permissions

Works either within or which would affect a Natura 2000 Site or a Site of Special Scientific Interest (SSSI) as a result of changes in flow regimes or water levels require the approval of English Nature or the Countryside Council for Wales, as appropriate.

Applicants should also check with their local authority whether their culverting proposals require planning permission under the Town and Country Planning Act 1990 and/or consent under the Public Health Act 1936.

7.0 | Consent Procedures

Landowners and developers should seek the Agency's advice as early as possible on any proposal, allowing sufficient time before work is to start. Identifying and resolving possible problems before plans reach an advanced stage will minimise costs to all parties and will reduce the time taken by the Agency when the consent application is received. In addition, opportunities for environmental enhancements can be identified, which may not necessarily entail significant expenditure by the developers.

Please refer to the Agency's leaflet **Technical Guidance on Culverting Proposals** before applying for consent. This is available from all Agency offices.

After preliminary details have been agreed, an application must be completed and submitted to the Agency, along with the appropriate fee, for formal consent. On receipt of a complete and valid application, the Agency has two months in which to determine it.

Each application will be treated on its merits in accordance with the Agency's duties and responsibilities under the Environment Act 1995, including the impact on the environment. The Agency acknowledges that the establishment of its policy regarding culverts is not in itself sufficient grounds for refusal of an application for consent to culvert a watercourse.

8.0 | Definitions

(Note: For the purpose of this document there are two types of structure connected with crossing watercourses, namely bridges and culverts. Short culverts are sometimes used, for example to allow an access road over a watercourse, and can be difficult to differentiate from bridges.)

Watercourse

Includes all rivers, streams, ditches, drains, cuts, dykes, sluices, sewers (other than public sewers) and passages through which water flows.

Bridge

An open span structure that carries a road, footpath, railway etc over a watercourse.

Culvert

A covered channel or pipeline which is used to continue a watercourse or drainage path under an artificial obstruction.

Internal drainage board

A board elected by ratepayers and established for designated, particularly low-lying, areas of England and Wales where flood protection and land drainage are necessary to sustain agricultural and developed land use. The functions of the IDBs and the Agency are separate.

Main river

All watercourses shown as such on the statutory main river maps held by the Agency and Ministry of Agriculture, Fisheries and Food or Welsh Office, as appropriate. Main river can include any structure or appliance for controlling or regulating the flow of water in or out of the channel.

More information on main rivers can be obtained from local Agency offices.

Ordinary watercourse

A watercourse which does not form part of a main river.

Sustainable development

Defined in the 1987 Report of the World Commission on Environment and Development (the Brundtland Report) as "Development that meets the needs of the present without compromising the ability of the future generations to meet their own needs".

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ENVIRONMENT
AGENCY

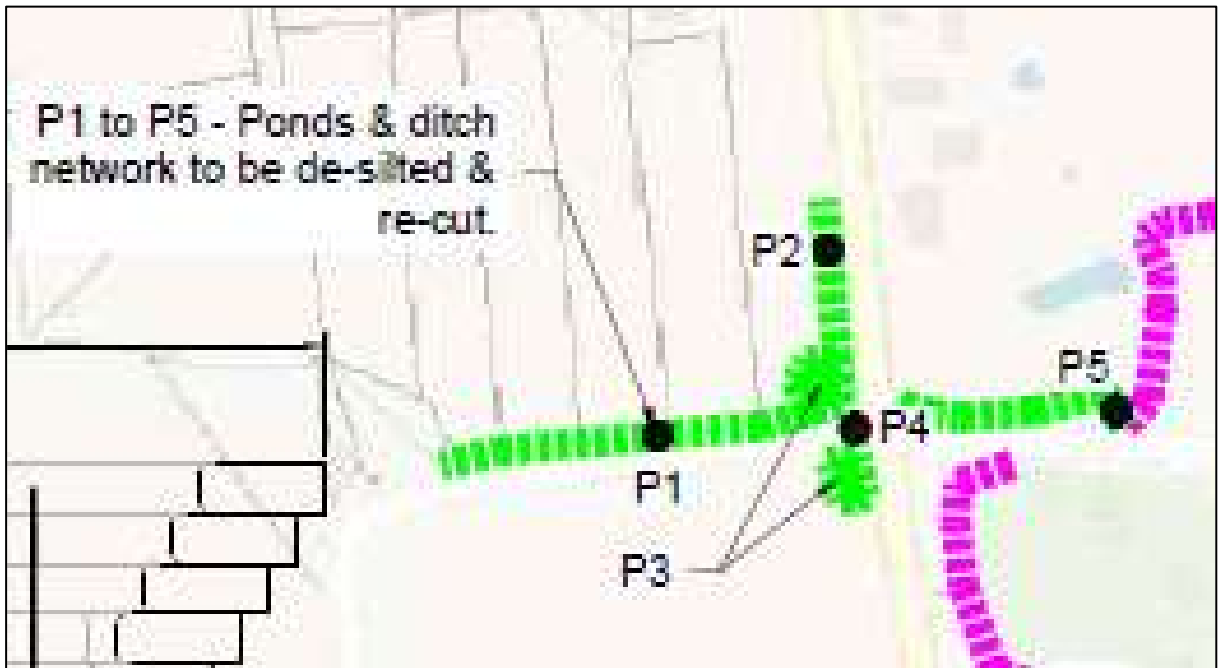
Appendix B: Watercourse Survey Photographs

Site Walkover Photographs




A selection of photographs taken during the site walkover on 18th March 2022 are provided below along with suggested watercourse improvements.

Hall Lane and Church Road Improvements:

Extract from Suggested Watercourse Improvements Plan - provided in full in **Appendix C**.



KEY:

-  Main River
-  IDB Watercourse
-  Ordinary Watercourse



Point P1: Looking west along Hall Road from Church Road. Ditch network is silted up and requires clearance to improve flow towards the culvert under Church Road (ford in times of heavy rainfall).



Point P2: Looking north from Hall Road up Church Road. Ditch network is silted up and requires clearance to improve flow towards the culvert under Church Road (ford in times of heavy rainfall).



Point P3: Ponds to the north and south of Hall Road/east of Church Road require desilting and removal of fallen and overgrown vegetation to restore storage area for storm water prior to entering the culvert/ford under Church Road.

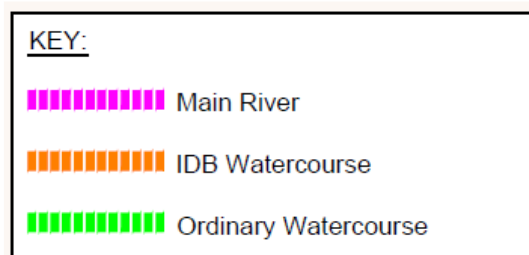
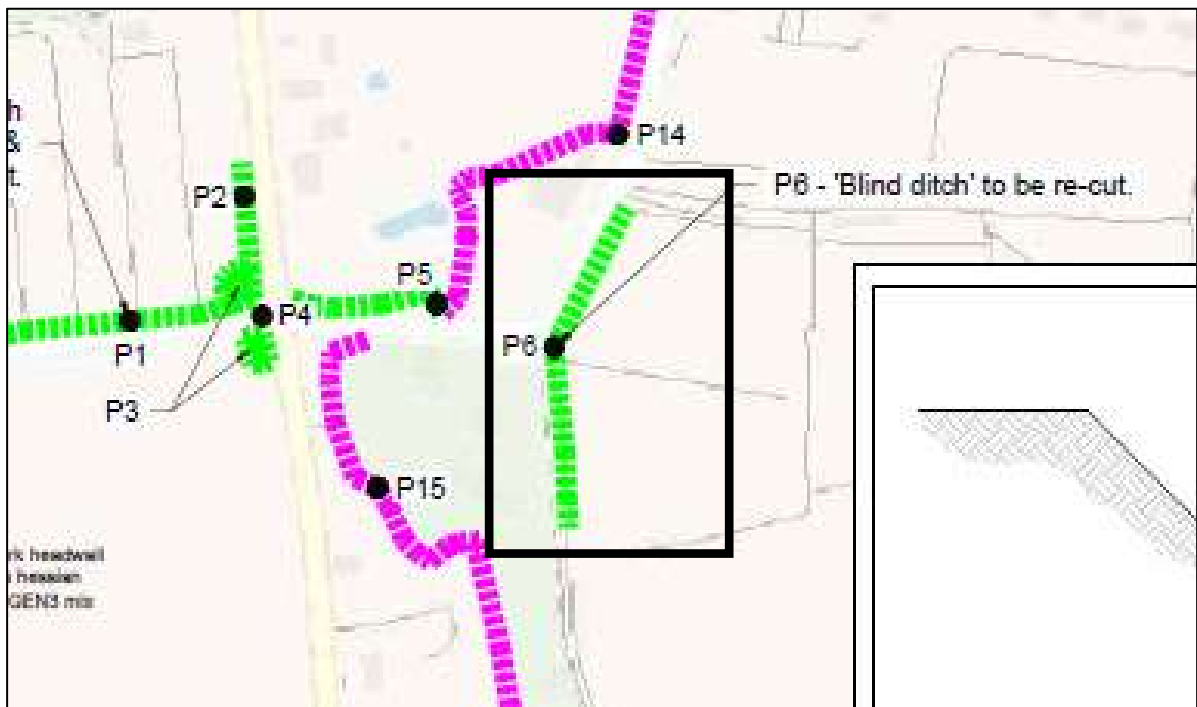




Point P5: Some minor maintenance and clearance required along the ordinary watercourse to the west of Church Road, within the grounds of Spa House, prior to reaching the Main River.

Wash Lane Improvements:

There is a 'blind' ditch alongside the east of Wash Lane which requires re-cutting – see P6. It is silted up and overgrown with vegetation. Any culverts (pipes under field access points) found require reinstating to improve flow.



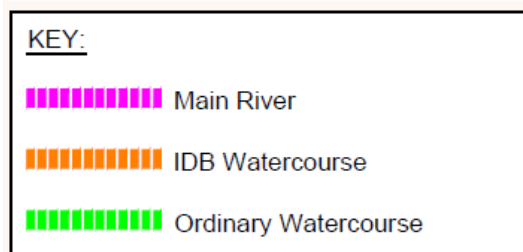
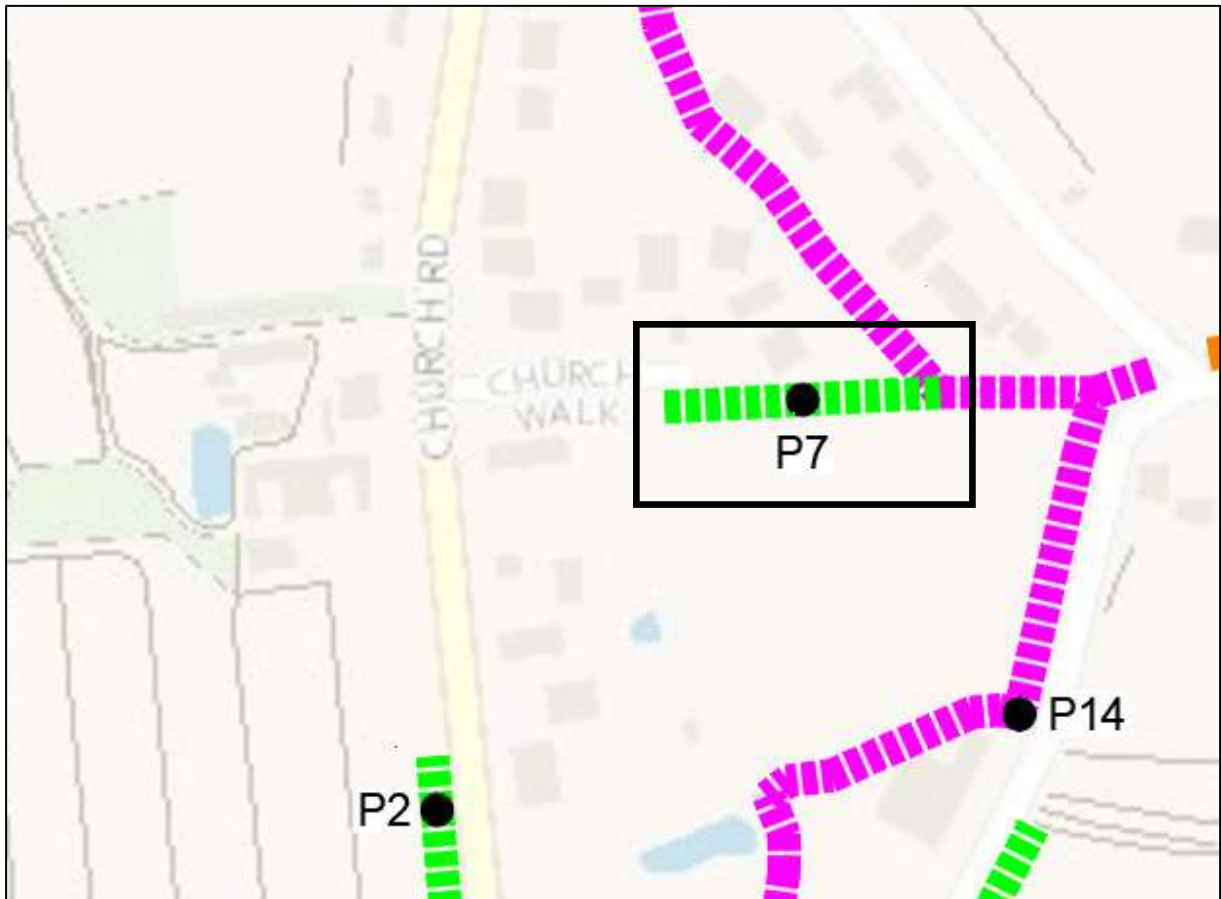


Point P6: Ditch network to the east of Wash Lane

Bambridge Green Improvements:

There is a 'blind' ditch alongside Bambridge Green which requires re-cutting. It is silted up and overgrown with vegetation. Any culverts (pipes under field access points) found require reinstating to improve flow.

This ditch system may link to the Main River via a culvert which if found requires reinstating.





Point P7: Ditch network to the north of Bambridge Green.



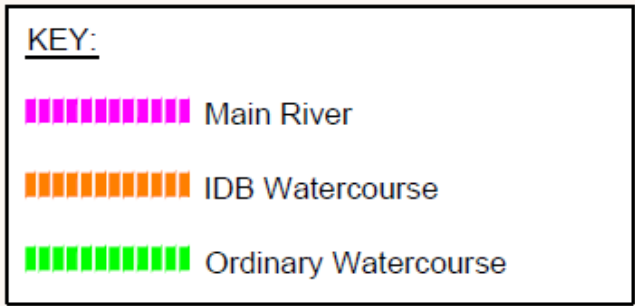
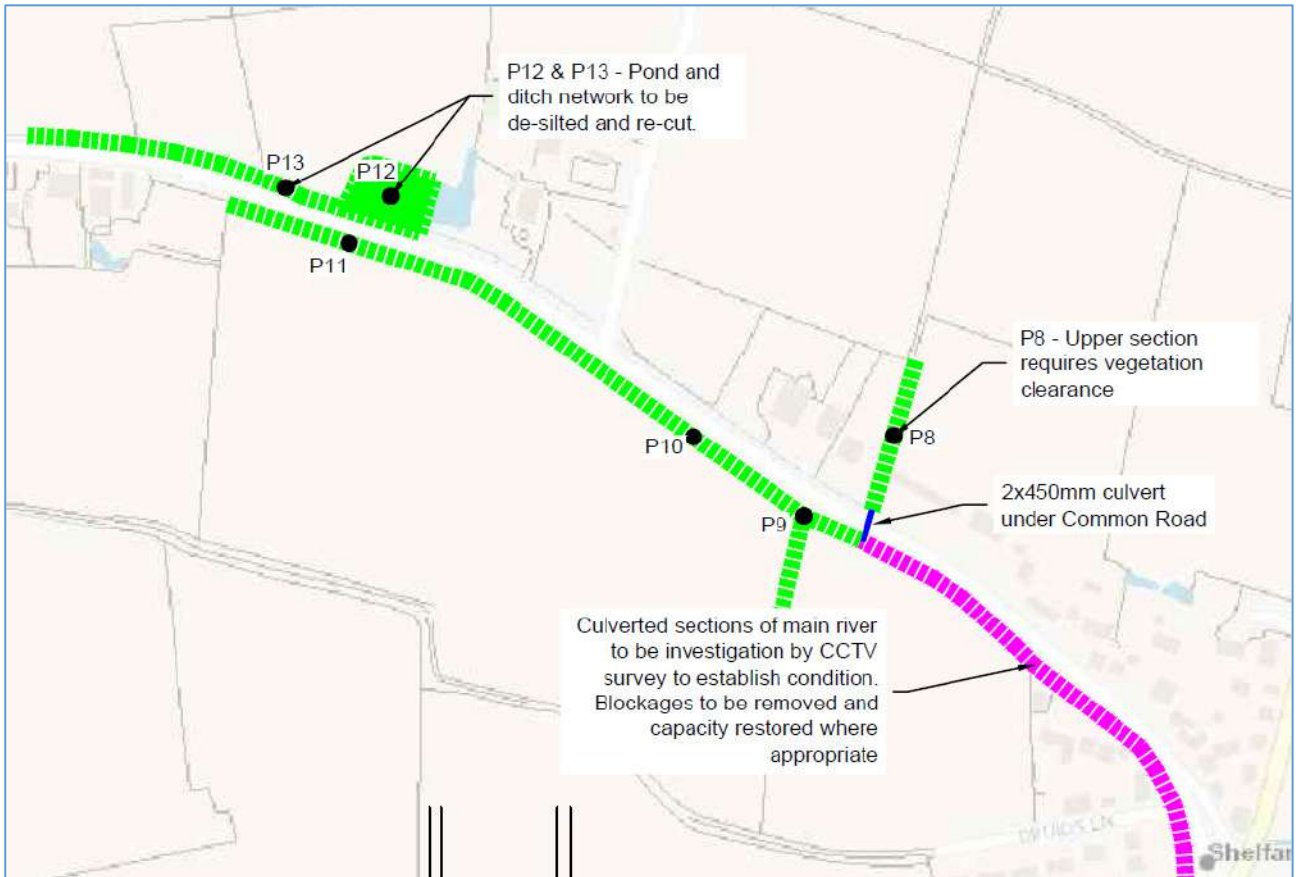
Point P7: Ditch network to the north of Bambridge Green.

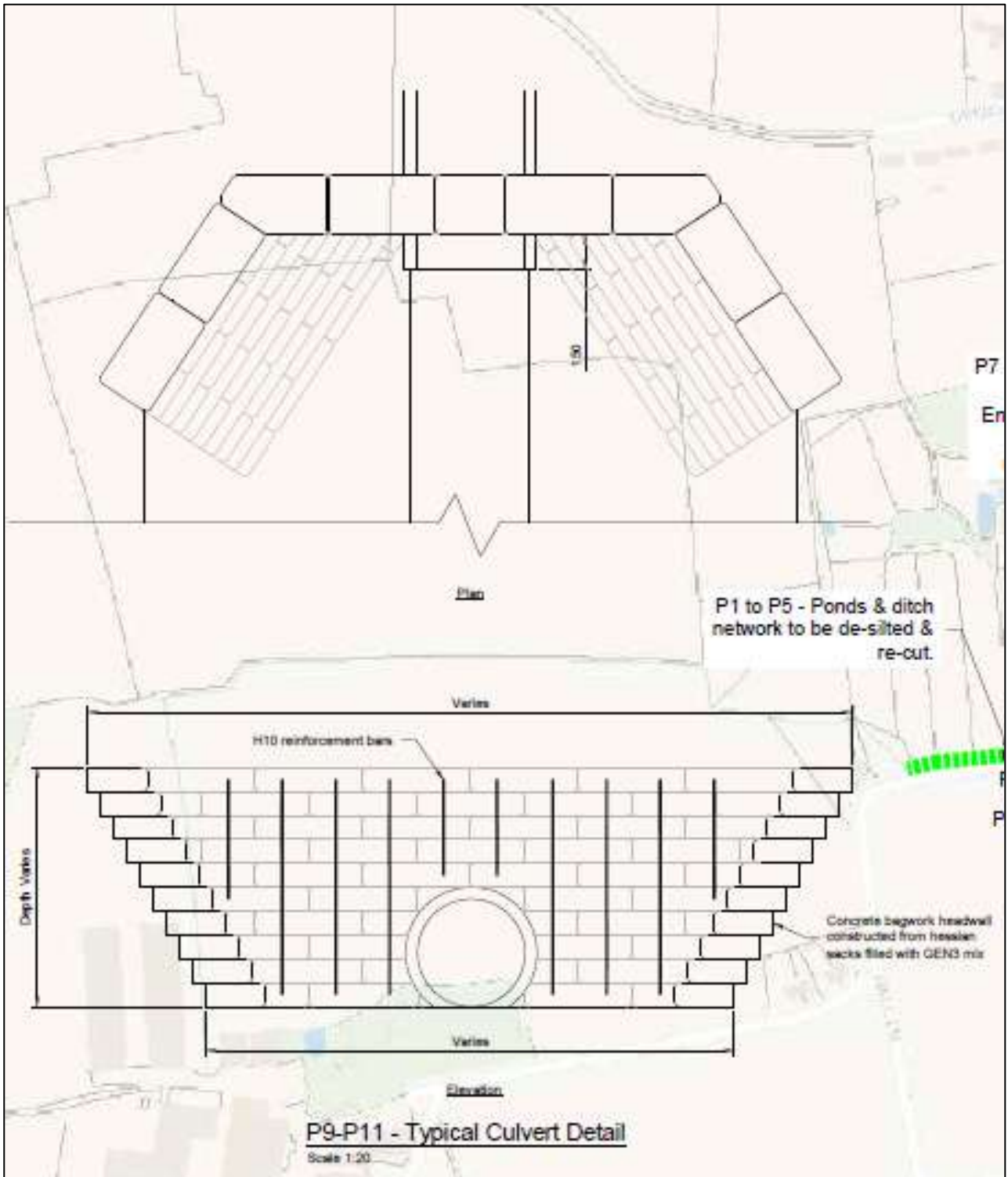
Common Road Improvements:

Existing culverted sections of the Main River to be investigated by CCTV survey to establish condition.

Points P8, P12 and P13 as per labelled improvements.

Points P9-P11 as per culverting detail on next page.





Existing culverted sections of the Main River may require investigation by CCTV survey to establish condition. Blockages to be removed and capacity restored where appropriate.





Point P8: Upper section of ditch network P8 requires clearance.

Care should be taken to clear vegetation regularly to avoid debris blocking the little screen prior to entering the culvert (2 x 450mm diameter) under Common Road leading to Main River.



Along the length of Common Road the road grips should be checked to ensure they allow the fall of water from Common Road into the adjacent ditch. Several are not effective.



Points P9: Field entrance is not culverted which in turn, during heavy storm events, allows water to overtop and flow onto Common Road, rather than flowing along the ditch network and continuing towards the Main River. Same for Point P10 (not pictured). It is recommended that the field entrances are culverted (a minimum diameter of 600mm) to keep flows within the ditch network. Typical section provided in **Appendix B**.



Point P11: Field entrance is not culverted which in turn, during heavy storm events, allow water to overtop and flow onto Common Road, rather than flowing along the ditch network and continuing towards the Main River. It is recommended that the field entrances are culverted (a minimum diameter of 600mm) to keep flows within the ditch network. Typical section provided in **Appendix B.**



Point P12: Pond at Manor Farm with outfall into adjacent ditch along northern side of Common Road. The pond on the western side requires clearance.

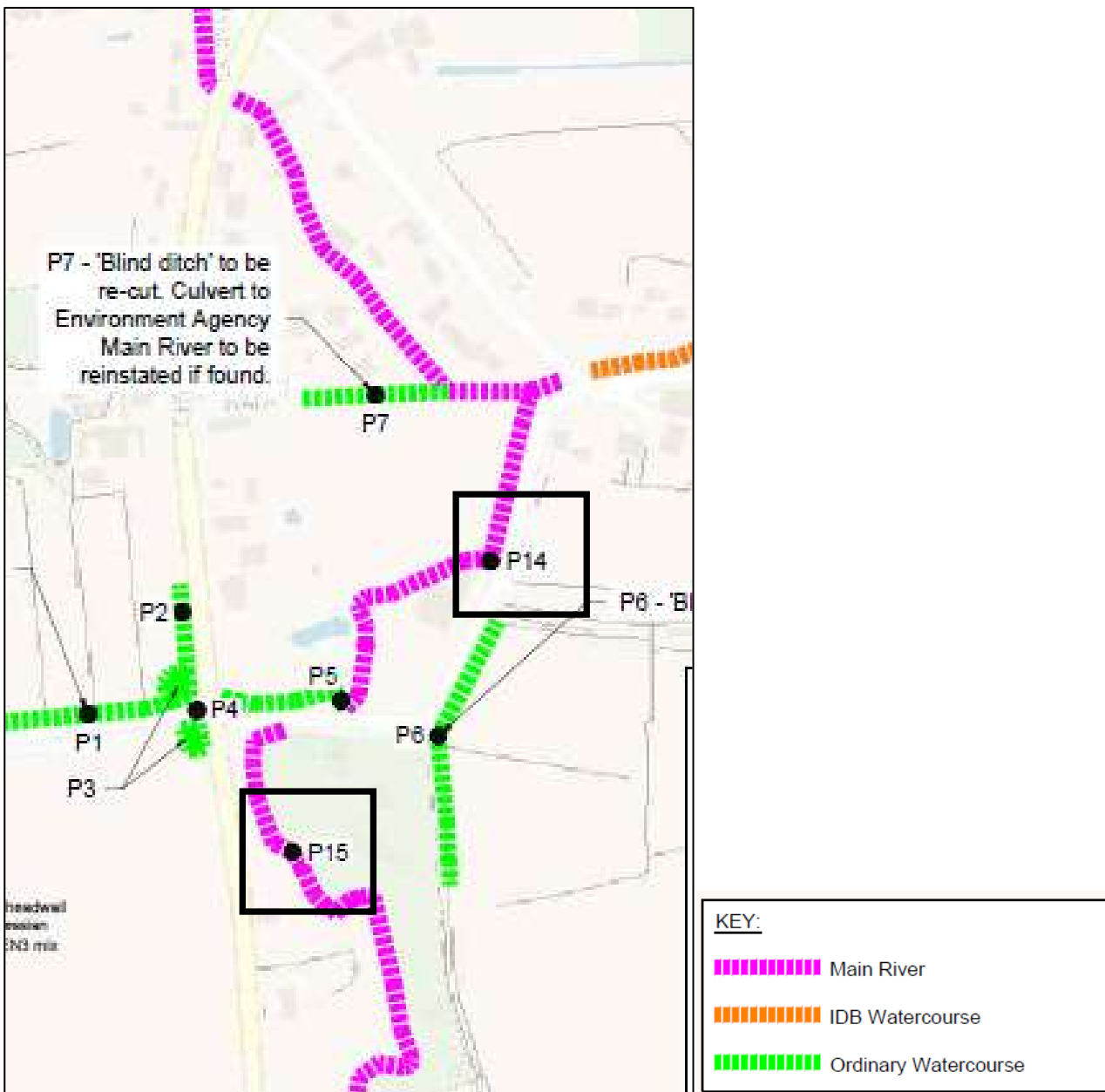


Point P13: Re-cutting and vegetation clearance required with care not to erode division between pond and adjacent ditch.

Main River Improvements:

Points P14 and P15: the Main River turns sharply at a number of locations. To improve flow an upper shelf could be provided to the inside corners of the channel to provide additional storage and effectively straighten the flow path to reduce bank erosion during storm events. A typical cross section is provided in **Appendix B**.

This would need to be agreed with the Risk Management Authority (Environment Agency) and adjacent landowners. Bank erosion was seen at a number of locations which should be reported to the Environment Agency.





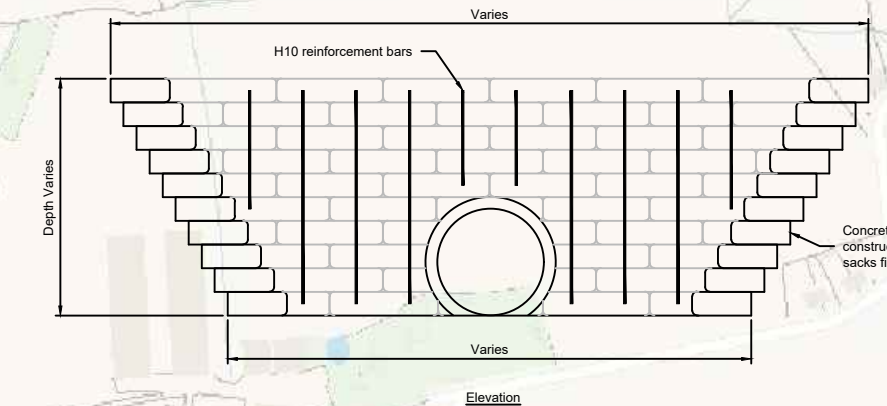
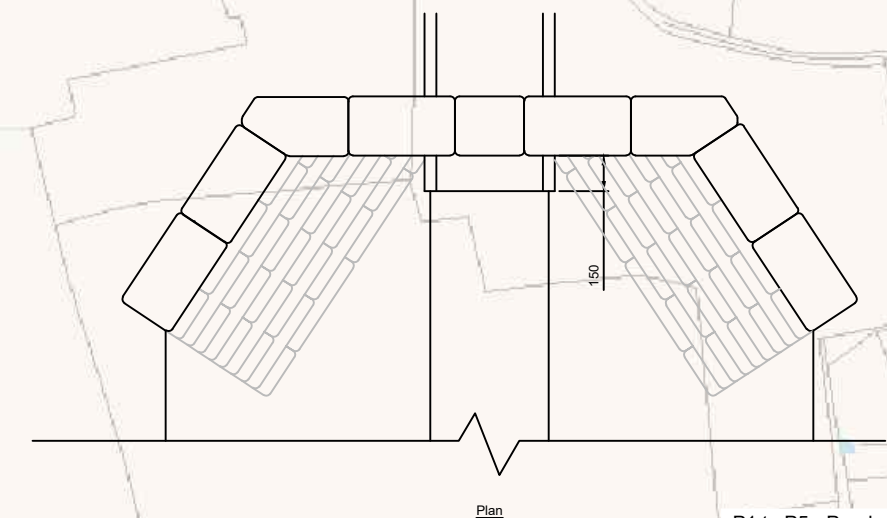
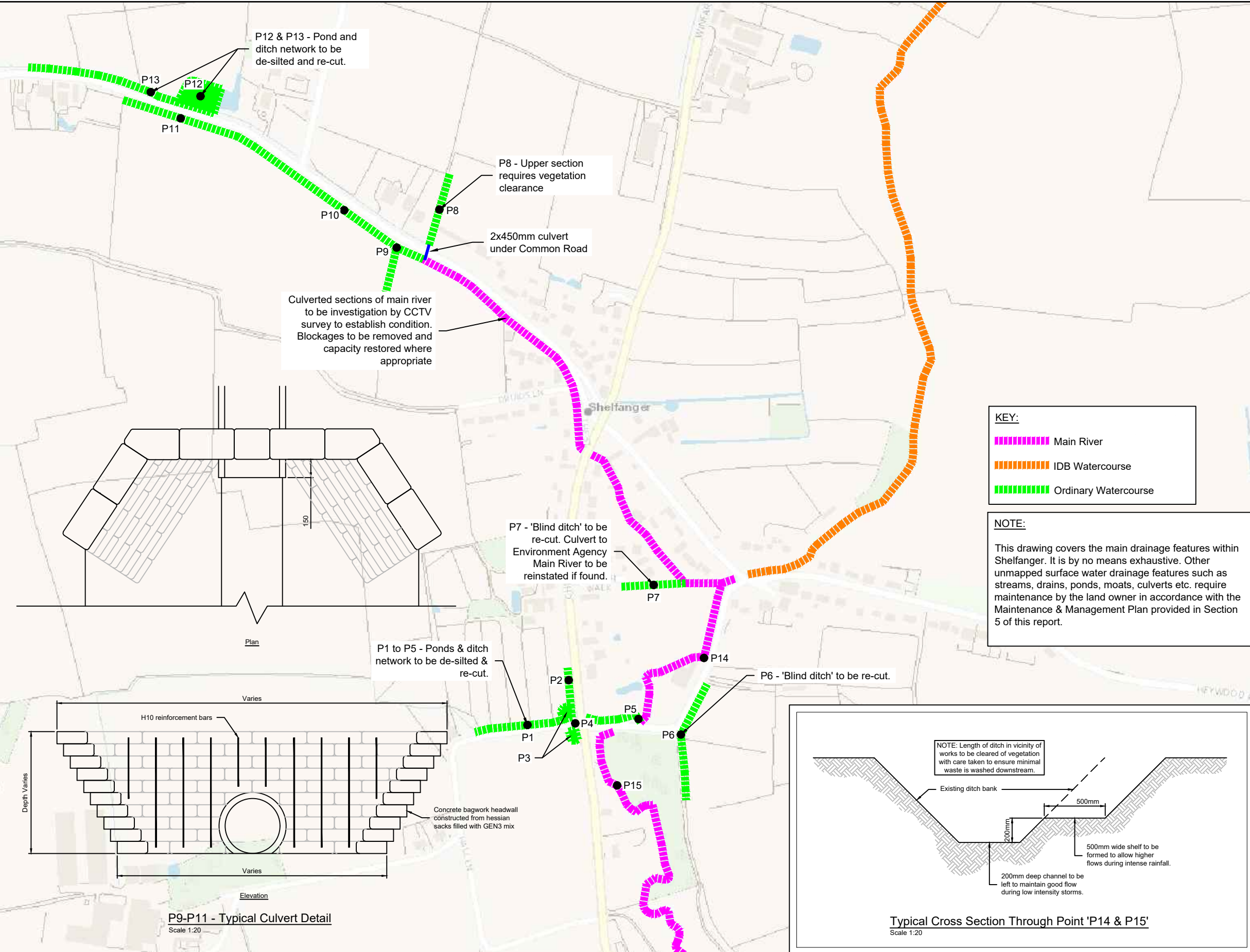
Point P14



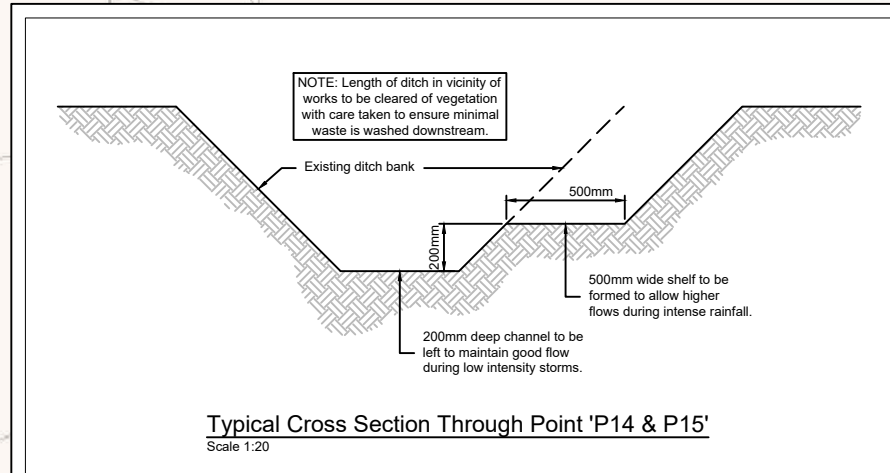
Point P15

Appendix C: Shelfanger Watercourse Improvement Works Layout - Overview

SHELFANGER WATERCOURSE SURVEY



P9-P11 - Typical Culvert Detail
Scale 1:20



KEY:

- Main River
- IDB Watercourse
- Ordinary Watercourse

NOTE:

This drawing covers the main drainage features within Shelfanger. It is by no means exhaustive. Other unmapped surface water drainage features such as streams, drains, ponds, moats, culverts etc. require maintenance by the land owner in accordance with the Maintenance & Management Plan provided in Section 5 of this report.

- GENERAL NOTES**
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 - This drawing should be read in conjunction with BHA Consulting Ltd engineering related drawings and all relevant drawings by the Architect and other specialists.
 - All dimensions are in millimetres unless stated otherwise.
 - All levels are in metres above ordnance datum (AOD) unless stated otherwise.
 - All co-ordinates are in metres to UK National Grid unless stated otherwise.
 - Do not scale from this drawing. All dimensions are to be checked and verified on site. Any discrepancy between this drawing and condition existing on site shall be reported to the Engineer.

Preliminary Drawing

This drawing is for preliminary purposes only and must not be read as a construction issue. It indicates design intent only and is subject to amendment during final design development.

Rev	Description	Date	By	App
P3	Further Information Added	28.06.22	GH	KE
P2	Further Information Added	10.06.22	RB	KE
P1	First Issue	06.05.22	RB	KE

P - Preliminary
C - For Construction

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Client
Shelfanger Parish Council

Project Title
Shelfanger Watercourse Survey

Drawing Title
Watercourse Improvement Works Layout Overview

Drawn by	Checked by	Approved By
RB	KE	KE

Date	Scale	Date
A2	NTS	May 2022

Drawing No.	Rev
3788.SK01	P3

WATERCOURSE IMPROVEMENT WORKS LAYOUT - OVERVIEW