



**Buckinghamshire County**

**Council**

**Culvert Policy**

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## **1.0 Purpose**

Buckinghamshire County Council, as Lead Local Flood Authority, became responsible for Ordinary Watercourse land drainage consent under Section 23 of the Land Drainage Act 1991 in April 2012, for the whole county except the areas covered by the Internal Drainage Board.

Before this date, the Environment Agency dealt with works of this nature and produced extensive guidance on the subject. We have therefore adopted many of the principles and policies that the Environment Agency have worked to over the years.

This policy document has been adapted from the Environment Agency's Policy regarding Culverts dated March 1999 and provides a detailed explanation of BCC's view on works to watercourses, with particular regard to culverts. It is intended for use by planning authorities, landowners and developers.

## **2.0 Introduction**

Watercourses fulfil many roles in today's environment. They provide drainage for developed and agricultural land and can be vital water resources, while some also have important recreational value. They are important features of the landscape and provide habitats for a wide variety of wildlife. It is therefore important that watercourses and their associated habitats are protected and enhanced for the benefit of present and future generations.

Buckinghamshire County Council considers it beneficial for watercourses to remain open wherever possible for both flood defence and environmental purposes. Culverting can exacerbate the risk of flooding, increase maintenance requirements and create difficulty in pollution detection. It also destroys wildlife habitats, damages a natural amenity and interrupts the continuity of a watercourse.

In considering any development proposals, our objective is to retain open watercourses with a corridor of open land on both sides. This maintains a conveyance channel for flow and creates a valuable environmental feature which can enhance the site and be easily maintained. We will also encourage developers to incorporate existing open watercourses or create new ones, within their design. Such features are of particular importance to wildlife by providing valuable open land in developed areas. Where possible, the removal of culverts will be encouraged to restore a more natural river environment and reduce flood risk as well as maintenance requirements.

Nevertheless, we understand that there may be cases where culverting is unavoidable for example, short lengths for access purposes or where infrastructure crosses watercourses. In such cases the length involved should be restricted to a minimum, the hydraulic and

environmental design assessed, and appropriate mitigating enhancements to the surrounding environment included.

However, culverting will 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;
- Constructing a ford, where appropriate.

Definitions of Ordinary Watercourse, Main River, bridge and culvert can be found in Paragraph 10 of this Policy.

### **3.0 Legal Requirements**

Consent in writing is required for Ordinary Watercourse land drainage consent from the Lead Local Flood Authority under Section 23 of the Land Drainage Act 1991 for the following works:

- a) Erect any mill dam, weir or other like obstruction to the flow of any Ordinary Watercourse or raise or otherwise alter any such obstruction; or
- b) Erect a culvert in an Ordinary Watercourse, or
- c) Alter a culvert in a manner that would be likely to affect the flow of an Ordinary Watercourse.

If any of the above works are carried out without consent, we have the power to serve notice on the person who carried out the work or the person having ability to remove the obstruction. If the notice is not complied with, then the LLFA may commence enforcement proceedings, including prosecution, against the relevant person or body. For more information on our enforcement process, please see our Enforcement Policy on our website at <https://www.bucksc.gov.uk/services/environment/flooding/land-drainage-consent/land-drainage-enforcement/>.

For works affecting Main Rivers the prior written consent of the Environment Agency is required under Section 106 of the Water Resources Act 1991 and under Environment Agency byelaws.

An area of the north of the county comes under the authority of The Buckingham and River Ouzel Internal Drainage Board, works affecting watercourse in this area will require land drainage consent from them. They also have byelaws which will need to be adhered to.

Our website has a useful map which identifies the organisation consent is required from within Buckinghamshire; <https://www.buckscc.gov.uk/services/environment/flooding/land-drainage-consent/>.

## **4.0 Buckinghamshire County Council Culvert Policy**

We are opposed to the culverting of watercourses because of the adverse ecological, flood defence and other effects discussed below. We will therefore adhere to the following policy when assessing any Ordinary Watercourse land drainage consent or planning consents proposing the culverting of a watercourse;

*“No watercourse should be culverted unless 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 cases where the policy allows culverting of a watercourse, adequate mitigation must be provided (refer to section 6). Wherever practical we will seek to have existing culverted watercourses restored to open channels through planning consent.

## **5.0 Impacts of Culverting**

### ***4.1 Increased likelihood of blockages and flooding***

Compared with an open channel there is an increased risk of blockage once a culvert is installed. If the blockage occurs within the culvert, there is much greater difficulty in removing it. Maintenance on culverts is more costly and time consuming than for open channels.

It is sometimes argued that culverting will reduce the problem of open channels being subject to litter and fly-tipping. Such short-term advantages are outweighed by the overall disadvantages, and alternative means should be pursued to address waste issues.

Flooding is more likely to result from culverts when they become obstructed, and culverted channels also provide less flood storage than open ones. There have also been cases of serious flooding caused by culverts collapsing due to root damage from vegetation or the weight of development above them.

### ***4.2 Change in morphology***

Culverting will create less permeable bed to a watercourse and often increases the speed of water flow, possibly increasing flood risk downstream and also preventing local recharge of groundwater. Culverted sections may also create or exacerbate downstream or upstream bank and bed erosion or promote sediment deposition, as a result of altered water velocities and disruption to the natural transport of sediment.

### ***4.3 Loss of environmental features***

Culverting has a detrimental impact on the environment, resulting in a complete loss of features within a watercourse. The continuity of the river corridor is broken, adversely affecting the landscape and ecological value of the watercourse for migrating species. An existing or potential amenity is also lost for present and future generations.

### ***4.4 Increased difficulties in providing new drainage connections, and the repair, maintenance and replacement of culverts***

Drain connections are more easily made to open watercourses where the performance of drainage systems can be visually monitored. Outfalls within culverts are prone to blockages or, in the case of flapped outfalls, can seize up. Maintenance of these outfalls is considerably easier in open channels where access is better.

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. The visible presence of a watercourse, reminds developers and the public that there is a risk, whereas this can be concealed and overlooked if the watercourse is culverted.

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 remains 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.

### ***4.5 Health and safety hazards***

There are dangers associated with natural open watercourses but culverted watercourses can be equally as dangerous. Culverting does not remove the risk of drowning or injury. There have been many cases in the past where children, and adults have died or suffered injury after entering culverts and they therefore represent a considerable safety hazard. Working within culverts is seen as confined space working which requires special training. 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. Working within or near to a watercourse also requires special safety training for operatives.

#### **4.6 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.

## **6.0 Design Guidance**

Detailed design plans will need to be submitted with your land drainage consent and planning application. Applicants will be required to adhere to the following guidance:

### **4.1 Environmental impact**

Applicants should demonstrate that they have considered the environmental implications of all options, and settle on the least environmentally damaging solution.

### **4.2 Culvert length & diameter**

If no other alternatives are feasible, any proposed culvert length should be as short as possible and the diameter as large as possible, the culvert should be designed to flow freely part-full rather than surcharged.

Applicants are required to:

- Choose a size that readily accommodates the design flow (for example, the 1% annual flood) with no appreciable increase in water level upstream.
- Allow for future development of the catchment upstream and for climate change effects (it is suggested that 20% is added to the estimated 1% flood to allow for this).

Depending on local circumstances the minimum acceptable culvert diameter would be 450mm. Any application for a proposed culvert with a smaller diameter than 450mm will need supporting drainage calculation for evidence (using CIRIA C689 Culvert Design 2010).

If any proposed culvert has an internal diameter of 900mm or larger then additional requirements may apply in relation to planning, design, construction, maintenance, adoption and/or demolition. Please contact the Council's structures team at [bridges@buckscc.gov.uk](mailto:bridges@buckscc.gov.uk) for further information.

In exceptional circumstances when a longer length of culvert is required, innovative and new technologies should be utilised, for example artificial lighting or natural daylight through openings.

### **4.3 Flow modification**

Culverts must be designed so they do not cause a restriction to flow. They must not increase the risk of flooding or prevent maintenance of the adjacent open watercourses.

Considerations must also be given to overland flow paths in the event of a culvert becoming obstructed. It should be ensured that flows will not affect property or cause unreasonable nuisance or harm.

### **4.4 Multiple culverts**

If culverting is unavoidable, the preference is to adopt a single culvert rather than multiple culverts. This ensures the largest possible waterway through the culvert and hence reduces the risk of large debris getting trapped inside and causing a blockage. Where multiple culverts are unavoidable, a minimum number of culverts should be used and cutwaters should be provided between pipes at the culvert inlet, at least one of the culverts should be positioned above the normal water level to reduce sedimentation risk and provide passage for mammals.

### **4.5 Culvert inverts**

The invert level of the culvert should generally be set lower than the existing bed level of the channel. This allows for any future regrading of the watercourse and also promotes the formation of a more natural bed through the culvert which helps to maintain ecological continuity.

### **4.6 Maintenance**

The responsibility for future maintenance and clearance of a culvert must be agreed and details of those responsible submitted with the application for land drainage consent. The responsibility for the maintenance of a culvert lies with the landowner or the person who owns the culvert unless otherwise arranged.

### **4.7 Bends, steps, changes of cross section**

Bends, steps and changes of cross section within a culvert should be avoided because they reduce the hydraulic efficiency and increase the risk of debris getting trapped. If a bend is unavoidable, adopt a long gradual bend. If the bend had to be sharp, provide an access shaft at the bend to afford easy access in the event of blockage.

### **4.8 Headwalls**

Appropriate inlet and outlet structures should be provided in order to ensure smooth hydraulic transition and avoid erosion. Headwall arrangements at the upstream and downstream ends of a culvert should be suitably keyed into the bed and banks of the watercourse, and should be appropriate to the local environment.



## 4.9 Screens

Inlet and outlet screens should not be used unless absolutely necessary. An appropriate risk assessment, such as a public safety risk assessment, must be submitted with your application to demonstrate when a trash screen is necessary, and a formal maintenance regime must be agreed prior to approval.

Screens serve two main purposes:

- Reducing the amount of debris entering a culvert
- Preventing unauthorised access into the culvert

Regardless of the primary purpose, all screens accumulate trash and debris over time, reducing the hydraulic capacity and causing the water level upstream to rise. The build-up of trash can be rapid, and the consequences can be severe in terms of flood damage to local properties and infrastructure. Many more problems have been caused by blocked screens than have resulted from blocked culverts. Buckinghamshire County Council therefore strongly discourages the use of screens and designers are urged to investigate alternative measures such as addressing the trash problem at source.

## 7.0 Environmental Considerations

Environmental mitigation measures may be appropriate if any open watercourse is being removed. We must also consider the key aims of the Water Environment (Water Framework Directive) (England & Wales) Regulations 2017 throughout the consenting processes, overall this Directive aims to:

- Prevent further deterioration and protect and enhance the status of aquatic ecosystems and associated wetlands;
- Promote sustainable water consumption;
- Progressively reduce or phase out discharges, emissions and losses of priority substances and priority hazardous substances;
- Progressively reduce the pollution of groundwater; and contribute to mitigating the effect of droughts and floods.

Environment mitigation for larger culverts:

- Make the culvert slightly larger than that needed to accommodate the design flow and then position the invert of the culvert below the natural bed of the watercourse, to enable some more natural bed features to form.
- Provide ledges running through the culvert (approximately 500mm wide and 300mm above normal water level) to allow for the passage of mammals. Or make provision for appropriately located mammal underpasses close to the culvert.
- The height of the invert should not pose an obstruction to fish movement.
- Provide structures to encourage bat roosting and bird nesting as appropriate.

Environmental mitigation for smaller culverts:

- Propose suitable environmental enhancements, for example opening up a length of previously culverted watercourse elsewhere on the site, enhancing other lengths of the watercourse, creation of a pond/marshy area, scrub/hedge planting.
- Construction headwalls and wingwalls in 'soft-engineering' or natural materials in keeping with the natural channel.

## 8.0 Land Drainage Consent Process

Landowners and developers should seek the advice of the Strategic Flood Management Team as the Lead Local Flood Authority, as early as possible on any proposal, allowing sufficient time before the intended start date. The consent application forms and details on how to apply and pay the appropriate fee are available on our website at <https://www.buckscc.gov.uk/services/environment/flooding/land-drainage-consent/>.

On receipt of a complete and valid application, the aim is to reach a decision as soon as possible within the two month determination period. As part of the process various authorities will be consulted including the Environment Department, Highways Department, Environment Agency, Internal Drainage Board and Natural England where appropriate. Identifying and resolving possible problems before plans reach an advanced stage will minimise costs to all parties and will reduce the time taken to determine the application.

Once determined, notification of the approval or refusal will be given in writing along with a written consent certificate if applicable.

## 9.0 Planning Considerations

As LLFA, Buckinghamshire County Council is the statutory consultee for surface water on major planning applications and as part of this role we provide comments on works relating to Ordinary Watercourses. When submitting a planning application please consider the following guidance relating to culverting an Ordinary Watercourse.

The requirement for Ordinary Watercourse land drainage consent is independent of the need for planning permission (from the Local Planning Authority) and the granting of planning permission does not imply or guarantee that consent will be granted.

Our position as LLFA is to oppose planning permission for any development which proposes a culvert where there are reasonable alternatives. Such alternative solutions might include a revised site layout or an ecologically acceptable diversion of an open channel.

Our position as LLFA is also to oppose planning permission where any proposed structure(s) are over an existing culvert, as the culvert may, in the future, need to be repaired, replaced

or upgraded if conditions in the catchment change. There is also the need to maintain an overland flow route if the culvert is blocked or its capacity exceeded.

Where an Ordinary Watercourse is already culverted on a proposed site and there is opportunity to re-open the full or partial length of it, this will be encouraged by the LLFA and justification for not doing so will need to be provided as part of the planning application. Where an applicant does propose to re-open a culvert, the LLFA encourages the use of best practice guidance, for example the River Restoration Centre's Manual of River Restoration Techniques Section 1.6 Opening up a culverted stream.

It is recommended that maintenance strips either side of open or culverted watercourses are designed for, a minimum of 9m should be given on one bank side and a more flexible approach could be taken on the other bank. The maintenance strips should not include any built development; this includes any open space furniture.

## 10.0 Acronyms and Definitions

**EA** – Environment Agency

**LPA** – Local Planning Authority

**BCC** - Buckinghamshire County Council

**LLFA** – Lead Local Flood Authority

**IDB** – Internal Drainage Board

**LDA** – Land Drainage Act

**WFD** – Water Framework Directive

**Ordinary Watercourse** – all rivers, streams, ditches, drains, cuts, dykes, sluices, sewers (other than public sewers) and other passages through which water flows that are not designated as main rivers.

**Main River** – all watercourses shown as such on the statutory main river maps held by the Environment Agency and Department for Environment, Food and Rural Affairs.

**Bridge** – an open span structure that carries a road, footpath, railway etc. over a watercourse.

**Culvert** – a covered channel or pipeline of any size, which is used to continue a watercourse or drainage path under an artificial obstruction.