Flood Risk Management Strategy - Culvert Policy

Date: 02/08/2013

Revision History

Revision Ref	Amendments	Issued to:
Version 1, 05/07/13	Draft Report	Consultation: Council members, Council Officers,
Version 2, 02/08/13	Final Report	Publication

Copyright

Culvert Policy

An explanation of our policy regarding applications to culvert ordinary watercourses, and a guide to good practice and design principles. Until April 2012, the Environment Agency (EA) gave consent for works of this nature and produced extensive guidance on the subject. We have therefore adopted many of the principles and policies that the EA have worked to over the years. This policy was developed from EA Policy documents.

1.0 Purpose

Bolton Council, as the Lead Local Flood Authority (LLFA), is responsible for ordinary watercourse consent applications under Section 23 of the Land Drainage Act 1991.

This guidance note has been adapted from the EA's 'Culvert Policy' documents and provides a detailed explanation of our view on works to watercourses, with particular regard to culverts. It is intended for use by Bolton Council officers, landowners and developers.

2.0 Introduction

Watercourses fulfil many roles in today's environment. They provide drainage for developed and agricultural land and are 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.

Bolton 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 and increase the maintenance requirements for a watercourse. It also destroys wildlife habitats, damages a natural amenity and interrupts the continuity of the linear habitat of a watercourse.

Nevertheless, the Authority recognises that watercourses over which we exercise our regulatory powers pass through a wide range of land use types, from rural to industrial landscapes. Consequently, this policy accepts that in certain situations the use of culverts may be unavoidable.

Conserving open watercourses is one of the Authority's major aims and, where possible, the Authority will encourage and promote the removal of culverts in order to restore a more natural river environment.

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.

3.0 Legal Requirements

Any culverting of a watercourse, or the alteration of an existing culvert, requires land drainage consent. On main rivers the prior written consent of the EA is required under Section 109 of the Water Resources Act 1991. On all other watercourses, consent of the Lead Local Flood Authority (Bolton Council) is required under Section 23 of the Land Drainage Act 1991.

Highway Authorities are required under Section 339 of the Highways Act 1980 to seek the consent of the drainage authority before carrying out any works affecting a watercourse.

The following works require ordinary watercourse consent from the Lead Local Flood Authority (Bolton Council) under Section 23 of the Land Drainage Act 1991:

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.

4.0 Authority Policy

The Authority 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 Authority 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 Authority will seek to have culverted watercourses restored to open channels.

5.0 Reasons for the Policy

5.1 General reasons

The Authority 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.

5.2 Loss of environmental features

Culverting a watercourse 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.

5.2 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 Authority 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.

5.3 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.

5.4 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.

5.5 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.

5.6 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. In the UK 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.

6.0 Consent Procedure

Landowners and developers should seek our advice as early as possible on any proposal via a pre-application submission, allowing sufficient time before the intended start date. The pre-application forms, consent application forms, explanatory notes, and detail on how to apply and pay the appropriate fee are available on our website.

As part of the process we will consult where appropriate various authorities including the Environment Agency, Highway Authorities and Natural England. 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, we will notify you of our approval or refusal in writing along with a written copy of your consent if applicable.

Any proposed features that qualify for designation as third party assets under the Flood and Water Management Act will follow the designation procedure once constructed.

7.0 General Design Requirements

1. A detailed design will need to be submitted with any pre-application submission and your formal application for consent. The planning, design, construction and management of the culvert should follow the guidance in the CIRIA document "Culvert design and operation guide C689". Adequate hydraulic calculations in accordance with the above document on which a design is based must be submitted and include an allowance for climate change over the life time of the development. We can advise applicants on the criteria and parameters to be used.
2. The applicant should consider the environmental implications of all options for the works to determine the least environmentally damaging solution. If no other alternative is feasible, any proposed culvert length should be as short as possible and the diameter as large as possible. Depending on local circumstances we shall require a minimum culvert diameter of 600mm.
3. Culverts must be designed so they do not cause a restriction to flood flow. They must not increase the risk of flooding or prevent maintenance of the adjacent open watercourse. Consideration must also be given to overland flow paths in the event of a culvert becoming obstructed. It should be ensured that overland flows will not affect property or cause unreasonable nuisance or harm.
4. The shape of the culvert and the materials used for construction should be chosen to satisfy site-specific requirements in terms of channel hydraulics, strength and durability, and should be appropriate to the local environment. Any proprietary products shall have a design life exceeding the lifetime of the development.
5. The use of differently shaped pipes or different cross-sectional details within a culvert length should be avoided unless adequate hydraulic transitions are incorporated into the design. Such transitions are also essential where works to extend an existing culvert are proposed.
6. 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.
7. The responsibility for future maintenance and clearance of a culvert must be agreed in writing with the LLFA and details of those responsible for maintenance submitted with your application for consent. The responsibility for the maintenance of a culvert lies with the land owner or the person who owns the culvert.
8. Suitable access arrangements for maintenance should be included in the design. Access chambers must be provided at each change of direction if the culverting is not straight. Sharp bends (exceeding 45 degrees) should be avoided. Manhole spacing should be in accordance with the guidance in CIRIA Guide C689 Culvert Design and Operation Guide but, due to the nature of watercourses and to facilitate maintenance, the maximum spacing between access chambers should not exceed 100 metres.
9. Inlet and outlet screens may be appropriate to prevent debris entering the culvert and causing clogging, or where there is a danger to public safety. If screens are included, they need to be sized and designed in accordance with the CIRIA Guide C689 Culvert Design and Operation Guide to reduce the risks of blocking. The screen layout and design must make provision for an adequate and safe means of cleansing and maintenance. A standard detail of a grille or screen can be provide on request. A formal maintenance regime must be submitted with the application and agreed prior to consent.

Parties with private maintenance liabilities shall be clearly stated and contact details provided.

10. In most situations it is appropriate for the inverts of culverts to be set below the existing bed level to allow for future maintenance or other works on the watercourse. It also aids the provision of a more "natural" bed to the culvert.
11. Multiple small culvert arrangements are prone to blockage by accumulation of waterborne debris at the inlet. The Authority will generally refuse applications containing multiple culverts, only in exceptional circumstances where site constraints prevent a single-pipe or box-culvert option being practical, will they be accepted. Where multiple culverts are unavoidable, a minimum number of culverts should be used and cutwaters should be provided between pipes at the culvert inlet.
12. Syphons are not an acceptable option.
13. Culverts and outfall structures should be designed so that the exit velocities do not create erosion problems at the outlet and downstream.
14. On watercourses subject to severe erosion and siltation problems consideration should be given to the provision of silt traps upstream of the culvert.
15. Services (for example sewers, gas pipes, water mains etc) should not intrude into the cross-section of the culvert.

8.0 Environmental Considerations

Each application for consent is considered on its own merits. Mitigation works to reduce the impact on the environment will be taken into account by the Authority when determining a consent application for culverting.

Environmental mitigation for larger culverts:

1. 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.
2. Provide ledges running through the culvert (approximately 500 mm wide and 300 mm above normal water level) to allow for the passage of mammals. Or make provision for appropriately located mammal underpasses close to the culvert.
3. The height of the invert should not pose an obstruction to fish movement.
4. Provide structures to encourage bat roosting and bird nesting as appropriate.

Environmental mitigation for smaller culverts:

1. 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.
2. Construct headwalls and wingwalls in 'soft-engineering' or natural materials in keeping with the natural channel.

9.0 Planning Application and Building Control Considerations

1. The requirement for ordinary watercourse consent is independent of the need for planning permission and the granting of planning permission does not imply or guarantee that we will grant Land Drainage consent.
2. We would normally oppose planning consent and refuse ordinary watercourse consent on conservation grounds for a 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.
3. Buildings should not be sited over the top of new or existing culverts. Building regulations (Approved Document H) stipulate the distance from which a watercourse or sewer should be laid from new foundations.
4. We would oppose planning consent for any building over a culvert as the culvert may, in the future, need to be repaired, replaced or up-rated 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.
5. Consent is required from the Environment Agency for development within a specified distance of either side of a Main River in accordance with Environment Agency Byelaws.

Glossary

Bridge	An open span structure that carries a road, footpath, railway etc over a watercourse.
Culvert	A underground channel or pipeline used to continue a watercourse or drainage path under an artificial obstruction.
Culverting	The act of creating an underground channel or conduit.
Cutwater	The wedge-shaped streamlined head of a bridge pier or other structure within a watercourse channel.
EA	Environment Agency
FWMA	Flood and Water Management Act
Invert	The lowest internal surface or the floor of a culvert.
LLFA	Local Lead Flood Authority
Main river	All watercourses shown as such on the statutory main river maps held by the Environment Agency. Main river can include any structure or appliance for controlling or regulating the flow of water in or out of the channel.
Ordinary watercourse	A watercourse which does not form part of a main river.
Watercourse	Includes all rivers, streams, ditches, drains, cuts, dykes, sluices, sewers (other than public sewers) and passages through which water flows.