DERBYSHIRE County Council
Improving life for local people

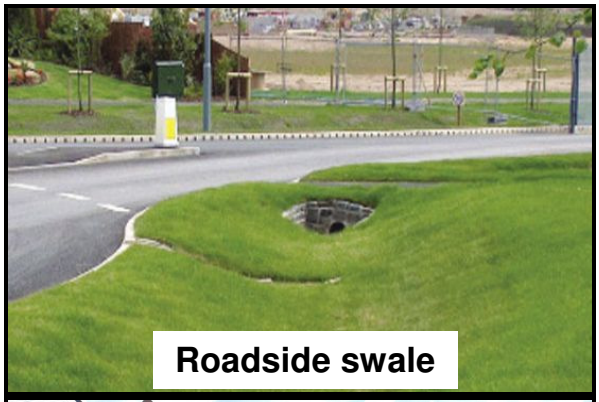
Guidance Notes: ENVIRONMENTAL BEST PRACTICE

If you are unsure about anything within these notes then please contact the Flood Risk Management (FRM) team using the details at the end of this document.

To ensure that Derbyshire County Council promote sustainable working practice and help to deliver environmental benefits where possible the following best practice guidance is relevant.

Natural flood resilience and drainage systems

Where possible the opportunity for natural flood defences should be utilised due to the multiple benefits that can be provided including; social, amenity, environmental and in most cases economic. The images below illustrate flood risk management/drainage options that are actively promoted across Derbyshire. Derbyshire's Local Flood Risk Management Strategy promotes working with natural processes; however this does not mean that traditional hard defences will not be needed, but that more sustainable approaches are favoured when assessing future flood mitigation options.


Roadside swale

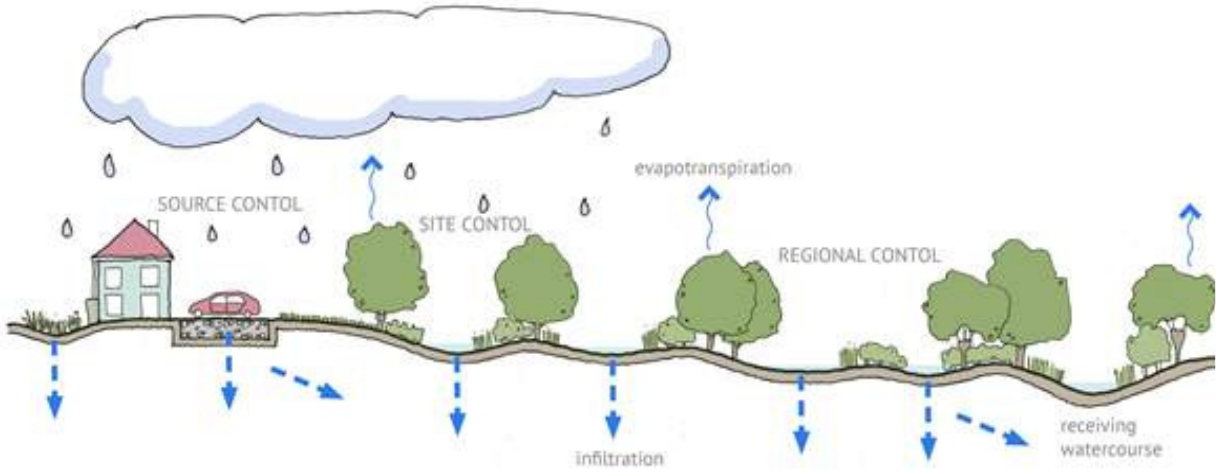
Attenuation and conveyance swale

Attenuation basin

Shared amenity/drainage urban space

Sustainable Drainage Systems (SuDS)

Traditional piped drainage systems have always focussed on removing water from the surface of developed land during rainfall events and into pipes before rapid delivery to local watercourses and sewage treatment works. The modern and more sustainable approach is SuDS. SuDS help to slow down the flow rate, the sediment/pollutant loading and where possible the volume of water flowing off paved surfaces by applying multiple stages of treatment where water is stored and released back to the system or filtrate back into the sub soil at a controlled rate. This is known as the SuDS management train. Treatment stages are ideally engineered using natural materials and follow natural topography to reduce operational and maintenance costs.



The 'SuDS management train' – www.susdrain.org

SuDS should deliver benefits in all of the following areas:

- Quantity: SuDS reduce the risk of flooding and erosion by reducing surface water runoff rates and, where possible, volume compared to traditional drainage systems.
- Quality: SuDS reduce pollutant loading in surface water from developments and in doing so protect, and in some cases enhance, the water environment.
- Amenity: SuDS can provide various socioeconomic benefits to people and should be multi-functional spaces within new developments.
- Biodiversity: SuDS should help to maintain or enhance habitat provision and encourage biodiversity against ongoing pressures from urban development.

Best practice for SuDS is to use vegetated features on or near to the surface such as swales, basins, wetlands and filter strips that enhance the natural and visual amenity of a development but also offer significant benefits for pollution filtration and runoff control. However SuDS can also include engineered solutions such as permeable paving and filter trenches that can offer similar

surface water management benefits, albeit with reduced amenity and biodiversity benefits

For more information on implementing SuDS, developers, engineers and the public are advised to consult the more comprehensive guidance in the CIRIA SuDS Manual (C697). A good source of information, including different SuDS elements and how these have been utilised in a number of case studies, is **Susdrain**[1], a website which is run by sustainable drainage professionals.

SuDS maintenance and adoption

If designed correctly, SuDS should maintain flood risk and environmental mitigation functions efficiently for their lifetime, with only minimal maintenance required. However, prior to building SuDS, developers should ensure that the long term maintenance of the development is secured through the system adoption by a competent organisation. At present, in the absence of any budget or legislative duty, DCC is unable to adopt any SuDS that serve private development. Therefore the responsibility for ensuring the long term adoption and maintenance of SuDS rests with the developer.

Sustainable riparian corridor management

It is important that the riparian environment is effectively and sustainably managed to enable the watercourse to function as naturally as possible for flood risk management, particularly in rural areas.

The River Restoration Centre has produced a **Manual of River Restoration Techniques**[2] which advocates best practice techniques for river restoration and sustainable river management. This manual provides a number of case study examples for the different techniques. For further advice and guidance please speak to a member of the FRM team or the Environment Agency.

Vegetation management

As the riparian landowner there is a legal requirement to maintain the free passage of water. Excessive vegetation growth can restrict the passive movement of water and requires maintenance. Riparian landowners should be mindful to not cause the spread of invasive plants, impact upon any nesting birds, and impact upon any wildlife or protected species or cause excessive silt movement during any maintenance works. Where possible any riparian landowner should liaise with a member of the FRM team prior to undertaking any works.

---

[1] www.susdrain.org
[2] http://www.therrc.co.uk/manual-river-restoration-techniques

Defra have produced a handbook which promotes good practice for channel management and supports better decisions on when and how to manage channels for flood risk and land drainage. This is available **online**[3] in early 2015.

Siltation

Excessive siltation can reduce the capacity of the watercourse to store or covey water and can cause or exacerbate flood risk, particularly in urban environments or where watercourses are culverted. Silts can also smother the bed of the watercourse and damage the habitat of river plants and animals, degrading the ecological quality.

Bank stabilisation

There are a number of techniques that can be employed to restrict the erosion of the banks of a watercourse. In an area where bankside erosion is particularly bad and/or vegetation is unable to properly establish, ecologically sensitive bank stabilisation techniques such as willow spiling can be particularly effective. Live willow stakes thrive in the moist environment and protect the soils from further erosion allowing other vegetation to establish and protect the soils. Please refer to the **'revetting and supporting river banks'**[4] section of the River Restoration Centre website.

The FRM team recommend that bank erosion is avoided where possible and encourage all landowners to avoid using machinery and vehicles close to or within the watercourse.

Example of willow spiling for bank stabilisation

Example of a more sustainable farm animal drinking point

[3] http://evidence.environment-agency.gov.uk/FCERM/en/Default/FCRM.aspx
[4] http://www.therrc.co.uk/manual-river-restoration-techniques

Farm animal drinking areas

The FRM team recommend that in rural farming environments drinking areas for farm animals are sensibly designed and preferably not directly linked to the watercourse. Where this cannot be avoided the FRM team strongly encourage restricted areas of the watercourse for drinking to try to limit the damage to the watercourse banks by animals. Excessive trampling of the river banks can result in large amounts of silts becoming mobilised which can deposit downstream, sometimes restricting the capacity of bridges or culverts. Excessive siltation can also degrade the river habitat for plant and animal species, impacting on flood risk as well as the ecology of the watercourse. Please refer to the **'providing public, private and livestock access'**[5] section of the River Restoration website.

Watercourse crossing points

The FRM team recommend that all vehicular activity within a watercourse is limited to an absolute minimum so as to restrict the amount of damage and silt/pollutant movement within the watercourse. It is recommended that where a bridge is not appropriate that a formal ford structure is constructed within the watercourse to facilitate a crossing point. Please refer to the **'providing public, private and livestock access'**[6] section of the River Restoration website.

Culverts, deculverting and river restoration

Culverted watercourses are often constructed to enable the efficient drainage of an area and allow land to become developable. In many cases watercourses become hidden or buried and relatively inaccessible often with buildings on top of them, resulting in the reduced ability to maintain the flow of the watercourse and increased flood risk.

Culverted watercourses require regular maintenance to ensure that they function correctly. In most cases they also require trash screens at their entrance to ensure they do not become blocked by large debris, further adding to the maintenance requirements. Culverting results in the loss of natural riverside and in channel habitat through the direct loss of vegetation which creates complex habitats for a wide variety of plants and animals to thrive in. Culverts can also be impassable to some river animal species and fish. In some, mainly urban areas, culverted watercourses can become extremely polluted due to cross connections associated with developments and industry.

[5] http://www.therrc.co.uk/manual-river-restoration-techniques
[6] http://www.therrc.co.uk/manual-river-restoration-techniques

Culverting of watercourses also alters the natural sediment transport regime resulting in displaced energy which can exacerbate or cause erosion upstream or downstream. Excessive erosion can weaken river banks and also results in excessive sediment in the watercourse which can be harmful to the plants and animals of the river environment.

The FRM team are committed to support the Environment Agency in meeting the requirements of the Water Framework Directive (WFD, 2000) and therefore will seek to restrict the amount of consents under the Land Drainage Act (1991) for the culverting of watercourses in Derbyshire.

Consent for large stretches of watercourses to be culverted will not normally be granted. Only in extreme circumstances such as the requirement for access or for the installation of critical infrastructure will consent for culverting be granted.

- *Construction of a bridge* – if the bridge is free spanning there will be no impact on the hydraulics of the watercourse and the bed and banks can remain undisturbed.
- *Construction of a ford* – for smaller watercourses with the requirement for less frequent crossing.
- *Diversion of a watercourse* – In some instances the diversion could improve the hydraulics and ecology of the watercourse although there can be disadvantages with this option.

Where practical the FRM team encourage the de-culverting and renaturalisation of watercourses restoring to open channel in Derbyshire.

De-culverting can bring many benefits including; reducing the need for regular maintenance and trash screens, reducing blockages and enhancing the river environment by providing a more varied habitat. In some cases small sections of open channel can be beneficial for flood risk management allowing for flood water to disperse naturally and thus slowing the movement of flood water downstream.

The FRM team recommend that any development does not encroach within 8m of the banks of an ordinary watercourse and would strongly discourage any construction over a watercourse.

Please note that the Environment Agency have set byelaws for Main Rivers.

For any guidance on river restoration please contact the **River Restoration Centre**[7].

[7] http://www.therrc.co.uk/

Introducing and enhancing blue corridors and green infrastructure

‘Blue corridors’ is a term used to describe the environment located alongside a watercourse such as the banks and immediate flood plain either side. A blue corridor’s primary function is to allow the dispersion of flood water when the river channel becomes too full. Blue corridors also provide natural habitat and amenity value to an area. ‘Green infrastructure’ refers to high quality ‘green’ spaces that provide a range of benefits in urban environments. Green infrastructure includes parks, fields, woodlands, rivers, gardens etc. and can be designed and managed to deliver a wide variety of benefits, including flood alleviation, habitat and amenity.

The FRM team encourage the enhancement of blue corridors and green infrastructure in all development across Derbyshire to help reduce flood risk as well as helping to meet the requirements of the WFD.

Enhancing outfalls and bridge wing walls in the riparian environment

Concrete outfalls and bridge wing walls can be unsightly and un-sympathetic to the riparian environment. Outfalls can often create localised scour if they are installed at the wrong angle which can result in bank instability and sediment deposition downstream. As discussed earlier this can damage the habitat of the riparian ecology. In some instances outfalls are also installed which are oversized for the purpose required.

Example of concrete bagwork

In most cases the structural elements of outfalls and bridge wing walls must comprise of pre-case concrete however the detail around the structure can be designed so as to fit in with the riparian environment and improve the visual amenity and habitat. Example sustainable techniques include:

- Gabions with natural stone facing with coir matting and planting at the surface; and
- Concrete bagwork around the pre-cast concrete which provides a more suitable surface for a variety of vegetation to establish.

Please refer to the **'enhancing outfalls to rivers'**[8] and **'providing public, private and livestock access'**[9] sections of the River Restoration Centre website for further guidance.

Any activities within or in close proximity to an ordinary watercourse may require land drainage consent from the FRM team under the Land Drainage Act (1991). For further information please refer to our website www.derbyshire.gov.uk/flooding or contact the FRM team on the details at the end of the guidance.

Derbyshire County Council
Flood Risk Management Team
Economy, Transport and Environment Department
County Hall, Matlock, Derbyshire, DE4 3AG
Call Derbyshire: (01629) 533190
Email: flood.team@derbyshire.gov.uk

[8] http://www.therrc.co.uk/manual-river-restoration-techniques
[9] http://www.therrc.co.uk/manual-river-restoration-techniques