Integrated design: SUDS should be fully integrated into the layout and the green and blue network. Fronting buildings onto attractive SUDS features can create a pleasing outlook as well as a focal point within the development. Image: Lionthorn, Falkirk

Technical Guidance: SUDS schemes should comply with the CIRIA SuDS Manual (C753) and, where the scheme is to be vested by Scottish Water, Sewers for Scotland (current edition). SUDS that are intended to drain water from an adopted road should be designed in accordance with SUDS for Roads.

Multi-functional: Using SUDS as a placemaking tool, and keeping water management above the ground, can enhance the surrounding environment and achieve a range of benefits. Bertha Park, Perth is a good example of integrating attractive SUDS with other functions including play provision, biodiversity, active travel and housing. Image: Bertha Park, Perth

SUDS landscaping: Appropriate marginal planting can help to integrate ponds into the landscape, create habitat and encourage wildlife. Image: Carrongrove, Stoneywood

Mixture: Developments typically have a SUDS scheme, usually a pond or basin at the bottom of the site. Using a mixture of SUDS such as ponds, swales, green roofs, trees, rainwater gardens etc. throughout the site can help create an attractive and linked green and blue network, mimicking nature and the SUDS management train. Images: Commonwealth Games Athletes' Village, Glasgow

Water storage and reuse: Rain water harvesting systems can be a relatively simple way of storing surface run-off from the roof of a development. They can provide an alternative source of non-drinking water for garden use, toilet flushing, car washing and even some industrial processes. The example shown here is the100 litre ‘prestige wall mount water butt’ from Freeflush Limited. Other manufacturers, designs and capacities are available.

Shapes and slopes: Natural shapes and slopes can achieve a natural feel within the design of SUDS ponds/basins (Mungal Park, Falkirk, top and below left). Overly rigid shapes and very steep slopes should be avoided as these can make ponds/basins look over-engineered and, in some cases, resemble a crater with low amenity value (Redding, top and below right).

Access for maintenance: Where access to ponds and basins is necessary for maintenance, access tracks should be unobtrusive and integrate with the open space of which they are part, for example through the use of reinforced grass systems. Images: Carrongrove, Stoneywood

Enclosures for SUDS basins and ponds: In low safety risk schemes, consider soft landscaping as a natural alternative to fencing. Transition planting around the margins can act as an effective visual cue deterring people from the water edge (Bertha Park, Perth, below left). Fencing, if needed, should be sited, designed and finished to be as inconspicuous as possible. Low hedging (Lionthorn, Falkirk, below right) can help soften the appearance of fencing while still maintaining views of the water area for natural surveillance.

Retrofitting: De-greying infrastructure through rainwater gardens can help tackle surface water flooding and pollution problems at an early stage as well as soften the surrounding built environment. Image: Ribblesdale Road, Sherwood (Nottingham City Council)

Further guidance

10,000 Raingardens for Scotland website

CIRIA SuDS Manual (C753)

Falkirk Council Planning Application Advice on Flood Risk and Surface Water Drainage

Forth Estuary and Forth Flood Risk Management Strategies and Plans

Forth Area River Basin Management Plan

NatureScot website

PAN61: Planning and Sustainable Urban Drainage Systems

Scottish Water's Surface Water Policy

SEPA guidance and advice notes for planning

Sewers for Scotland (current edition)

SG07 - Biodiversity and Development

SUDS for Roads

SUDSWP's Water Assessment and Drainage assessment Guide

SUSDRAIN website

Water, People, Places - A guide for master planning sustainable drainage into developments

Urban Design London's Designing Rain Gardens: A Practical Guide

9. WATER: RESTORING THE WATER ENVIRONMENT

Key Principles

- **Development should safeguard, and, where possible, enhance the water environment.** Improvements to the water environment may be achieved by development for example through deculverting, remeandering, removing redundant structures or barriers to fish passage, and enhancing bankside habitat.
- **An appropriately sized buffer should be provided** between development and a waterbody to maintain natural fluvial processes and to protect the water environment.
- **Unnecessary engineering works in the water environment should be avoided** including new culverts, bridges, watercourse diversions, bank modifications or dams.
- **New or enhanced public access to a waterbody should be provided**, where appropriate, to allow access for a wide range of users.

Key LDP Policies

PE01 Placemaking

PE13 Green and Blue Network

PE19 Biodiversity and Geodiversity

PE22 The Water Environment

PE24 Flood Management

IR02 Developer Contributions

IR10 Drainage Infrastructure

Good Practice

River access in an urban setting: Some locations provide opportunities to improve active travel links to nearby rivers and waterbodies, connecting people with nature and the wider green and blue network. Images: canal path at Canavan Court/Park, Falkirk (below left) and Commonwealth Games Athletes' Village, Glasgow (below right)

Buffer Strips: A buffer strip is an area of permanent vegetation between development and a watercourse. It can provide many environmental benefits from habitat connectivity, better water quality through to reduced soil erosion and improved flood risk management. The table below provides minimum widths for a buffer strip based on the width of the watercourse. Depending on site conditions, some strips may need to be wider than the relevant minimum buffer width stated. A buffer of at least 3m may be required for ditches.

Width of watercourse (measured between the top of banks)	Minimum width of buffer strip (either side of the watercourse)
Less than 1m	6m
1-5m	12m
5-10m	15m
10m+	20m+

Deculverting: Culverts can contribute to local flood risk, becoming blocked and/or quickly conveying water downstream. They have low ecological and amenity value being constructed from concrete channels with little daylight. Delculverting can restore a natural flow regime, benefitting sustainable flood management, placemaking and biodiversity. Images: Bog Burn, former British Leyland site, Bathgate, West Lothian (SEPA).

Wildlife ditches, ponds and wetlands: These can help create important aquatic and semi aquatic habitats for native species as well as contribute to sustainable water management and amenity. Image: Jupiter Urban Wildlife Centre, Scottish Wildlife Trust, Grangemouth

Regeneration: Zetland Park's paddling pool is to be transformed into a new wildlife feature as part of Heritage Lottery funded plans to regenerate the park. The project is an innovative example of using the public realm to create an attractive water space for both wildlife and people. Image credit: LUC

Removing barriers: The removal of an old weir and creation of a fish ladder with a new hydro scheme on the River Carron as part of the redevelopment of the Carrongove site in Stoneywood has improved upstream access for salmon and sea trout.

Other Useful Guidance

CIRIA SuDS Manual (C753)

Forth Estuary and Forth Flood Risk Management Strategies and Plans

Forth Area River Basin Management Plan

SG07 - Biodiversity and Development

SEPA's guidance and advice notes for planning, in particular the 'Background Paper on the Water Environment'

River Restoration and Biodiversity - Nature-Based Solutions for Restoring the Rivers of the UK and Republic of Ireland

Rivers by Design - Rethinking development and restoration

10. WILDLIFE

Key Principles

- **Development proposals should actively seek to enrich biodiversity in and around development sites.** SG07 Biodiversity and Development provides a detailed guide on the ways to support biodiversity.
- **Site audits, survey work, and an understanding of the Local Biodiversity Action Plan** is important. This will highlight opportunities for both protection and enhancement.
- **Existing habitats should be treated as important assets, and integrated into the landscape design.** The 5 stage approach outlined in SG07 - protect, enhance, mitigate, compensate and manage - should be followed.
- **Opportunities to create new habitat within open space, SUDS areas and planting should be maximised.** Landscape treatments, species and management regimes should be chosen to encourage wildlife.
- **Designs should provide for wildlife corridors, buffers and 'stepping stones'** that allow routes for species movement and migration.

Relevant LDP Policies

PE13 Green and Blue Network
PE17 Open Space and New Development
PE18 Landscape
PE19 Biodiversity and Geodiversity
PE20 Trees, Woodland and Hedgerows
PE22 The Water Environment

Good Practice

Hierarchy of biodiversity conservation: The five stage approach to biodiversity conservation provides the basis for ensuring that wildlife is properly considered within site planning. Images: SG07 Biodiversity and Development

Overall Aim:

To ensure that species, habitats, sites and networks that are of national or local ecological importance are protected and that our wider biodiversity is maintained and enhanced.

Biodiversity Objectives:

Protect	Protect our existing ecologically important species, habitats, sites and habitat networks before, during and after development.
Enhance	Pursue opportunities to improve the ecological value of all or part of the development site. Creating quality green infrastructure benefits people as well as biodiversity. Consider aiming for Biodiversity Net Gain.
Mitigate	Minimise negative impacts on biodiversity through appropriate mitigation measures.
Compensate	Provide compensatory biodiversity creation or enhancement, where development is permitted and negative impacts on key biodiversity features cannot be avoided.
Manage/ Maintain	Ensure the long-term protection and quality of environmental features through appropriate design and the development and implementation of biodiversity management plans, where necessary.

Initial site audit: The audit can help identify opportunities and constraints for biodiversity at an early stage. Image: SG07 Biodiversity and Development

Opportunities for New Habitat Creation within Development Sites

Woodland: Structure planting and parkland trees in open space provide opportunities for creating an attractive woodland habitat, supporting a wide variety of species from birds to butterflies. Images: The Helix

Opportunities for New Habitat Creation within Development Sites

Wetland: SUDS and surface water management provide ideal opportunities for wetland creation, but features must be carefully designed to support biodiversity. Image: The Helix

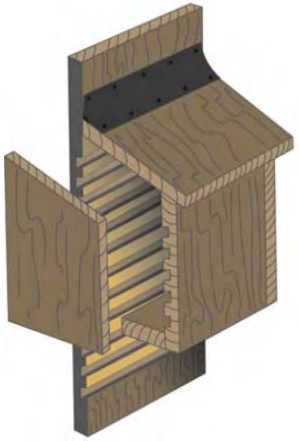
Hedgerows: Hedgerows are valuable resource for wildlife, providing habitats for nesting and feeding. They can also function as movement corridors for small animals. Image: The Helix

Wildflower meadow: Grassland that is not needed for active play can be given over to wildflower meadow, bringing colour and variety to otherwise sterile spaces, supporting pollinating insects and reducing maintenance costs. Image: Westquarter Glen, Laurieston, Falkirk

Accommodating Wildlife within Development Sites

Bat, bird or bug boxes: Boxes (or purpose made bat/bird bricks) are an effective way of encouraging wildlife being relatively inexpensive and simple to install. Advice should be sought on the most appropriate design for the specific location.

Bird Box



Bat Box

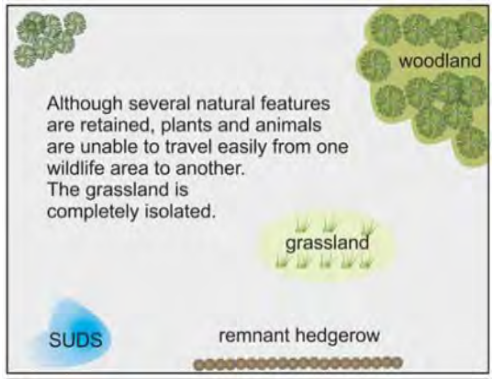
Habitat piles and loggeries: logs and habitat piles can create a good and simple home for invertebrates, benefitting our ecosystem.

Control invasive non-native species (INNS) INNS are a significant problem, disrupting habitats and ecosystems in the Council area. See SG07 Biodiversity and Development and www.falkirk.gov.uk for further advice, regarding INNS control.

Linked habitats: Corridors, buffers and stepping stones can increase connectivity and permeability to allow wildlife movement through a site and reduce habitat defragmentation. Image: SG07 Biodiversity and Development

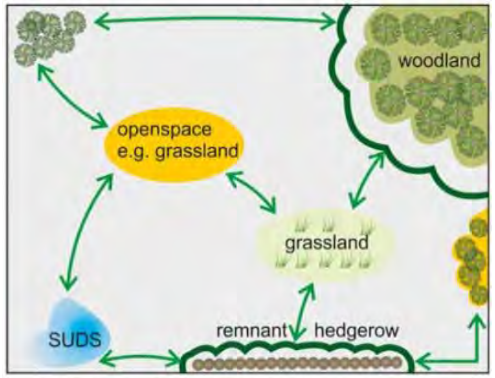
Scenario A:

Development without wildlife corridors, buffers or 'stepping stones'.



Scenario B:

Development with wildlife corridors, buffers or 'stepping stones'.



Designing in simple wildlife corridors e.g. along road verges, hedges, footpaths and watercourses ; and well placed buffer zones and "stepping stone" habitat ensures that wildlife can migrate throughout the site and key areas are protected.

Hedgehog highway: 13cm by 13 cm gaps at the bottom of boundary fencing can enable hedgehogs to travel to gardens and open spaces for forage. Small signage above the gaps can remind residents to keep the gaps free from obstacles. Images: Council housing development, Blinkbonny Road, Falkirk

Further Guidance

Hedgehogstreet.org

Landscape and Urban Design for Bats and Biodiversity

Second Nature: A Biodiversity Action Plan for the Falkirk Council area

NatureScot website

Scottish Wildlife Trust

SG07 - Biodiversity and Development

SG08 - Local Nature Conservation and Geodiversity Sites

SG10 - Trees and Development

SG13 - Developer Contributions

11. MANAGEMENT AND MAINTENANCE

Management and Maintenance Plans

Good management and maintenance arrangements are necessary to ensure the open space environment remains attractive and fit for purpose during the lifetime of the development. The design of all open spaces, including play areas, should take into account how these spaces will be managed and maintained in the future.

Falkirk Council considers maintenance issues during the assessment of planning applications and will, if necessary, incorporate long term management and maintenance requirements in the planning permission or associated planning obligation. The requirements may involve submission of a Landscape Management and Maintenance Plan for the Council's approval prior to the development commencing. The content of the plan will be specific to the development, but should include the following information as a minimum:

- Plan period - this should cover the lifetime of the development
- The overall vision for the open space areas i.e. what are they intended to achieve in design terms
- Full details of the maintenance responsibility for the open space areas
- A3 plans of the approved landscape plans and specifications
- A3 plans delineating areas of ownership and maintenance responsibility for all aspects of open space in the development
- Management objectives for all aspects of open space
- Maintenance schedules for all aspects of open space including:
  - ◊ Paths and hard surfacing
  - ◊ Soft landscaped areas including trees, hedgerows, grassed areas, amenity shrub planting etc.
  - ◊ Walls and fences
  - ◊ Play areas
  - ◊ Natural or built conservation features
  - ◊ Water features
  - ◊ Street furniture
  - ◊ Drainage systems (cross referenced to the drainage strategy)
- The schedules should state the maintenance tasks, their frequency and duration.
- A Biodiversity Management Plan, and Biosecurity plan, if required.
- Procedures for replacement of decommissioned, broken or failed play facilities equipment and unadopted street furniture. Replacement play facilities equipment must be of a similar or higher play value.

Maintenance Responsibility

Residential Development

Falkirk Council's preferred approach is that the developer makes robust factoring arrangements for the open spaces within the new residential development. This approach will involve the developer appointing the factor initially and imposing a title deed condition on the homeowners requiring them to contribute to the upkeep of the open spaces on a shared basis.

Non Residential Uses

For non-residential uses, such as employment, retail or leisure, the management and maintenance of open space will remain with the freeholder to arrange. Nevertheless, planning conditions and/or a planning obligation may be required to ensure adequate provision is made for open space maintenance over the lifetime of the development.

SUDS Maintenance

Sustainable drainage systems (SUDS) should be regularly inspected and maintained to ensure they continue to function properly within a development. The appropriate responsible party for SUDS maintenance should be established first of all as the responsible party will have particular requirements that need to be taken into account within the design of the SUDS scheme. The details of SUDS maintenance should be covered in the drainage strategy and cross referenced in the Landscape Management and Maintenance Plan, where appropriate. Maintenance arrangements will be dependent on the type of SUDS and also the nature of landscaping chosen.

Within the Curtilage

Property owners are responsible for the maintenance of SUDS within the curtilage of their private property. Developers should make property owners aware of their burden of responsibility and ensure suitable arrangements are in place for ongoing maintenance throughout the lifetime of the development. The arrangements will also need to be agreed with the relevant entity and confirmed with the Council.

Outside the Curtilage

Scottish Water will only vest particular types of 'public' SUDS such as retention basins and ponds providing they meet the specifications as detailed in the current edition of Sewers for Scotland. Nevertheless, this should not automatically discount the incorporation of other SUDS components (such as swales or porous paving) that Scottish Water will not vest. It may be appropriate for property owners or another body to take on the responsibility for maintaining these components. Early discussion with Scottish Water, SEPA and the Council is strongly recommended as this will establish the right approach to sustainable drainage at the outset.

SUDS draining surface water from an adopted road are maintained by the Roads Authority, after adoption, or by Scottish Water after vesting. Nevertheless, the adoption of the road can only happen if the road is offered to the Roads Authority for adoption and has been constructed to the authority's specifications. Detailed guidance on road SUDS is given in 'SUDS for Roads'.

Falkirk Council is working towards a collaborative framework with Scottish Water that will enable the surface water drained from Council adopted roads and the roofs and curtilages of buildings to be accommodated within a shared SUDS with maintenance responsibilities split between the Council and Scottish Water. The framework will take the form of a memorandum of understanding made under Section 7 of the Sewerage (Scotland) Act 1968, and could help minimise costs to the Council, Scottish Water and developers around SUDS provision.

APPENDIX 1: GREEN INFRASTRUCTURE AND NEW DEVELOPMENT CHECKLIST

	Compliance (Yes/No/Not	Comments
Process		
Design team assembled with appropriate qualifications, experience and accreditation.		
Site appraisal carried out to appropriate level		
Pre-application engagement with relevant stakeholders		
Pre-application discussions on conceptual design carried out		
Planning applications submitted with necessary green infrastructure supporting information		
Well Being: Open Space		
Appropriate multifunctional open space incorporated in design		
Open space properly integrated into layout		
Recreational needs of development provided for in terms of different categories of provision (playspace, parks, sports areas, natural greenspace/green corridors, guided by local open space audit)		
Any loss of open space compensated appropriately		
Well Being: Active Travel		
Active travel provision integrated into development providing access to active travel network and local facilities		
Active travel links are safe, convenient and direct		
Active travel links cater for different types of users		
Additional infrastructure is provided where appropriate		
Severance/impediments to existing active routes is avoided		
Specification of routes appropriate to level of use, users, and location		
Access plan produced and submitted		

Well Being: Landscaping		
Landscape led approach taken		
Landscape plan produced which is consistent with other plans		
Development achieves a good landscape fit		
Trees and planting incorporated into proposals, designed to achieve multiple benefits		
Species choice appropriate		
Water: Sustainable Drainage		
Surface water management and flood risk considered at the outset of the design process		
Water used positively and creatively within the layout		
SUDS requirements incorporated, following relevant guidance		
Scottish Water's Surface Water Policy taken into account		
Water: Water Environment		
Water environment safeguarded and enhanced where opportunities arise		
Appropriate buffers provided between development and any water bodies		
Unnecessary engineering works in the water environment avoided		
Enhanced public access provided to water bodies provided where appropriate		
Wildlife		
Biodiversity enriched in and around the site		
Approach informed by site audits, survey work and LBAP		
Existing habitats integrated into landscape design following the five stage approach		
Opportunities to create new habitat have been maximised		
Wildlife corridors, buffers and stepping stones created or safeguarded		
Management and Maintenance		
Common areas such as playspaces, connecting paths, landscaped areas etc. have been designed to be well managed and maintained		
Landscape Management and Maintenance Plan (LMMP) submitted with all required information		
SUDS maintenance arrangements set out within the drainage strategy and cross referenced to the LMMP where appropriate		

APPENDIX 2: LOCAL OPEN SPACE AUDIT TEMPLATE

About the Development

Application/Enquiry Reference Number	
Applicant	
Location	
Description of Development	
Site History	

Local Open Spaces

Name of open space	Open Space Audit Ref	Typologies	Size	Distance from site	Accessibility Issues

Playspace Assessment

Name of Playspace	Size	Accessibility (min 800m)	Equipment/Surfacing	Quality Assessment

Relevant Open Space Strategy Provisions/Planned Investment
Development Framework/Brief/Masterplan Requirements (if relevant)
Provision Proposed within Site (if relevant)
Summary
Recommendations

Parks/Informal Play/Recreation Assessment

Name of Park/Open Space	Size	Accessibility (min 400m)	Kickabout/Informal Play	Quality Assessment

Relevant Open Space Strategy Provisions/Planned Investment
Development Framework/Brief/Masterplan Requirements (if relevant)
Provision Proposed within Site (if relevant)
Summary
Recommendations

Sports Area Assessment

Name of Sports Area	Size	Accessibility (min 800m)	Changing Facilities	Quality Assessment

Relevant Open Space Strategy Provisions/Planned Investment
Development Framework/Brief/Masterplan Requirements (if relevant)
Provision Proposed within Site (if relevant)
Summary
Recommendations