Isle of Wight Sustainable Drainage Supplementary Planning Document

Final Draft

April 2024

Isle of Wight Council

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Abbreviations

AOD	Above Ordnance Datum
AONB	Area of Outstanding Natural Beauty
BRE	Building Research Establishment
BSI	British Standards Institution
CCMA	Coastal Change Management Area
CDM	Construction Design and Management Regulations
CIRIA	Construction Industry Research and Information Association
Defra	Department for Environment, Food and Rural Affairs
EMS	European Maritime Site
FRA	Flood Risk Assessment
ICE	Institute of Civil Engineers
IPS	Island Planning Strategy
IoWC	Isle of Wight Council
km	Kilometres
LFRMS	Local Flood Risk Management Strategy
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
MCZ	Marine Conservation Zone
m	Metres
mm	Millimetres
NPPF	National Planning Policy Framework
NPPG	National Planning Policy Guidance
NVZ	Nitrate Vulnerable Zone
RSPB	The Royal Society for the Protection of Birds
SAB	SuDS Approving Body
SAC	Special Area of Conservation
SFRA	Strategic Flood Risk Assessment

SPA	Special Protection Area
SPD	Supplementary Planning Document
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage Systems
UNESCO	United Nations Educational, Scientific and Cultural Organization
UV	Ultraviolet
WFD	Water Framework Directive
WwTW	Wastewater Treatment Works

1 Introduction

Sustainable Drainage Systems (SuDS) help to manage flood risk to homes, businesses, roads and services on the Isle of Wight. They control the amount of rainfall and pollutants which flow off paved surfaces, and enter the island's rivers, and eventually the sea. Well-designed SuDS also contribute to our resilience to climate change, and provide habitats for native wildlife on the island. They also provide places for communities to meet, play, exercise and enjoy nature.

Surface water drainage should be one of the first aspects considered when assessing whether a site is suitable for development, or when considering works to an existing property. This allows the design of effective drainage strategies, which maximise the benefits of SuDS to people and the environment.

Early engagement and consultation on surface water drainage with the relevant bodies at pre-application stage is also key to reducing the risk of design conflicts and planning objections. This includes Isle of Wight Council (as Local Planning Authority and Lead Local Flood Authority), Island Roads, the Environment Agency, and Southern Water.

Isle of Wight Council expects *all* development proposals to include SuDS. This Supplementary Planning Document (SPD) sets out the Council's expectations for SuDS designs on the island, in the form of the Isle of Wight SuDS Design Standards (Section 0 and Appendix A), and provides guidance on how to meet these. A validation checklist is provided for major development (Appendix D), and for non-major and minor development, standing advice is provided in Section 4.4.3.

1.1 Purpose of this document

The SuDS SPD introduces the concept of SuDS, and outlines the design principles required to deliver SuDS on the Isle of Wight. It provides advice on integrating SuDS within any development and delivering the multiple benefit drainage systems expected within the Isle of Wight.

This guidance is primarily intended for practical use by those looking to undertake development of any scale, as well as designers of surface water drainage systems. However, the guide is also relevant to all those involved in the masterplanning, design, approval, construction and maintenance of new development. It can also be used by anyone looking to find out more about SuDS.

As an unitary authority, the Isle of Wight Council acts as the Lead Local Flood Authority and Local Planning Authority for the island. In its role as Lead Local Flood Authority (LLFA), the Council is responsible for managing the risk of flooding from surface water, groundwater and Ordinary Watercourses (all watercourses not classified as Main Rivers) and is statutory consultee to the planning system on surface water drainage matters.

The Council will use the new guidance to ensure that surface water drainage is managed appropriately and in accordance with national standards and industry best practice for SuDS, as well as the latest national and local planning policy.

The SPD is intended to assist Isle of Wight Council, developers and property owners to deliver SuDS which:

- manage surface water flood risk;
- are appropriate to the island, its geology and hydrology;
- deliver social, environmental and financial benefits;
- aim to meet a range of sustainability and place-making objectives;
- are clearly presented at planning stage, enabling an efficient review and approval process; and

- have clear responsibilities for future maintenance and management.

Where appropriate, the SPD defines local technical design standards for the Isle of Wight, where these go beyond national standards. However, this document is not intended as a detailed design guide. The CIRIA SuDS Manual C753 (2015) is recommended for this purpose, and relevant chapters of the manual, and other reference documents are signposted throughout this SPD.

Finally, the document outlines the planning and approval process, and provides checklists and advice to ensure that planning requirements are clear and accessible (Section 4).

1.2 How to use this document

This document is designed to be read in its entirety. However, some sections may be more relevant to particular users.

Figure 1-1 provides suggested sections for different users to focus on.

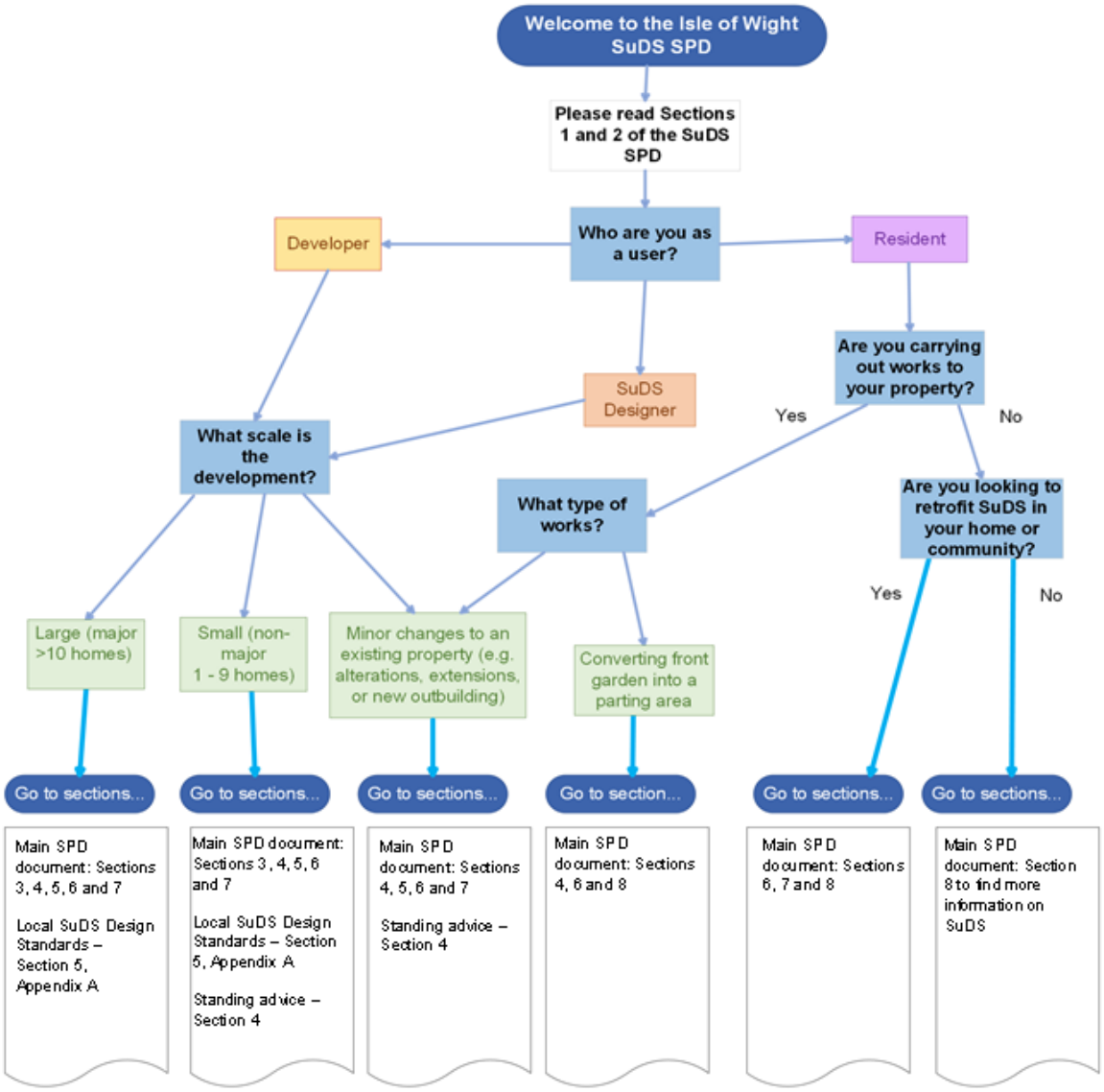


Figure 1-1: User guide to the Isle of Wight SuDS SPD

2 Overview and Context

2.1 What are SuDS and why use them?

Sustainable Drainage Systems, or SuDS, are a way to manage surface water by mimicking the way that rainwater drains in a natural landscape. Traditionally, rain falling on roads, roofs and pavements has been collected in underground pipes and transferred as quickly as possible to the nearest sewer or river. However, this has contributed to flooding and pollution within rivers.

SuDS aim to **slow the flow** of water, by:

- **Source control** – intercepting rain close to where it falls on roads, roofs and pavements
- **Re-using water** – collecting rainwater and re-using it in homes and buildings
- **Allowing water to soak (Infiltration)** – allowing rain to soak into the ground
- **Moving water (Conveyance)** – moving water along the ground surface
- **Storing water (Attenuation)** – storing water on the surface in ponds and basins

There are a wide range of SuDS components which either reuse water, allow water to soak into the ground, move water or store water. A SuDS system has several interconnected components which form part of a management train. The management train should begin with managing rainwater as close to where it falls as possible ('source control').

"The SuDS approach involves slowing down and reducing the quantity of surface water runoff from a developed area to manage downstream flood risk, and reducing the risk of that runoff causing pollution. This is achieved by capturing, infiltrating, slowing, storing, conveying and treating runoff on site and, where possible, on the surface rather than underground. Water then becomes a much more visible and tangible part of the built environment, which can be enjoyed by everyone."

The SuDS Manual C753 p.19 (CIRIA, 2015)

2.2 What are the benefits of using SuDS?

The primary benefits of SuDS are often seen as managing water quantity and quality. SuDS techniques help to manage flooding during storms and also naturally filter pollution (such as silt and petrol), preventing it from entering rivers and the sea.

However, well-designed SuDS provide a host of social, environmental and financial benefits for residents and developers. They create spaces for wildlife and places for people to enjoy, and make developments more resilient to climate change. As a result, SuDS features can contribute to a range of site requirements, including Biodiversity Net Gain, habitat corridors, climate change adaptation and nutrient neutrality.

"Surface water is a valuable resource and this should be reflected in the way it is managed and used in the built environment. It can add to and enhance biodiversity, beauty, tranquility and the natural aesthetic of buildings, places and landscapes and it can help make them more resilient to the changing climate."

The SuDS Manual C753 p.19 (CIRIA, 2015)

Aside from the statutory requirement for SuDS within major development, there are many benefits for developers in integrating well-designed SuDS, to help meet several requirements for a site:

- Ensure national and local planning policy requirements are met

- Use multi-functional SuDS features to **meet several planning policy requirements within the same area of the site** (e.g. biodiversity, amenity, green infrastructure, flood risk, drainage)
- Avoid delays in the planning process and reduce risk of drainage systems needing re-design at a late stage
- Manage flood risk and reduce damage to property both on-site and off-site
- Contribute to providing habitats and meeting Defra Biodiversity Net Gain requirements for new developments
- Improve water quality in environmentally designated sites (Ramsar, SAC, SSSI) and contribute to Water Framework Directive (WFD) targets required by Natural England and the Environment Agency, as well as nutrient neutrality requirements
- Reduce drinking water and garden watering demand (through water-re-use)
- Well-designed SuDS are cheaper and easier to maintain than 'traditional drainage'. Management costs can be saved, as maintenance can be carried out as part of standard landscape contracts
- Providing green spaces, which benefit the health and wellbeing of communities
- Contribute to making developments attractive places to live, which can increase premiums on property values

2.3 What type of developments?

This guidance demonstrates that SuDS can be incorporated into **all types** of development, and is intended to encourage SuDS uptake down to permitted development scale:

- Residential, commercial, industrial and mixed developments
- Greenfield and brownfield (previously developed) sites
- Major development (where the LLFA has a statutory consultee role)
- Minor development types (including extensions, conservatories and driveways)
- Permitted development
- Other development (minerals and waste, schools)
- Refurbishments of existing developments (SuDS retrofitting)
- Existing public open space and streetscapes (SuDS retrofitting)

2.3.1 What are the keys to the successful design and implementation of SuDS?

This guidance provides a starting point for the design of a successful SuDS scheme. The key elements of this are:

- Early consultation with Isle of Wight Council
- Integrate SuDS into the design **from the beginning**
- Ensure opportunities for multiple benefits are realised
- Agree or develop adoption strategy for all forms of SuDS to be used on the site
- Consider the operation and maintenance requirements of the whole drainage system

2.4 How can SuDS support other legislation and policies?

Where SuDS are designed to provide multiple benefits, they can help developments meet the objectives of a range of requirements set out in legislation, national planning policy and Local Plan policies.

The National Planning Policy Framework (NPPF) states that SuDS are a requirement for major developments in England, and where possible they should provide multifunctional benefits (paragraphs 173, 175).

The Local Plan for the Isle of Wight, the Island Planning Strategy (IPS), is used to guide development on the island. The Island Plan Core Strategy was adopted in 2012 and sets out the planning policy framework up to 2027. The Draft IPS is currently being prepared to cover the next 15 years, and SuDS will support any existing policies rolled forward into the new Local Plan.

As mentioned in Section 2.2, multi-functional SuDS can also help to meet multiple mandatory requirements for sites, such as Biodiversity Net Gain, nutrient neutrality and WFD requirements.

See Appendix B for details of how SuDS can contribute to meeting these requirements.

2.5 Biodiversity Net Gain

Biodiversity Net Gain (BNG) as a mandatory requirement came into effect on the 12 February 2024 for all Town and Country Planning Act developments. Additionally, since 2 April 2024 BNG was made a requirement for non-major developments. This statutory requirement is intended as a mechanism to ensure that development proposals demonstrate and ultimately deliver a minimum of 10% gain in biodiversity value (compared to the pre-development baseline). As such, BNG requirements should be considered early in the development process, proposed strategies can also be discussed with the Isle of Wight planning authority prior to submission of a planning application using the pre-application advice service.

Well-designed above ground SuDS features such as swales, bioretention areas, wetlands, and intensive green roofs (such as roof gardens) can offer opportunities to create high quality blue-green corridors which promote habitat connectivity and therefore confers biodiversity benefits. SuDS design should consider how SuDS on a development site can link to existing or planned locally priority habitats (see Section 7.4 for more information on protected habitats). The CIRIA SuDS Manual provides considerable guidance on how biodiversity benefits of SuDS feature can be enhanced. Standard 3b of the SuDS standards in Section A.8 of Appendix A also outlines how proposed SuDS are expected to deliver biodiversity benefits.

2.6 How does the SuDS SPD fit in with other SuDS guidance?

The SuDS SPD builds upon the Defra Non-Statutory Technical Standards for Sustainable Drainage Systems (Defra, 2015). This sets out high level standards for managing flows and volume of runoff, flood risk within the development, as well as the structural integrity, maintenance and construction of SuDS. It should be noted that Defra is currently reviewing and recommending updates to the standards. If adopted, the proposals would bring the standards in line with current best practice in the CIRIA SuDS Manual, including greater focus on the water quality, amenity and biodiversity benefits of SuDS.

Where appropriate, the SPD defines local technical design standards for the Isle of Wight where these go beyond national standards. However, this document is not intended as a detailed design guide, and the CIRIA SuDS Manual C753 (2015) is recommended for this purpose. The SuDS Manual should be considered alongside accompanying CIRIA guidance, including on the construction of SuDS[1], and use of SuDS to reduce nitrogen[2] and phosphorous[3] in surface water runoff. Other national design guidance for SuDS is

1 CIRIA (2017) Guidance on the construction of SuDS (C768). Available at: Item Detail (ciria.org)

2 CIRIA (2023) Using SuDS to reduce nitrogen in surface water runoff (C815F). Available at: Item Detail (ciria.org).

3 CIRIA (2022) Using SuDS to reduce phosphorous in surface water runoff (C808F). Available at: Item Detail (ciria.org)

available, as produced by the Institute of Civil Engineers (ICE) and the British Standards Institution (BSI). The Susdrain website also provides a helpful resource.

2.7 Changes to SuDS approval

In January 2023, Defra announced a decision to implement Schedule 3 of the Flood and Water Management Act 2010 in England. This will introduce a new framework and national standards for the approval and adoption of SuDS in England, and will make Unitary and County Councils SuDS Approving Bodies. It will also remove the automatic right for surface water drainage to connect into the public sewer system. The UK Government is currently considering how Schedule 3 will be implemented. This SuDS SPD will be updated once these details are available.

3 Characteristics of the Isle of Wight

The Isle of Wight lies off the south coast of mainland England and covers an area of approximately 380km^2 (38,016 hectares) and has a coastline of 57 miles in length. The largest town on the island is Ryde, but Newport, the second largest town by population, is the administrative centre. The population on the island has increased by 1.5%, from around 138,300 in 2011 to 140,400 in 2021[4]. Residents are joined by up to 2 million tourists each year.

3.1 Topography

The chalk geology forms the highest elevations in the south and centre of the landscape, with the highest point on the island reaching a maximum elevation of 242mAOD at St Boniface Downs in the south east. The topography falls away from the chalk uplands towards the river valleys and coastline, where it reaches sea level.

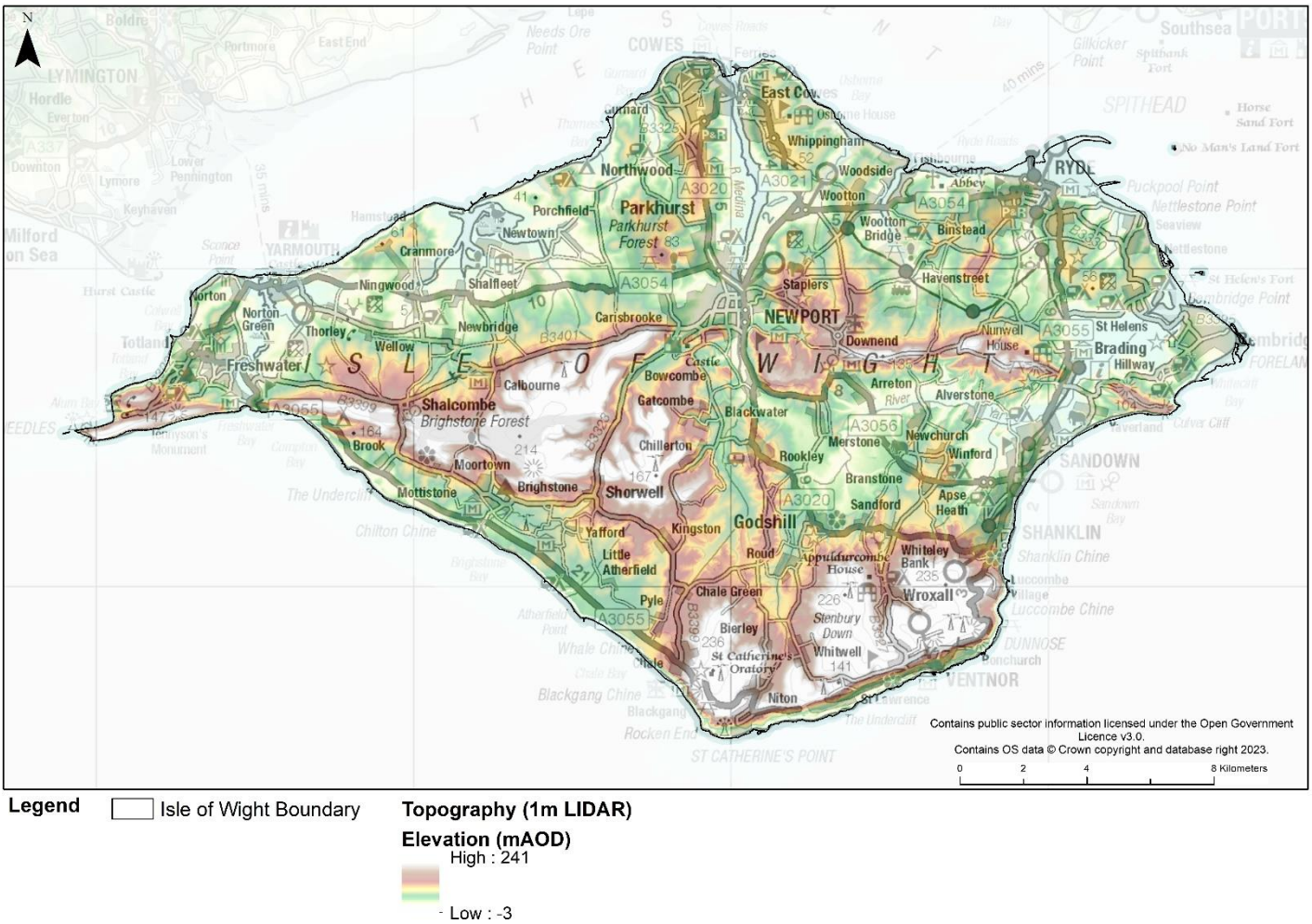


Figure 3-1: Topography of the Isle of Wight

4 Isle of Wight Council (2022) Isle of Wight population figures. Available at: Isle of Wight population figures (iow.gov.uk)

3.2 Soils

Soils in the northern half of the island are base-rich, loamy and clayey. These are seasonally wet and slightly acid. Clay produces heavy soils and where it occurs inland, it mostly supports pasture. These give way to shallow lime-rich soils over chalk or limestone as the underlying bedrock changes along the central ridge. The southern half of the island has mainly freely draining, slightly acid, loamy soils which support distinctive vegetation, as well as some further clays. The light sand soils provide some of the best arable land on the island.

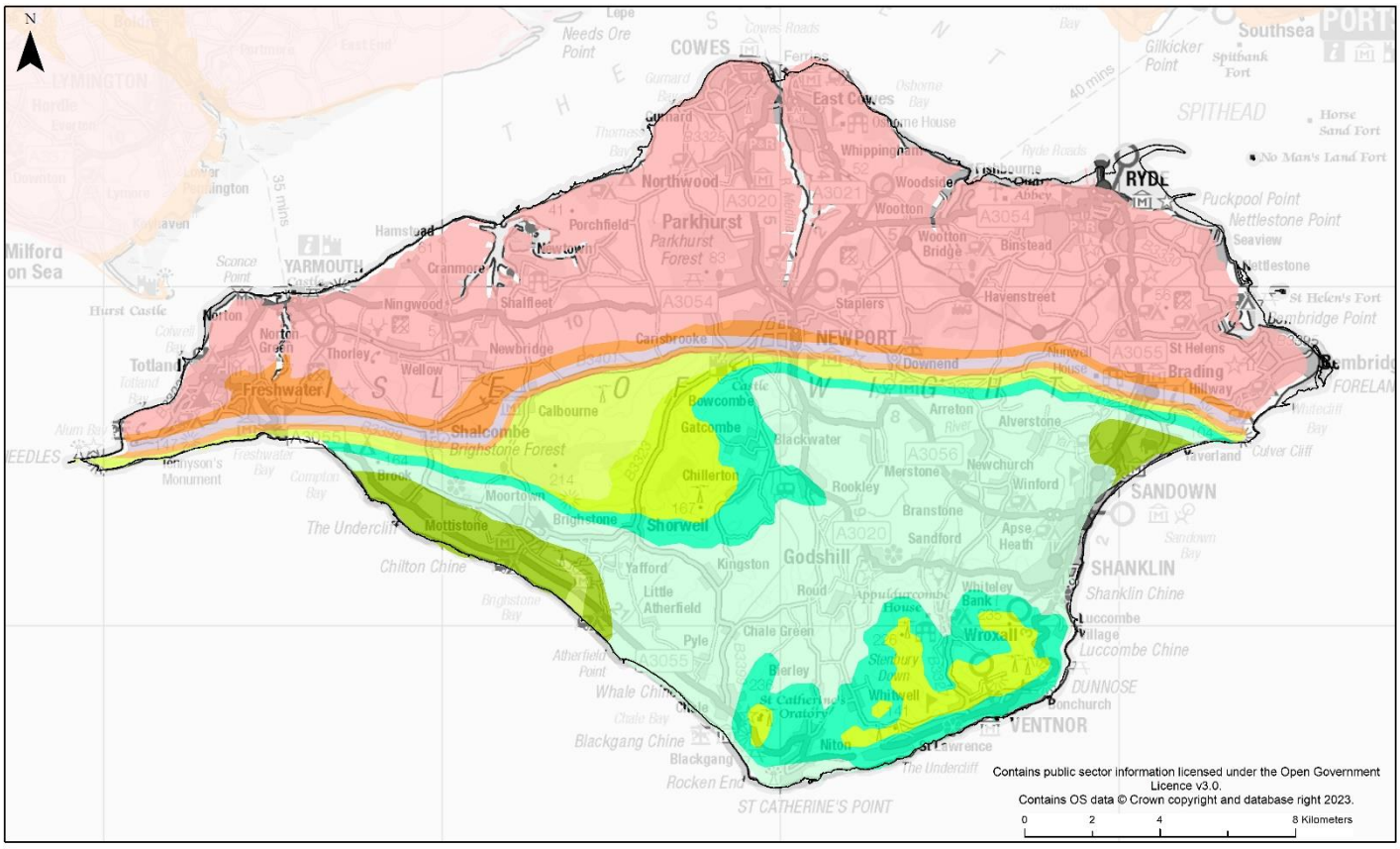
3.3 Geology

The Isle of Wight has a diverse bedrock geology (Figure 3-2). Chalk is the most dominant landform, with a central chalk ridge running from the eastern point at Culver to the western point at The Needles. A second area of chalk downland is located in the south, above the towns of Shanklin and Ventnor and the villages of Niton, Whitwell and Wroxall. Inland areas of chalk correspond with undulating land and often include steep-sided dry valleys.

North of the central chalk ridge, the bedrock is formed of Hamstead Member clays, sands and silts. This geology is also associated with the low-lying cliffs along the north west coast of the island (Hamstead Heritage Coast), the tidal inlets of the Western Yar, Newtown Creek, Kings Quay, Wootton Creek and the wetlands inland at Thorness Bay.

Immediately to the south of the central chalk downs, a band of Lower Sandstone runs from Compton in the west to Yaverland in the east. These rolling hills are often the location of spring lines.

Due to the varied geology of the island, site-specific assessments and ground investigations are required to determine the underlying geology, in order to inform drainage designs. Relevant guidance on standards and best practice for site ground investigations includes the UK Specification for Ground Investigations and the BS 5930 Code of practice for ground investigations.



Legend

Isle of Wight Boundary

Bedrock geology

- BRACKLESHAM GROUP AND BARTON GROUP (UNDIFFERENTIATED) - SAND, SILT AND CLAY
- THAMES GROUP - CLAY, SILT, SAND AND GRAVEL
- LAMBETH GROUP - CLAY, SILT, SAND AND GRAVEL
- SOLENT GROUP - CLAY, SILT AND SAND
- GREY CHALK SUBGROUP - CHALK
- WHITE CHALK SUBGROUP - CHALK
- GAULT FORMATION AND UPPER GREENSAND FORMATION - MUDSTONE, SANDSTONE AND LIMESTONE
- LOWER GREENSAND GROUP - SANDSTONE AND MUDSTONE
- WEALDEN GROUP - MUDSTONE, SILTSTONE AND SANDSTONE
- WEALDEN GROUP - SANDSTONE AND SILTSTONE, INTERBEDDED

Figure 3-2: Bedrock geology of the Isle of Wight

3.4 Coastal geomorphology and landsliding

The town of Ventnor and its surrounding villages along the Undercliff and parts of the Cowes and Gurnard headland are built on pre-existing landslide features, which have implications for these towns and their communities. On the south coast of the Isle of Wight, the Ventnor Undercliff is the largest urbanised landslide complex in north-western Europe, and parts of the area are affected by ground movement. In both areas there is the potential for landslide reactivation. These two zones are marked on the Isle of Wight Council Draft Island Planning Strategy map.

Along the coastline of the island, areas likely to be affected by coastal change over the next 100 years are defined by a Coastal Change Management Area (CCMA), also shown on the Isle of Wight Council Draft Island Planning Strategy map. There is a presumption against new development within the CCMA, to limit the risk to people (see Draft Island Planning Strategy Policy EV16). However, where development is required, a sustainable approach to flood risk and coastal erosion management must be demonstrated.

Within known areas of potential ground instability and coastal landslide risk, groundwater has a significant influence on ground stability. The recharge of groundwater by soakaways and the leakage of sewers and surface water drainage systems is potentially the most

destabilising activity associated with development[5]. Therefore, SuDS features which encourage infiltration of rainfall into the ground are not acceptable within the two zones of potential landslide reactivation. Similarly, the CCMA also typically precludes the use of soakaways, and therefore measures which encourage infiltration into the ground are also considered to be unacceptable within the CCMA. Instead, surface water from development sites in these areas should be discharged into existing watercourses, or should employ the use of adequately lined and sealed surface water drainage systems (see Standard 6a in Section A.8 of Appendix A). Section 7.6 outlines the main design considerations for developments in areas with coastal stability and landslide risk.

3.5 Landscape

Over half of the island (191km^2) was designated as an Area of Outstanding Natural Beauty (AONB) in 1963. The discontinuous AONB area is made up of five land parcels across the island.

A rural island, 80% of its land area is devoted to agriculture, including sheep rearing on the downs and heath 'rangelands', dairy farming on the lower-lying land, and pockets of arable farming and forestry elsewhere. North of the central chalk ridge the soils become wetter and heavier, leading to more grazing land and woodland in these areas.

The coast of the island includes wide sandy shorelines, particularly on the east side of the island, as well as at steep cliffs to the west and south.

3.6 Habitat and biodiversity

In 2019, the Isle of Wight was awarded UNESCO Biosphere Reserve status, to reflect the balanced relationship between people and the natural environment.

The chalk grasslands, cliffs and estuaries on the island support rich habitats and species. As an island, there are also stable populations of native animals which are rare on the mainland, including red squirrels, dormice, bats and water voles[6]. Above-ground, vegetated SuDS provide opportunities to create habitats which support these native species.

The international designations on the coastline alone include Special Areas of Conservation (SAC), European Maritime Site (EMS), Marine Conservation Zones (MCZ), Special Protection Areas (SPA) and Ramsar sites (Figure 3-3).

5 Geomorphological Services Limited (1991) Coastal Landslip Potential Assessment: Isle of Wight Undercliff, Ventnor. Available at: Ventnor Undercliff and Cowes to Gurnard (iow.gov.uk)

6 Isle of Wight Council (2023) Go Wild on Wight. Available at: Go Wild on Wight: Biodiversity on the Isle of Wight

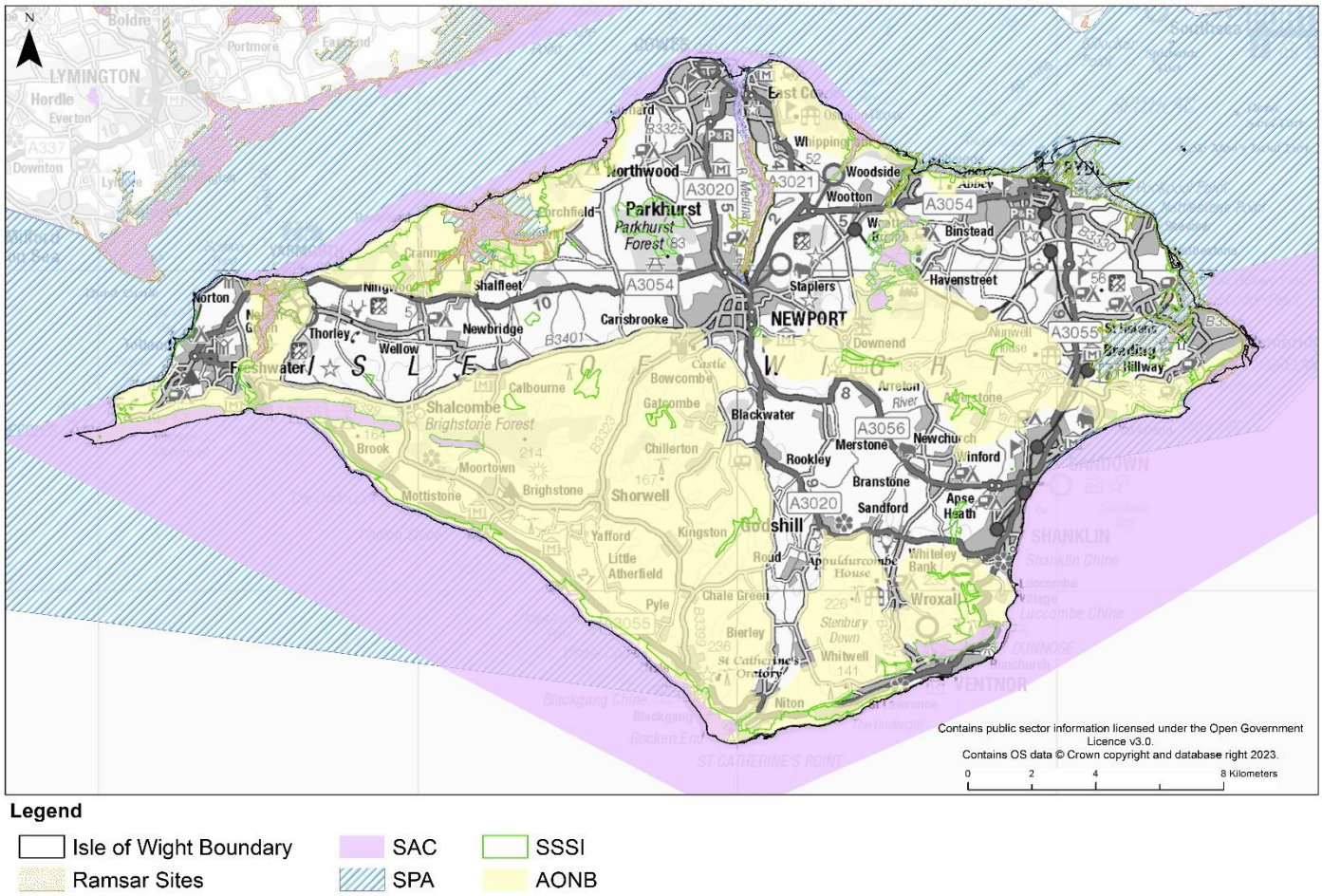


Figure 3-3: Environmental designations on the Isle of Wight

3.7 Historic environment

The historic environment includes listed buildings, historic landscapes, monuments of national interest, and buried archaeological sites. Sufficient consideration should be given during design to any possible impacts of a SuDS scheme, the required mitigation and opportunities to enhance the historic environment. For instance, proposed infiltration should not compromise buried archaeological remains or historic buildings. However, the presence of heritage assets does not preclude the possibility of development. Good design with adequate regard for the choice of appropriate materials and links to existing blue-green spaces can allow development to both retain and make a beneficial contribution to the historic environment. The CIRIA SuDS Manual C753 (2015) outlines where some of the opportunities for betterment can be realised in historic environments, an example may include the use of appropriately designed rainwater harvesting features adjacent to historic buildings.

Developers should identify the presence of heritage assets early in the planning process and consult the LLFA to ensure they are given the opportunity to advise on proposed site drainage. Information and advice on when consent for works needs to be sought can be obtained from the Isle of Wight Council's Archaeology and Historic Environment Service and from the Historic England website. The National Heritage List for England should also be consulted, which is the official register of nationally designated assets. Undesignated

heritage assets are recorded by the Council in the Heritage Gateway's Historic Environment Record for the Isle of Wight.

3.8 Nutrient pollution vulnerability

A large percentage of Isle of Wight AONB is designated as a Nitrate Vulnerable Zone (NVZ) under the Nitrates Directive 1991, which covers most of the Chalk and Lower Greensand areas. The Directive aims to reduce current and future nitrate water pollution.

Natural England has advised that there are high levels of nitrogen and phosphorus input causing eutrophication in the marine designated sites in the Solent (SPAs and SACs). The nutrients are understood to originate from agricultural sources and wastewater from existing and new housing, as well as other development.

As a result, any proposed development which uses Wastewater Treatment Works (WwTW) which discharge into the Solent designated sites and/or waterbodies that subsequently discharge into these designated sites, will need to demonstrate no adverse effects by achieving nutrient neutrality. Conversely, development which connects to a WwTW that does not discharge into the Solent does not need to demonstrate nutrient neutrality.

Isle of Wight Council has produced a position statement[7] that requires all planning applications that involve a net increase of residential units, to demonstrate that their development would not cause harm to the Solent protected sites, as a result of drainage that would result in a net increase in nutrients. SuDS can play a role in mitigating excess nutrients produced within surface water runoff on development sites, though this is a lesser contribution of nutrients than effluent discharge in separate sewer systems. However, in areas with combined sewers reducing overall surface water runoff contributions to the sewer network through SuDS can be beneficial in mitigating effluent discharges and their associated nutrient loads from storm overflows. SuDS can also be effective at managing polluting runoff from roads and highways. The role of SuDS in addressing storm overflows and their impacts is recognised in the Government's Storm Overflows Discharge Reduction Plan published in August 2022. CIRIA guidance on using SuDS to manage nitrogen[2] and phosphorous[3] should be consulted when designing SuDS in areas of nutrient pollution.

3.9 Rainfall

The Isle of Wight is sunniest place in the UK, and is dry by UK standards, with an average annual rainfall of 900-1000mm. A shift in the seasonal pattern of rainfall is expected as a result of climate change, with summers becoming drier on average than at present and winters becoming wetter. The number of days experiencing rainfall in summer and winter will decrease and increase respectively, but the intensities of extreme rainfall in both seasons are expected to increase. SuDS provide an opportunity to harvest rainwater for re-use during drier weather, as well as storing runoff during storm events.

Current Government guidance recommends that an uplift of 25% (Central) to 45% (Upper end) should be applied to peak rainfall estimates for the 1% Annual Exceedance Probability (AEP) (1 in 100-year) event on the Isle of Wight. This accounts for the increase in rainfall intensity expected by the 2070s (years 2061 to 2125)[8]. Isle of Wight Council expects that the latest available upper end allowance is used within design rainfall calculations (see Standard 1d in Section 5 and Appendix A).

3.10 Hydrogeology and water resources

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7 Isle of Wight Council (2021) Isle of Wight Council Position Statement: Nitrogen neutral housing development. Available at: 2981-IWC-Position-Statement-Nitrates-2021.pdf (iow.gov.uk)

8 Environment Agency (2022) Isle of Wight Management Catchment peak rainfall allowances. Available at: Climate change allowances for peak rainfall in England (data.gov.uk)

The island has three principal rivers. The River Medina flows northwards into the Solent, the Eastern Yar (the island's largest river) flows north eastwards to Bembridge Harbour, and the Western Yar flows from Freshwater Bay to the estuary at Yarmouth.

The majority of the watercourses flow in a northerly direction, fed by runoff from steep topography on the island, and drain into estuaries on the northern shores of the island. However, the Chines are home to a series of streams which can rise from the chalk bedrock and flow southwards.

Due to the western Solent being narrower than the eastern Solent, the north coast of the island has four high tides each day, with a double high tide every twelve and a half hours. During these high tides, the ability of watercourses and drainage systems to drain is restricted (further details in 0).

The Isle of Wight is classified at 'serious water stress', with the chalk aquifer providing one of the main resources for the island's water supply. The total water abstraction for public supply on the Isle of Wight is approximately 16.5 million litres per day, split between 23% river water, 47% groundwater and 30% transfers from the mainland. The Eastern Yar provides the largest abstractions and the main aquifers on the Isle of Wight are the Chalk, the Upper Greensand and the Lower Greensand, all found within Isle of Wight AONB. SuDS features such as soakaways, rainwater harvesting systems, and infiltration SuDS (in areas with suitable underlying geology) can support the recharge of groundwater which supplies aquifers. Rainwater harvesting systems can also be designed to conserve and treat rainwater for reuse, minimising the use of potable water for grey water applications (such as flushing toilets).

Flood risk

A significant number of properties on the island are at risk of flooding from multiple sources (coastal, river, surface water, groundwater, sewers – see

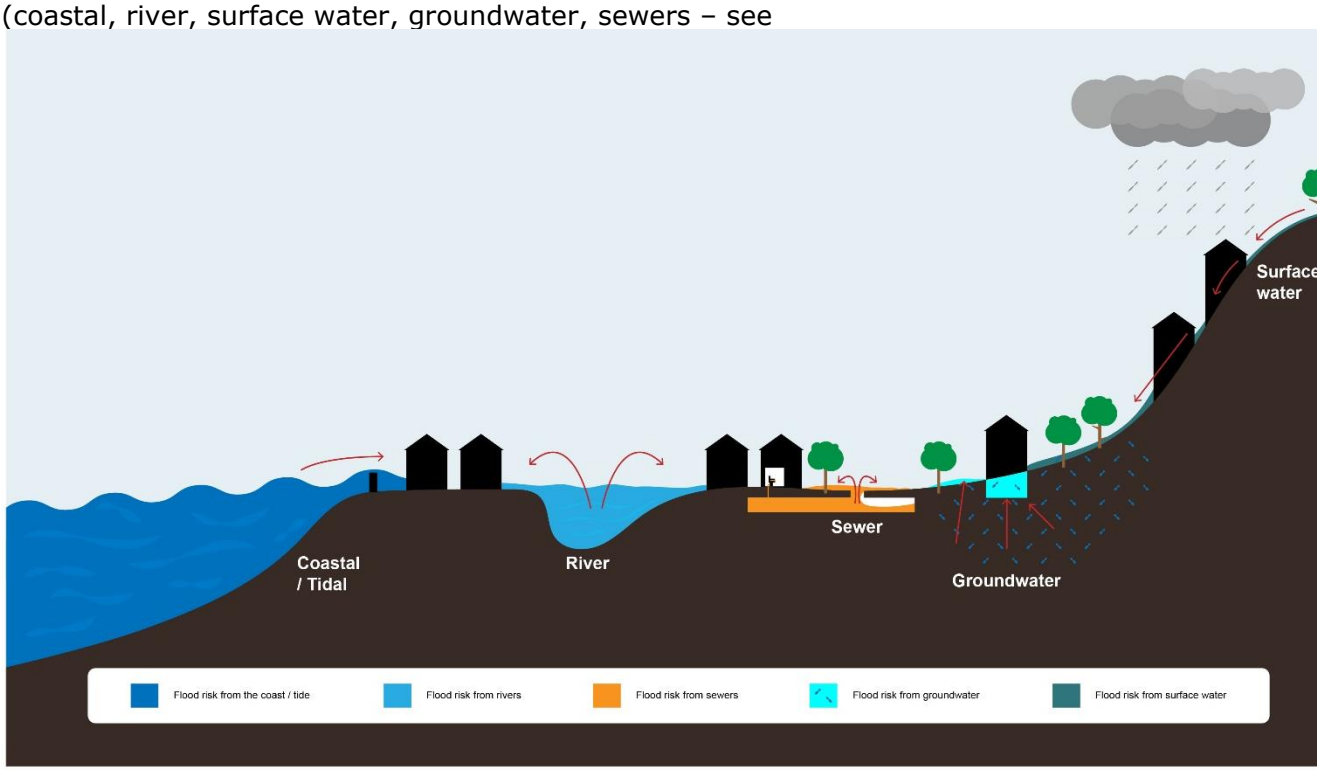

Figure 3-4). Wetter winters and more intense storms are likely to occur with climate change, making flooding more frequent and more severe.

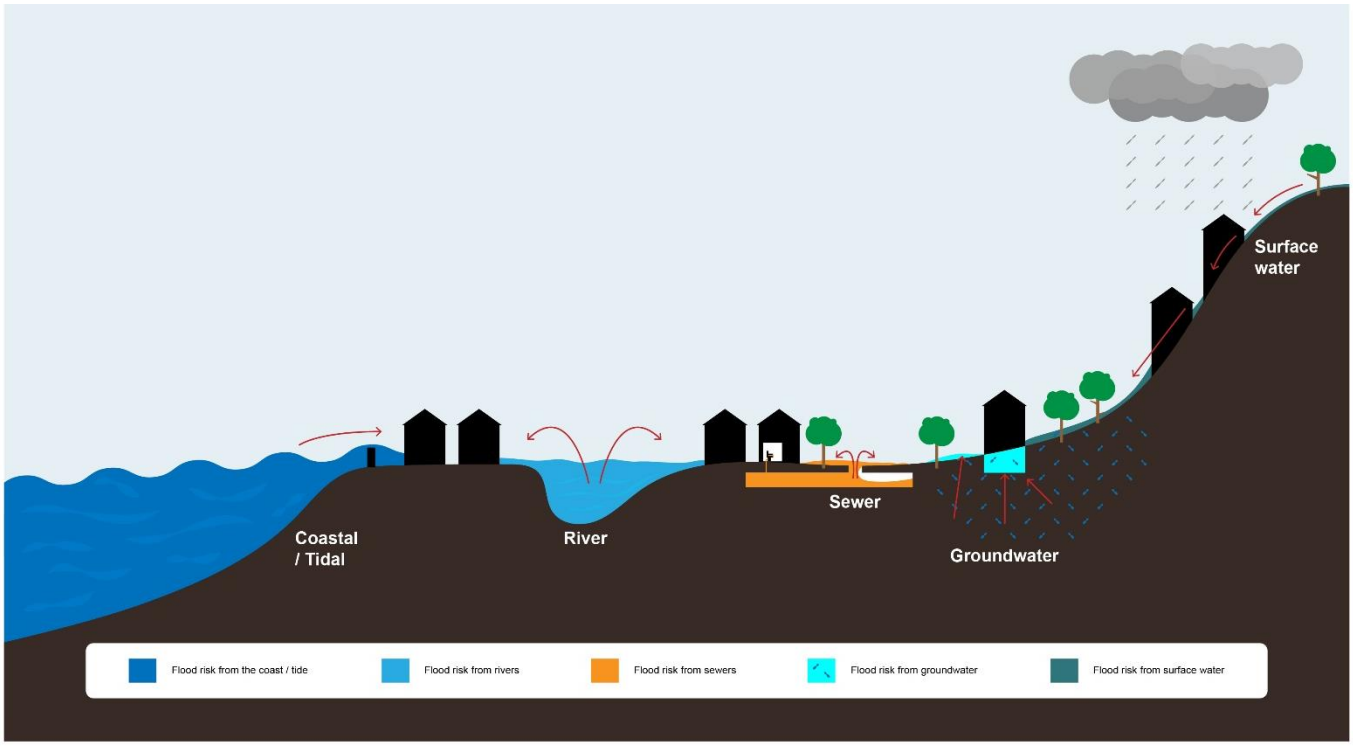

Figure 3-4: Sources of flood risk (source: JBA Consulting)

The primary sources of flood risk on the Isle of Wight are considered to be from rivers and the sea. Large areas of the coast and estuaries are at risk of tidal flooding, including parts of Ryde, Cowes and East Cowes, Sandown and Yarmouth. Fluvial flood risk is concentrated in the northern portion of the island where the majority of the watercourses are located. Tidal conditions have a significant influence on fluvial flood risk, particularly in Ryde, Freshwater and Newport[6].

Surface water flood risk is high in urbanised areas of the island, where runoff forms on paved surfaces and the capacity of drainage systems can be exceeded by heavy rainfall[9]. Many of the older sewer networks within towns are combined systems, which receive both sewage and surface water. The sewer capacity can be exceeded during heavy rainfall, resulting in diluted, but untreated, effluent being discharged into watercourses and the sea during heavy rainfall, to reduce the risk of sewage flooding to property. By controlling the rate and volume of surface water entering the combined sewer network, SuDS can improve existing flood risk and water quality.

A combination of a system of rias (sunken or flooded estuaries) and the complex tidal regime of the Solent (with double or dual peak high tides) can lead to tidal water blocking the discharge of watercourses, drainage infrastructure and surface water, in a process known as tide locking. Flood risk on the island often occurs due to a combination of high tides and a fluvial or surface water flood event occurring at the same time. This causes water levels to rise within channels and drainage structures and can lead to exceedance of capacity. Increases to sea level as a result of climate change will impact areas that are tidally influenced. This will affect future flood risk in these tidally influenced areas, particularly from fluvial and surface water flooding. Where discharge from a site is proposed to an area of tidal influence, the potential for tide locking and its impact on drainage and storage potential should be considered as part of any scheme.

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9 Environment Agency (2009) Isle of Wight Catchment Flood Management Plan. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/293850/Isle_of_Wight_Catchment_Flood_Management_Plan.pdf

Groundwater flooding is considered to present a less significant risk to the island than tidal, fluvial or surface water flooding. The Isle of Wight Strategic Flood Risk Assessment (SFRA) identified that groundwater flooding is usually linked to, and contributes to, fluvial flooding, with limited groundwater flooding having occurred in the Lower Eastern Yar. However, due to the variable geology on the island, a site-specific assessment of groundwater levels is required to inform drainage designs.

Significant flood events have occurred in recent years, notably in Autumn 2023, Winter 2000 – 2001, Winter 2013/14 and Summer 2021. In 2000, prolonged rainfall led to high river levels, which coincided with frequent tide-locking. Gurnard, Cowes, Newport, Ryde and Seaview all experienced flooding as a result of high river, groundwater and tidal levels. In 2021, an extreme and intense rainfall event exceeded the capacity of surface water drainage and combined sewer systems. Internal property flooding occurred in Ryde, Binstead, Bembridge and Monktonmead.

4 SuDS design and the planning process

4.1 Overview

Since April 2015, SuDS have been a statutory requirement on all major development, and are approved through the planning system, with the LLFA acting as a statutory consultee to the Local Planning Authority (LPA).

This means SuDS are required for:

- residential developments of 10 dwellings or more,
- residential developments of 0.5 hectares or more,
- developments where the building floor space to be created is 1,000 square metres or more,
- developments on sites with an area of 1 hectare or more,
- winning and working of minerals of the use of land for mineral-working deposits,
- waste developments.

However, since then, updates to the National Planning Policy Framework (NPPF) (2021) and Planning Practice Guidance (NPPG) (2022) have strengthened the requirement.

Isle of Wight Council expects SuDS to be considered within all developments, regardless of their scale.

This section provides guidance on the level of detail which should be provided to support SuDS designs in different types and scales of development (as summarised in Figure 4-1).

The CIRIA SuDS Manual (Section 7) provides in depth, step-by-step guidance on the design process. This section outlines how these design stages correspond with the planning process on the Isle of Wight.

The key steps in the planning process for SuDS are as follows[10]:

- Pre-application
- Planning negotiation and decision-making on outline and detailed design
- Final planning approval for construction
- Adoption and maintenance of SuDS
- Planning inspection and enforcement action of SuDS construction and maintenance

Further policies on SuDS and green infrastructure are set out in the Environment Policies (Section 4) of the Isle of Wight Local Plan.

Following enactment of Schedule 3 of the Flood and Water Management Act in England, it is anticipated that SuDS approval will be undertaken by the LLFA as the SuDS Approving Body (SAB) in a separate process to the planning system, as is currently the case in Wales. **This section of the guidance will be updated following implementation of Schedule 3.**

10 Potter, K., Vilcan, T. (2020) Managing urban flood resilience through the planning system: insights from the 'SuDS-face'. Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences. Available at: Managing urban flood resilience through the English planning system: insights from the 'SuDS-face' | Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences (royalsocietypublishing.org)

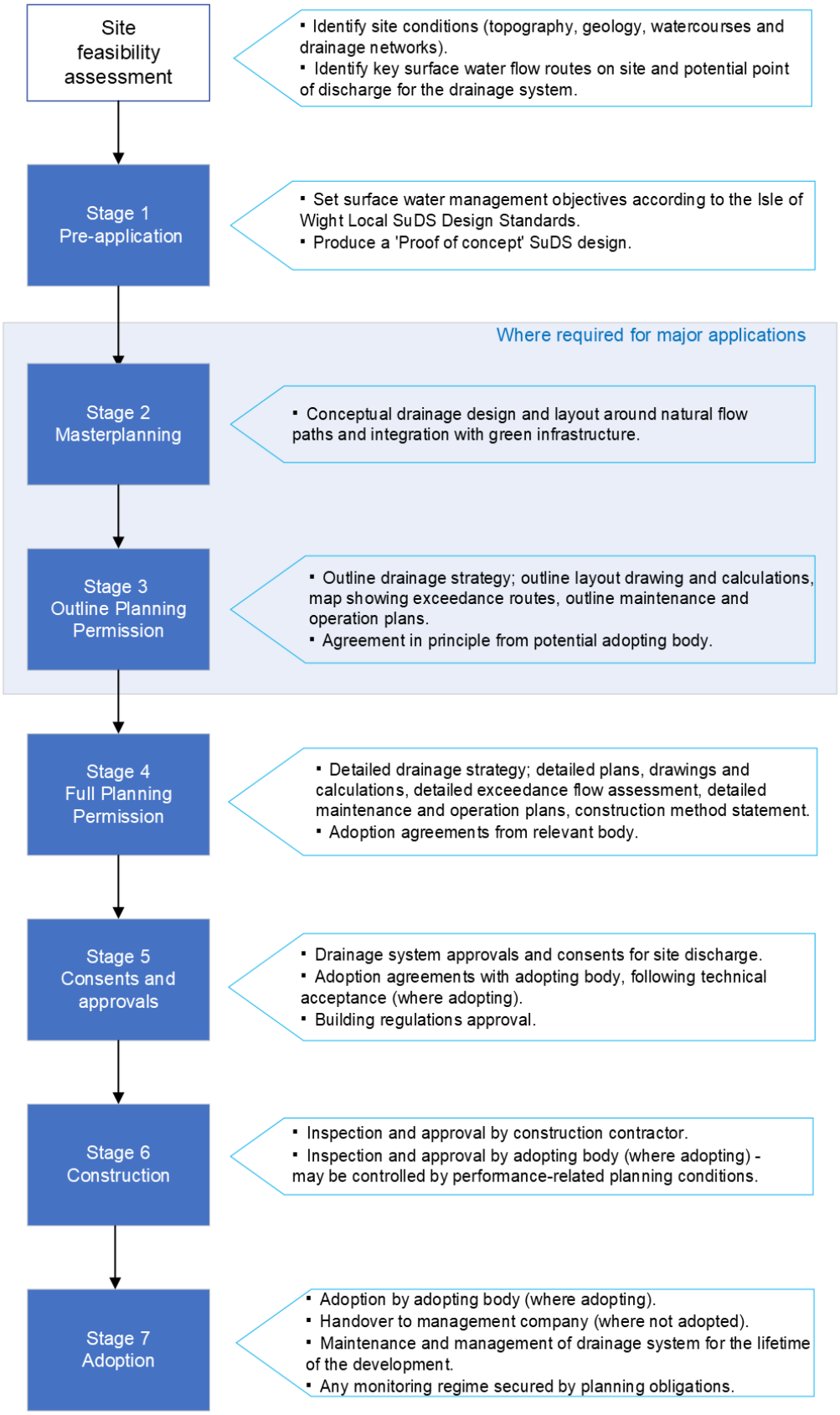

Figure 4-1: Overview of the SuDS delivery process

4.2 Who to consult?

Statutory consultees must be consulted where appropriate conditions apply, as shown in Table 4-1.

Table 4-1: Statutory consultees for planning applications

Organisation	Role	When to consult	How to consult
Isle of Wight Council	Lead Local Flood Authority	Consult on SuDS design and flood risk from Ordinary Watercourses, surface water and groundwater. Statutory consultee on surface water drainage proposals for all major developments Applications to discharge into a watercourse would require an Ordinary Watercourse Consent	The LLFA does not have a formal pre-application process. However, it welcomes early discussions with developers around surface water drainage and flood risk relating to major developments. Please complete a pre-application advice form to arrange this.
	Local Planning Authority	On planning applications for all types of development.	Details on how to apply for pre-application advice or planning permission can be found on the Isle of Wight Council website.
Southern Water	Sewerage undertaker	Early consultation with Southern Water and the Local Planning Authority will be required before developing the site layout or masterplan (plan showing the general layout of key elements on the site). To ensure a viable drainage strategy, Southern Water must be contacted before submitting a planning application. This will allow agreement of any connections and discharge rates into the public sewer network, as well as adoptable SuDS design standards.	Complete a wastewater pre-planning enquiry application form and email it to developerservices@southernwater.co.uk.
Island Roads	Highways Authority	Consult if SuDS will impact on adopted public highways or if discharge of surface water to highway drainage is proposed. Statutory consultee engaged where a development proposal has an impact on the highway network.	Details on how to book pre-application advice can be found on the Development Control pages of the Island Roads website, or by emailing developmentcontrol@islandroads.com
Environment Agency	Executive non-departmental public body sponsored by Defra	Consult on flood risk within Flood Zones 2 and 3, discharge of surface water to Main Rivers, Critical Drainage Areas and infiltration in Source Protection Zones.	Please read the Environment Agency's Standing Advice on flood risk, before consulting them. Pre-application advice service Flood Risk Activity Environmental Permits for works to a Main River

Whilst not compulsory, consultation with other organisations and groups is beneficial, to gain further understanding of the implications and considerations in planning for SuDS. Recommended non-statutory consultees include:

- Hampshire and Isle of Wight Wildlife Trust
- Island Rivers Partnership hosted by Natural Enterprise
- The Royal Society for the Protection of Birds (RSPB)
- Local communities - Parish Councils, community flood groups etc.

4.3 Major development

4.3.1 Pre-application

Engaging with the approving authorities at the pre-application stage clarifies the requirements and is expected in a full planning application for a particular site. This can minimise delays in the planning approval process, as less time is spent amending drainage designs at the outline and full planning stages.

The Isle of Wight Council, as LPA and LLFA, encourages the use of pre-application advice for all developments.

Information required

Designers and developers should check the Isle of Wight SuDS design standards (see Section A.8 of Appendix A) at an early stage to understand what is expected of SuDS on the island.

A 'proof of concept' SuDS plan and statement will be prepared, to inform the pre-application discussions. Once agreed in principle, this plan can then be used to guide the site masterplan and detailed drainage design.

Early consideration should be given to:

- Identification of site characteristics which present opportunities and constraints for SuDS (topography, infiltration potential, coastal stability, discharge destinations, local habitats, flood risk, adoption arrangements etc.). The Island Core Strategy map provides a useful resource.
- Seeking advice and surveys from professionals from relevant disciplines (ecologists, landscape architects, archaeologists, drainage engineers etc.)

4.3.2 Masterplanning

For larger developments, a masterplan will be necessary. Seeking advice from the LPA, LLFA, Southern Water and Island Roads early in the masterplanning process will help to avoid costly issues or redesigns at a later stage. Considering SuDS at this stage also maximises the financial benefits of SuDS, such as cheaper drainage construction costs and a potentially more desirable development.

Information required

At this stage, the conceptual design and layout will be determined, designing SuDS around natural flow paths, low points and catchments.

SuDS will be integrated with multifunctional green spaces and the road network, with prevention and source control SuDS integrated into building designs. Land uses should be clustered to manage pollution.

4.3.3 Outline application

An outline planning application is used to determine whether a development is likely to be approved by the planning authority. The aim is to secure approval in principle, before a fully detailed proposal is submitted.

Information required

An outline drainage strategy, plans and drawings must be provided. The LLFA must be satisfied that the drainage proposals are viable and will meet the Isle of Wight local SuDS standards, national SuDS standards and planning policy.

As well as managing the quantity of surface water, the strategy must also demonstrate how the site will meet Isle of Wight standards on water quality, biodiversity, climate change, coastal stability, amenity, health and safety (see Section 0 and Appendix A). It must also set out an agreement in principle for who will adopt and maintain the SuDS, and an outline Maintenance and Operation Plan.

4.3.4 Full application

A full planning application seeks complete approval for a development proposal.

Information required

A detailed drainage strategy, plans and drawings must be provided. This will include detailed design of the layout, dimensions and performance of the proposed SuDS system and components, and detailed design of exceedance routes. The LLFA must be satisfied that the drainage proposals are viable and will meet the Isle of Wight local SuDS standards, national SuDS standards and planning policy.

The strategy must fully evidence how the site will meet Isle of Wight standards on water quantity, water quality, biodiversity, climate change, coastal stability, amenity, health and safety. It must also set out an agreement for who will adopt and maintain the SuDS, a detailed Maintenance and Operation Plan and a Construction Method Statement.

A ground investigation must be undertaken in advance of a full planning application, to sufficiently inform the detailed drainage strategy.

4.3.5 Reserved matters

Where outline planning has previously been approved, a reserved matters application can be made within three years, to deal with any outstanding details. These details typically include the layout, scale and appearance of the development.

Work cannot begin on site until all reserved matters have been approved.

Information required

Any reserved matters relating to SuDS will require information to be provided at the same level of detail as a Full Application. Where all or parts of the SuDS system are to be adopted, approval in writing of the design from the adopting body must be submitted.

4.3.6 Discharge of conditions

Where conditional planning approval has been granted for a site, an application is required to submit further details, to discharge these conditions.

Details requested at the discharge of conditions stage often centre around construction, operation and maintenance of the SuDS network. However, other conditions may be applied depending on the application and the site.

Information required

Examples of Discharge of conditions requirements:

- Confirmation of proposed methods for treating surface water runoff (including the first 5mm of rainfall)
- Consent from relevant authority, where connection of discharge to a waterbody/sewer is proposed
- For phased developments, proposed delivery and construction phasing plans

- Full construction, operation and maintenance schedules for the proposed SuDS features
- Documented evidence of confirmed adoption arrangements with the adopting authority

Where all or parts of the system are to be adopted, approval in writing of the design from the adopting body must be submitted before the discharge of conditions.

Any discharge of conditions relating to SuDS will require information to be provided at the same level of detail as a Full Application. See Section 6.2 for more information on the arrangements for the adoption of SuDS.

4.3.7 Phased developments

Phased developments are those which are constructed in several stages, often over many years. This can be a challenge for installing SuDS, as consistency in approach must be maintained from the outline drainage strategy for the entire site to the phase-scale detailed drainage design.

Drainage design for each phase of the development should meet the wider drainage strategy for the whole site, as agreed in the approved outline application. If the drainage design changes between outline approval and the detailed design for a development phase, surface water calculations and drawings will need to be re-submitted for planning approval.

Any changes to the design must not impact on its quality in terms of water quantity, water quality, climate change, biodiversity, coastal stability, amenity, health and safety, or ease of maintenance.

Information required

At site-level strategic outline planning stage:

- Details of planned phasing of development, with SuDS in earlier stages of development sized to accommodate later development phases
- Specified limits to surface water runoff rates and volumes for each phase of development
- Details on sequencing of SuDS during construction phases, to manage surface water runoff and limit sediment erosion during each development phase (see Isle of Wight SuDS local standard Principle 7)

At phase-scale individual planning application stage:

- Use of surface water runoff rates and volumes agreed at outline planning stage
- Clear integration of the SuDS scheme with the site-wide outline drainage strategy, as well as completed and proposed development phases

4.4 Non-major / Minor development

The impact of non-major and minor development on flood risk and surface water drainage issues is often underestimated. The successive growth of small developments within a catchment can have a large cumulative impact on surface water runoff rates and volumes, as well as flood risk on downstream communities.

SuDS can and should be incorporated in all developments, including smaller developments and extensions/renovations.

Isle of Wight Council as LLFA is not a statutory consultee on surface water drainage for minor development. However, standing advice for non-major and minor development is provided in Section 4.4.3.

4.4.1 Non-major development

Major development is defined under the Town and Country Planning Order 2015 as: residential development of ten or more dwellings (or a site area of 0.5 hectares or more), a building where the floor space is 1,000m^2 or more, development with a site area of 1 hectare or more, and waste and minerals development.

'Non-major development' is defined within the Flood Risk and Coastal Change NPPG as any development falling below the threshold of major development. For example, a planning application for eight dwellings, an office building creating 750 square metres of floor space, or a development with a site area of 0.4 hectares.

There are many benefits to using SuDS rather than traditional drainage in a new development and it is strongly encouraged. SuDS may also help in meeting many other Local Plan policies and requirements for a development, such as Biodiversity Net Gain.

4.4.2 Minor development

In relation to flood risk, "minor development" is defined within the Flood Risk and Coastal Change NPPG. In this context, minor development means:

- Minor non-residential extensions (industrial/commercial/leisure): with a floorspace of less than 250 square metres
- Alterations: development that does not increase the size of buildings (e.g. alterations to external appearance)
- Householder development: for example, sheds, garages, games rooms etc. within the curtilage of the existing dwelling, in addition to physical extensions to the existing dwelling itself. This excludes creating a separate dwelling within the curtilage of the existing dwelling (e.g. subdividing houses into flats)

Much of the advice relating to space-restricted developments (see Section 7.10) can also be applied to minor development and renovations. There are opportunities to install on-site surface SuDS in any small project. For example green roofs and trees can add biodiversity value on small areas, and areas of hardstanding can be fitted with permeable paving or gravel to slow runoff and improve water quality. Other suitable features include slow-release water butts which redirects roof runoff into a tank with an elevated drain, this allows excess water to drain slowly towards the drainage system.

4.4.3 Standing advice for Non-major and Minor Development

The expectation is that all developments on the Isle of Wight will aim to include high quality SuDS and provide some form of betterment to existing conditions. The inclusion of SuDS has many benefits and will also help to meet many other local policies.

Applicants are required to provide Isle of Wight Council, as Local Planning Authority, with a surface water drainage management plan which demonstrates how surface water from the development will be disposed of in a manner that does not increase flood risk elsewhere, in accordance with the principles of SuDS. The applicant is advised to refer to the Isle of Wight Local SuDS Design Standards, particularly those relating to water quantity (Principle 1). To achieve this, we recommend the inclusion of source control components (such as rainwater re-use/harvesting, green roofs, rain gardens, trees, permeable paving). Existing flow routes and drainage features within the site should be identified and preserved (e.g. ditches, seasonally dry watercourses, historic ponds).

Surface water drainage should also aim to enhance the water quality, biodiversity, climate change resilience and amenity of the site. Clear justification and evidence are required to prove that inclusion of SuDS within non-major or minor development "would be inappropriate" (NPPF paragraphs 173 and 175). The NPPG for Flood Risk and Coastal Change states that where cost is included as a reason for not including SuDS, information

must be provided to allow comparison of lifetime costs between SuDS and a conventional public sewer connection.

This must include the opportunity costs of providing land for drainage components, as well as the maintenance and operating costs.

4.5 Other development

As well as residential and commercial developments, SuDS should also be implemented to manage surface water in other types of development. This includes:

- **Schools**
  - Schools provide excellent opportunities to incorporate SuDS which deliver benefits for learning and play.
  - SuDS bring many benefits to schools, including water re-use, cost savings, flood risk management, pollution control and aesthetic improvements, as well as being an education and play resource. SuDS in schools which incorporate standing water into the design should incorporate child safety barriers and warning signs, without detracting from the function and amenity value of the feature.
  - Health and safety concerns are often identified as constraints for delivering SuDS in schools. However by using effective and creative designs, safety can be incorporated into SuDS designs, without detracting from the amenity value of the features.
  - New schools on the Isle of Wight must incorporate SuDS into the site design, following the Local SuDS Design Standards and national standards. Redevelopment plans for existing schools also explore opportunities to retrofit SuDS features, particularly where flooding or restricted sewer capacity issues exist.
- **Minerals and waste**
  - Minerals and waste development is classified as major development under the Town and Country Planning Act (1990). It is therefore subject to the same SuDS requirements as major residential or employment sites.
  - The Island Planning Strategy Waste and Minerals is used to determine waste and minerals planning applications on the Isle of Wight.
  - As stated in the NPPG (Paragraph 215) mineral deposits have to be worked where they are found, and there is no scope for relocation. Sand and gravel extraction is defined as 'water-compatible development' in NPPF Annex 3, acknowledging that these deposits are often in flood risk areas. However, mineral working should not increase flood risk elsewhere and sites need to be designed, worked and restored accordingly.
  - Mineral workings can be large and may provide opportunities for applying sequential working and restoration. This can be designed to reduce flood risk by providing flood storage and attenuation. Most mineral development will involve the management of water, whether in terms of de-watering or consumption (such as washing, or dust mitigation). All such activities should minimise water consumption, flood risk (both on and off site) and poor water quality. Site restoration is also likely to present biodiversity enhancement, including through the management of water features.
  - As set out in the National planning policy for waste (Appendix B)[11], potential waste management sites must consider the proximity of vulnerable surface water and groundwater bodies. For landfill or land-raising, geological conditions and the behaviour of surface water and groundwater should be assessed, both for the site under consideration and the surrounding area. The

11 Department for Levelling Up, Housing & Communities and Ministry of Housing Communities & Local Government (2014) National planning policy for waste. Available at: National planning policy for waste - GOV.UK (www.gov.uk)

suitability of locations subject to flooding, and consequent issues relating to the management of potential contamination risk to water quality, will also need particular care.

4.6 Applications to pave front gardens

The paving of front gardens with hardstanding is strongly discouraged, as it has a significant cumulative impact on flooding and pollution of watercourses, as well as putting pressure on the local highway drainage systems and sewer networks.

Planning permission is required for proposals to cover more than 5 square metres of a front garden with hardstanding, which do not provide for the surface water to run to a permeable area. Planning permission is not required if:

- A new or replacement driveway of any size uses permeable (or porous) surfacing, such as gravel, permeable block paving, or porous asphalt; or
- Rainwater from the driveway is directed to a lawn or border, to drain naturally.

Applying for planning permission requires completing an application form, providing plans (which must be to scale) and paying a fee.

Proposals which include creating new vehicle access to the front garden will require application for a Section 171 agreement from Island Roads.

For further guidance see UK Government guidance on permeable surfacing for front gardens[12] and Royal Horticultural Society guidance on permeable paving[13].

4.7 Consent for works to watercourses

Consenting is a separate process to planning applications.

Consents are required:

- Where discharge into a watercourse, water body is proposed
- Before piping/culverting or obstructing a watercourse, whether permanent or temporary
- If as part of the construction of development, works are planned to any watercourse
- For repairs to certain existing structures and maintenance works

The requirement for consent from the relevant authority applies, even if planning permission has been granted. Consents should be considered at an early stage. For information, see the UK Government Guidance on works to watercourses.

Table 4-2 identifies the authority to contact for different watercourse consents. There is a presumption against the culverting of open watercourses, except for access, and for connecting surface water drainage from new development into the highway drainage system.

12 UK Government (2009) Guidance on the permeable surfacing of front gardens. Available at: Guidance on the permeable surfacing of front gardens - GOV.UK (www.gov.uk)

13 Royal Horticultural Society (2023) Front gardens: permeable paving. Available at: Front gardens: permeable paving / RHS Gardening

Table 4-2: Consents required for works to watercourses

Watercourse or drainage system	Consent required	Seek consent from:
Main river	Flood Risk Activity Permit	Environment Agency
Ordinary watercourse (all other ditches, drains or streams)	Land Drainage Consent	Isle of Wight Council (Lead Local Flood Authority)

5 Isle of Wight SuDS design standards

This section provides an overview of the seven principles for SuDS design on the Isle of Wight, which are underpinned by a series of standards. Detailed guidance on how to meet each of the SuDS standards is provided in Appendix A.

5.1 Principle 1: Control the quantity of runoff to manage flood risk

5.1.1 Discharge destination

Standard 1a: Discharge must be prioritised according to the following discharge hierarchy:

a) Rainwater re-use and recycling

b) Shallow infiltration

c) Discharge to surface water body (watercourse[14], lake, sea)

d) Discharge to surface water sewer

Discharge to a combined sewer will only be permitted as a last resort where all other options have been robustly demonstrated not to be possible. In these circumstances, surface water inputs to the network should be reduced, and the remainder attenuated as much as possible. Any new surface water inputs from major housing or commercial development to the wastewater network should also be offset by removing rainwater connections elsewhere in the catchment, for example through retrofitting SuDS as set out in Section 8.1 of this document. This is to ensure that new development does not contribute to increased occurrence of storm overflows.

5.1.2 Runoff rates and volumes

Standard 1b: For all developments, the peak allowable discharge rate from the development to any surface water body or sewer for the 1 in 1-year, 1 in 30-year and 1 in 100-year rainfall event must never exceed the peak greenfield runoff rate for the same event. In some cases, it may be necessary to restrict rates further depending on local requirements.

Standard 1c: For all developments, the runoff volume from the development to any surface water body or sewer in the 1 in 100-year, 6-hour rainfall event must never exceed the greenfield runoff volume for the same event (with an allowance for future climate change and urban creep)

5.1.3 Flood risk within the development

Standard 1d: The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30-year rainfall event. Any flooding within a 1 in 100-year plus climate change rainfall event must be retained within the site boundary, and no flooding occurs in any part to any building or utility plant within the development.

Standard 1e: Flows resulting from rainfall in excess of a 1 in 100 year plus climate change rainfall event, OR from overtopping or failure of a SuDS feature, must be managed in downstream SuDS components or designated exceedance routes that minimise the risks to people and property.

5.2 Principle 2: Manage the quality of runoff to prevent pollution

Standard 2a: SuDS must prevent runoff from leaving the site during everyday rainfall events (up to 5mm).

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14 Subject to Flood Risk Activity Permit or Ordinary Watercourse consent from relevant consenting authority.

Standard 2b: A SuDS management train approach must be followed to ensure that surface water discharged from the development does not adversely impact the quality of receiving waters.

5.3 Principle 3: Create and sustain better places for nature

Standard 3a: SuDS designs must maximise the use of vegetated SuDS features for storage and conveyance across the site.

Standard 3b: SuDS designs must contribute to meeting local and national policy on biodiversity.

5.4 Principle 4: Create and sustain better places for people

Standard 4a: SuDS designs must maximise multi-functional use of space on the site.
Standard 4b: SuDS must be safe for residents and operators.

5.5 Principle 5: Climate change resilience

Standard 5a: SuDS designs must contribute to ensuring new developments are resilient to climate change for the lifetime of the development.

5.6 Principle 6 : Coastal stability

Standard 6a: SuDS designs must not exacerbate coastal erosion or landsliding**,** or have an adverse effect upon the stability of cliffs or areas of known ground instability on the Isle of Wight.

5.7 Principle 7: Adoption, maintenance and construction

Standard 7a: SuDS must be adopted and maintained for the lifetime of the development.

Standard 7b: Surface water runoff must be managed during the construction phase.

6 Planning for construction, adoption and maintenance

6.1 Construction

SuDS are no more difficult to construct than traditional piped drainage systems. However, the construction of SuDS requires care and a contractor with a good understanding of their purpose and function. This is particularly important for the phasing of SuDS within the multiple stages of construction typical of larger development sites.

The CIRIA Guidance on the Construction of SuDS should be consulted in the design and construction of all SuDS on the Isle of Wight.

6.1.1 Planning for construction

Before construction of SuDS can take place, full details are needed of the site conditions, and the design details of each component. This must include how the construction of SuDS fits into wider construction works on the site.

A Construction Method Statement must be prepared and approved by the LLFA at the detailed design stage, before SuDS construction works can commence. The method statement should identify the potential constraints and requirements for constructing SuDS on the site.

The Construction Method Statement should contain the following:

- Who will be responsible for construction
- How and when SuDS will be built, in relation to the overall site construction programme, including phasing of development
- Evidence that works will be completed early in the process, and a proposed strategy for sediment control and site drainage during construction
- If not possible, evidence must be provided that sufficient remediation of SuDS features will take place after construction
- Consideration of ecological and water quality impacts
- Emphasis of the differences between traditional construction activities
- Constraints on site works and how other works will be coordinated with SuDS
- A clear process of as-built SuDS inspections and sign off, which could be controlled by performance-related planning conditions

See the pre-construction checklist within Section 6.2 of the CIRIA C768 Guidance on the construction of SuDS for full details of what needs to be considered before constructing SuDS.

6.1.2 During construction

During the construction of SuDS, site management practices should be put in place, to prevent costly damage and re-building of SuDS features. Care should also be taken during construction to avoid negative impacts on areas of ground instability.

The phasing of construction works and management of site activities are critical to the performance and success of SuDS features. As best practice, SuDS should be completed early and isolated from areas of ongoing construction, while the rest of the site works are underway.

Site Management

The following aspects should be considered when managing the construction of SuDS on a development site:

- Appropriately phasing SuDS into development.

- Allows surface water generated during construction phase to be managed on site.
- Prevents damage to below-ground structures.
- Isolates the SuDS features from areas of 'live' construction on the site, to avoid damage.
- Keeps site access and material storage areas, which may cause damage, away from SuDS features.

- Managing runoff both on and off-site
  - On steeper slopes, check dams should be used to manage the velocity of runoff on the site, to prevent erosion.
  - Temporary features, like basins and swales, can be created to accommodate the runoff generated on the site during the construction phases.
- Pollution control
  - Construction must meet the regulatory requirement of discharged water from the site being free from silt and pollutants.
  - If SuDS are used to drain site runoff during construction, they must later be remediated, to remove silt and pollutants.
- Managing soils and controlling sediment erosion
  - Compaction of soils designated for SuDS by heavy machinery should be avoided.
  - To control erosion, grassy SuDS either need to have vegetation established, or to be covered by erosion control mats and blankets, before they are used.
  - Reducing erosion prevents silt from entering other parts of the system.

Inspection

SuDS should be inspected by the adopting body at agreed points during construction, to confirm that the built features meet the approved design.

Where significant variations are discovered on site (e.g. changes in levels, changes in materials, changes in the sequence of works) they should be reviewed by the original SuDS designer, to determine how this will affect the design performance.

See Susdrain Construction Guidance for further information.

6.1.3 After construction

Handover inspection and sign-off

After construction, the adopting body or management company should arrange inspections of the work, prior to adoption. An as-built topographic survey of the system should be completed after construction.

Reviewing the performance of SuDS

Like all drainage systems, SuDS components should be regularly inspected, monitored and maintained in line with agreed method statements, to ensure efficient operation and prevent failure.

6.2 Adoption

For SuDS to be effectively managed and maintained, clear arrangements need to be in place to specify which organisation is responsible. Adoption arrangements are key to the feasibility of a drainage strategy, and can significantly influence the design and location of SuDS features within a development site.

As a result, agreement on which organisation will have responsibility for adoption and maintenance of SuDS should be discussed with the Local Planning Authority and Lead Local Flood Authority. This should be agreed at the pre-application stage of the planning process.

All proposed discharge rates and volumes must be agreed with Isle of Wight Council, as Lead Local Flood Authority, before reaching an adoption agreement with any organisation.

The developer may arrange for adoption and maintenance to be undertaken by one of the following parties, where appropriate:

- Private management company
  - Often arrangements are made for a private management company to take on the responsibility for maintenance of SuDS and the public spaces on developments.
  - A detailed maintenance and operation plan must be in place to establish how the private management company will manage the SuDS components. It will also specify how often maintenance works will be carried out.
- Southern Water
  - Since 1st April 2020, water companies have been able to adopt certain SuDS features as part of the surface water sewer network, under the Water UK Sewerage Sector Guidance.
  - Early consultation with Southern Water and the Local Planning Authority will be required, before developing the site layout or masterplan and making a planning application. As with conventional piped systems, the right to discharge must be secured by the developer and transferred to the water company on adoption.
  - See Southern Water Outline Guidance for SuDS for further details.
- Island Roads
  - As Highways Authority, Island Roads considers the adoption of SuDS features which accept runoff from the highway alone.
  - Where SuDS drain runoff from roofs or other areas of hardstanding in addition to the highway, they are currently not considered for adoption.

Where SuDS components are proposed on land within private ownership (such as property driveways or gardens), the developer will be expected to include provision within the deeds of the property which ensures that the SuDS features remain in situ throughout the lifetime of the development.

6.3 Maintenance

The maintenance and adoption of SuDS should be considered at the pre-application stage of a development. It is important to consider **who** will manage the SuDS features, and **how** they will maintain them.

Maintenance of SuDS should be simple and practical. Management of SuDS features within a site by multiple organisations is not an efficient use of resources.

Further detail can be found in the Susdrain Maintenance of SuDS and Maintenance and Adoption Factsheet resources.

6.3.1 Designing for maintenance

Maintenance is critical to effectiveness and success of SuDS, for example ensuring that the system drains effectively, and the created habitats sustain wildlife. These requirements should be considered from the outset of the design process, and cover the lifetime of the development.

Piped networks and underground features, particularly involving deep excavation, should be avoided, through early consideration of operational and maintenance requirements. Shallow surface features are preferred, with easily visible inlets and outlets where problems can be easily identified and systems designed to prevent blockages.

Further detail is provided under the Isle of Wight Local SuDS Design Standards (Principle 7) and within the Susdrain Maintenance and Adoption Factsheet.

6.3.2 Maintenance and operation plan

All outline and full planning applications for major developments on the Isle of Wight must provide a Maintenance and Operation Plan. This will demonstrate that the proposed SuDS can be easily and safely maintained by the adopting organisation. A maintenance plan must comply with the Isle of Wight Local Design Standards, as set out in Principle 7. Note that different adopting authorities, such as Southern Water, may have additional maintenance design requirements for adoptable SuDS.

A Maintenance and Operation Plan should be at an appropriate level of detail for the planning stage including:

- Details of the required regular, occasional, emergency, and remedial maintenance activities for all SuDS features on the site. The plan should be tailored to the actual SuDS features planned for the site and how they should be maintained in the specific setting of the development. The feature-specific maintenance tables in Chapter 32 of the CIRIA SuDS Manual can be used to inform the plan, but simply reproducing them is not acceptable
- Estimated costs for the specified maintenance activities
- Details of any maintenance activities required over the first 5 years to aid establishment
- Locations of access points for maintenance of the SuDS features
- Identification of a specified management authority for each SuDS feature for the lifetime of the development and details of adoption arrangements
- Where multiple maintenance organisations are identified, details of how maintenance plans will be coordinated, to maintain performance of the SuDS network
- Emergency maintenance following a catastrophic failure of SuDS features
- Details of how the maintenance plans will be communicated effectively to residents. This should include:
    - What SuDS features are present
    - How they work
    - What defects to look out for
    - Who to contact in the event of a problem

Further guidance including a sample maintenance plan and inspection checklist (Appendix B) can be found in Chapter 32 of the CIRIA SuDS Manual. However, this is a guide only and the maintenance plan is likely to differ from one site to another. Careful consideration is required to ensure that the maintenance plan is site-specific.

7 Overcoming challenges in delivering SuDS on the Isle of Wight

7.1 Introduction

SuDS can be implemented on any development site. Certain site conditions may require adjustments to the design or the type of components used, but even the most challenging sites must integrate SuDS in some form. Development proposals will be regarded favourably for maximising benefits and including multi-use features, not just focussing on water quantity. Previously developed, or 'brownfield' sites, provide an opportunity to significantly improve the amenity and biodiversity value of the land, and its resilience to climate change, through the use of SuDS.

The following sections provide guidance on the most commonly raised site constraints and demonstrate how they can be overcome with good planning and design.

7.2 Flood Risk

Flood risk can come from various sources: fluvial (river) flooding, tidal, pluvial (surface water) flooding, sewer systems, high groundwater levels and climate change. Despite the challenges which flooding can cause for development, it can also provide opportunities. Understanding the causes and impacts of flooding on a site can allow natural flow paths and flood extents to be harnessed and incorporated into the design.

Details of flood risk across the island can be found within the Isle of Wight SFRA .

7.2.1 Fluvial and tidal flood risk

Advice should be sought from the Environment Agency regarding flood risk from the sea and fluvial flood risk on Main Rivers, and from the LLFA for fluvial risk from Ordinary Watercourses. A Flood Risk Assessment should be completed where necessary to ensure that the site is safe and does not increase flood risk elsewhere (e.g. compensation for loss of floodplain storage).

The NPPF and Isle of Wight SFRA provide full details of managing flood risk within development. The SFRA also outlines the criteria for sites requiring a site-specific Flood Risk Assessment (FRA).

SuDS design considerations:

- Storage for runoff from the development in extreme events should be located out of the fluvial and coastal floodplain.
- Floodplain areas can provide treatment for more frequent events, so long as floodplain capacity is not reduced. The effects of modelled fluvial and tidal water levels, frequency, duration and velocities on performance of SuDS components, and the risk of damage by erosion should be considered.
- Where discharge from a site is proposed to an area of tidal influence, the potential for tide locking and its impact on drainage and possible storage should be considered as part of any scheme.
- Design for a high groundwater table.
- Consider maintenance implications of silt and sediment deposition from a flood event.
- Design attenuation SuDS with a sufficient drain-down time (to half-empty within 24 hours) following a storm event to allow for it to receive runoff from subsequent events.

7.2.2 Surface water and ordinary watercourse flood risk

Advice should be sought from Isle of Wight Council regarding flood risk from surface water and Ordinary Watercourses. Surface water flood risk may be identified using the Environment Agency Risk of Flooding from Surface Water map. Flood risk from Ordinary Watercourses not shown in the Environment Agency Flood Zones map may also be indicated by this surface water mapping.

The identification of local surface water flood risk should not be a constraint, as well-designed SuDS can improve flood risk both on and off the site.

SuDS design considerations:

- Assess and design for additional surface water flows and volumes entering the site.
- Design for natural drainage pathways - existing surface water flow routes should be identified and integrated into the exceedance design for the site.
- Communication and collaboration with neighbouring land owners and stakeholders.

7.2.3 Groundwater flood risk

Site investigations, informed by local flooding incidents and Isle of Wight Council flood reports, should be undertaken to identify if the site is prone to high groundwater levels. Infiltration testing and groundwater monitoring should be undertaken on sites identified as at high risk throughout the winter months, and should take into account the wetness of the winter and also historic groundwater levels. High groundwater levels during extreme wet periods may render infiltration SuDS ineffective and pose a direct pollution risk to groundwater. If levels are very high, groundwater may enter the SuDS feature and reduce the storage capacity and structural integrity of the design.

SuDS design considerations:

- The base of an infiltration system should be located at least 1m above the likely maximum water table. Groundwater quality protection must be considered for infiltration SuDS where the seasonal water table is high.
- Avoid locating below-ground features such as tanks below the maximum groundwater level, as pressure loads are likely to be high.
- Shallow surface features such as swales, ponds and permeable pavements can be lined with an impermeable layer, to isolate SuDS from groundwater.

Advice should be sought from the LLFA regarding areas at risk. On-site ground investigations are required prior to the design and construction of infiltration SuDS or deep storage features.

7.2.4 Discharges to groundwater and Source Protection Zones (SPZ)

The quality of discharges to groundwater are regulated by the Environment Agency. The document 'The Environment Agency's approach to groundwater protection' gives details of their position statements, and supports the use of a SuDS management train approach.

SPZs are designated to protect drinking water supply aquifers from pollution. For development in an SPZ1 which proposes infiltration SuDS for anything other than clean roof drainage, the Environment Agency will require a risk assessment to demonstrate that pollution of groundwater will not occur. **There are 15 SPZ1s on the Isle of Wight.**

The Source Protection Zone map can be found at http://www.natureonthemap.naturalengland.org.uk/MagicMap.aspx.

SuDS design considerations:

- Shallow surface features such as basins, swales, ponds and permeable paving can be lined with an impermeable layer to prevent infiltration.
- Additional treatment stages or proprietary treatment systems to improve water quality before infiltration can be provided.

7.3 Receiving surface waters

When planning a new outfall to a watercourse, or works to the bed or banks of a channel, a consent will be required.

Works within 8m of a designated Main River will require a Flood Risk Activity Permit from the Environment Agency.

For all other watercourses, an Ordinary Watercourse Consent may be required from Isle of Wight Council as the LLFA. Approval will be dependent on the impacts on adjacent land owners and future maintenance of the watercourse.

An Environmental Permit is not currently required to discharge uncontaminated runoff from public roads and small parking areas to surface water bodies, if it has been treated by a SuDS system.

SuDS design considerations:

- Provision of additional treatment stages or proprietary treatment systems to improve water quality.

7.4 Protected habitats

There are large numbers of designated sites and watercourses on the Isle of Wight, and SuDS designers should be aware of their species and habitat needs.

Developments within an SSSI Impact Risk Zone should liaise with Natural England, as receiving waters are likely have environmental designations (SSSI, SAC etc.). SSSI Impact Risk Zones and all other environmental designation areas can be viewed on the Natural England website. The Local Planning Authority is required to consult Natural England within these areas.

7.5 Topography

7.5.1 Flat site

SuDS rely on gravity to transfer water around the site and meet outlet levels without being affected by downstream water levels, meaning flat sites can be problematic.

SuDS design considerations:

- Green roofs, rainwater capture and reuse and permeable paving can be used as normal on flat sites
- Keep water on the surface and use conveyance methods of kerbs, shallow rills and swales.
- Design should be based on small sub-catchments with storage and conveyance managed close to source. Hydraulic head will build up locally and push water out of the system.
- The LLFA does not accept of the use of pumps in SuDS design, because they are not a sustainable solution. If it is not possible to design a solution without using pumping, then this is considered an exception.

7.5.2 Steep site

Steep slopes (>5%) can generate high flow velocities and pose problems of water by-passing drainage features, scour, erosion and in severe cases health and safety issues.

Permeable paving becomes ineffective on steep gradients, and infiltrated water can re-emerge further downslope, causing slope instability.

SuDS design considerations:

- Green roofs, rainwater capture and reuse can be used as normal on steep sites.
- Features such as permeable paving, bioretention areas, swales and wetland can be terraced or designed to follow contours.
- Design should be based on small sub-catchments with storage and conveyance managed close to source.
- Erosion protection can be provided for steep conveyance features such as waterfalls, stones set into the bed of channels etc.
- Check dams can be placed in swales to slow velocities.
- Geotechnical investigations should be undertaken to make sure that infiltration will not cause instability.

7.6 Coastal stability and landslide risk

The Coastal Change Management Area (CCMA) identifies areas likely to be affected by coastal change over the next 100 years, and on the Isle of Wight there are also two further areas of potential risk from future ground instability and landslides, including the town of Ventnor and its surrounding villages along the Undercliff, and parts of Cowes and Gurnard. Within known areas of potential ground instability and coastal landslide risk, groundwater has a significant influence on ground stability. The recharge of groundwater by soakaways and the leakage of sewers and surface water drainage systems is potentially the most destabilising activity associated with development[15]. Therefore, SuDS features which encourage infiltration into the ground are not acceptable within the zones of potential landslide risk and also considered to be unacceptable in the CCMA (see Standard 6a in Section A.8 of Appendix A). Instead, surface water from development sites should be discharged into existing watercourses, or adequately lined and sealed surface water drainage systems.

SuDS design considerations:

- Engage early with Isle of Wight Council LPA, LLFA and Coastal Geomorphology officers to discuss constraints at the site.
- SuDS features must not use infiltration and must be lined to prevent ingress of surface water into the underlying geology.
- Drainage strategies should allow adequate collection of surface water at the base of any slopes or areas of hardstanding, to prevent water from ponding in localised areas.
- Drainage systems should be designed to run parallel to, rather than across, landslide units.
- Pipework should be designed to tolerate some ground movement. For example, rigid pipes with flexible joints, embedded in a granular fill material suitable for flexible pipes, to reduce the risk of pipe fracture.
- Seek early advice from a geotechnical professional.

15 Geomorphological Services Limited (1991) Coastal Landslip Potential Assessment: Isle of Wight Undercliff, Ventnor. Available at: Ventnor Undercliff and Cowes to Gurnard (iow.gov.uk)

7.7 Contaminated land

There are no sites on the island that have been identified as "contaminated land" within the terms of The Environmental Protection Act 1990. However, the following guidance should be applied in the event that contaminated sites are identified in future.

Water infiltrating through affected soils can mobilise contaminants and pose a pollution risk to groundwater. Excavation and disposal of contaminated soils is expensive, and SuDS may compromise remediation measures in place to protect residents from contamination. However contaminated land will not be accepted as a reason to exclude SuDS.

Once the location and depth of contamination has been established, SuDS designs can be adapted to prevent mobilisation of contaminants, for example by restricting infiltration to uncontaminated areas, and to avoid creating pathways for pollutants to enter surface water or groundwater.

SuDS design considerations:

- Green roofs and rainwater capture and reuse can be used as normal on contaminated sites
- Seek early advice from a geo-environmental professional so that drainage design and remediation strategies for contamination can be integrated (e.g. capping layer can be extended beneath SuDS).
- Suitability of infiltration systems will depend on testing the leaching potential of contaminants. Infiltration may be possible at depth, below the contaminated layer. Alternatively, contaminated soil around soakaways can be removed and replaced.
- If infiltration is not possible, shallow surface features such as basins, swales, ponds and permeable pavements can be lined with an impermeable layer to prevent infiltration.
- Materials should be assessed for durability when exposed to contaminants (as for any other construction material in this situation).
- Use of shallow surface features can reduce the need to excavate contaminated ground

7.8 Low permeability

Soils/geology with low permeability are often cited as a reason not to include SuDS, but in reality, almost all SuDS components can still be used, with some modifications.

SuDS design considerations:

- All SuDS except infiltration systems can be used on low permeability sites. Above ground components should be used to provide the required attenuation and treatment.
- Greenfield runoff rates tend to be high on low permeability geologies, so attenuation requirements should be more manageable.
- Permeable paving may require an underdrain.
- Infiltration may be possible at greater depth below a low permeability soil layer. The Environment Agency should be consulted on deep infiltration systems to ensure they will not have an adverse effect on groundwater.

7.9 High permeability

Large areas of the south of the island are underlain by chalk geology. There is a potential for infiltration systems to cause solution of chalk over time, leading to sink holes or settlement of foundations at infilled solution features.

SuDS design considerations:

- Seek early advice from a geo-technical professional.
- Place infiltration features at sufficient distance from foundations.

7.10 Limited space

It may be perceived that site profitability will be reduced by the land-take associated with larger surface SuDS such as swales and ponds/wetlands. Brownfield developments in particular, may be restricted in terms of space or existing infrastructure.

There are a range of space-efficient SuDS techniques. Source control is a key concept, and opportunities can be maximised where strategic SuDS design is considered at an early stage and all available public and private space is utilised (e.g. verges, small pockets of grass or paving). Incorporating SuDS into landscaping can significantly enhance the amenity value of brownfield sites for residents. High density housing will not be accepted as a reason to exclude SuDS.

Design considerations:

- Green roofs, rainwater capture and reuse, infiltration systems, permeable paving, bioretention areas, tree pits and micro-wetlands are all possible on space-restricted sites.
- Non-trafficked paved areas can be made permeable (pavements/footpaths, parking).
- Rills, channels and depressions can be built into the hardscape and planted to provide water features.
- Swales, filter strips, ponds and large wetlands are less suitable.
- Access to existing underground infrastructure, such as utilities, will need to be considered in the design.

7.11 Brownfield sites

Brownfield sites are often targeted for redevelopment on the island, but there is a perception that they are unsuitable for SuDS. In contrast, SuDS which deliver multiple benefits are of particular importance on these sites, where they can help to manage existing flood risk and water quality issues, and contribute towards regeneration of urban areas. Existing brownfield sites also often provide niche habitats for invertebrates, which can be enhanced by incorporating vegetated SuDS features, such as green roofs.

The majority of SuDS components can be adapted to suit the requirements of brownfield sites, including contaminated land, space constraints, and compacted soils with poor infiltration potential.

Design considerations (see also design considerations for 0: Contaminated Land, 7.8: Low Permeability and 7.10: Limited Space):

- Permeable paving can be used to replace areas of hardstanding. Hard landscaped depressions, ponds and rills can be used to provide both storage and attractive features for people and wildlife.
- Use of shallow surface features can reduce the need to excavate contaminated ground or areas congested with below-ground services.
- Existing drainage infrastructure can be reused, subject to condition and capacity.

7.12 Commercial sites

SuDS must be used to manage surface water on commercial sites such as retail parks and business parks, for the lifetime of the development. SuDS offer a number of advantages to commercial developments including making them more attractive to customers and businesses; helping them to meet minimum environmental standards; making them

resilient to climate change; encouraging wildlife and biodiversity; and providing savings on heating and cooling and maintenance costs.

Design considerations:

- Green roofs, rainwater capture and reuse, infiltration systems, permeable paving, bioretention areas, tree pits and micro-wetlands are all possible on commercial sites.
- Green roofs on large commercial buildings provide insulation and absorb ultraviolet (UV) radiation, reducing heat in summer and retaining heat in winter. They also protect the roof membranes from UV radiation, increasing their lifespan.
- Large roofs are also an opportunity for rainwater harvesting and re-use.
- Large car park areas provide opportunities for permeable paving and filter strips to treat pollution, but also vegetated surface features such as swales and tree pits which bring multiple benefits.
- Ponds and wetlands can provide attractive amenity spaces for workers and customers.

7.13 Industrial sites / high pollution risk

Care must be taken when designing SuDS for some commercial and industrial sites, particularly where storage, handling or use of hazardous substances occurs (such as for example, garage forecourts, coach and lorry parks/turning areas and metal recycling/vehicle dismantling facilities).

Design considerations:

- Runoff from 'safe' areas (e.g. roofs or car parks) should be separated and drained through SuDS.
- SuDS such as swales, permeable paving and bioretention areas can be lined if there is a risk of contamination.
- Runoff from areas with a high risk of contamination from hazardous substances should be separated, contained and dealt with as industrial waste.
- Discharges of surface water run-off to ground at pollutant storage sites are likely to require an environmental permit from the Environment Agency. The site will be subject to risk assessment and provision of acceptable effluent treatment.

7.14 Health and safety considerations

Designers have responsibilities under the Construction (Design and Maintenance) Regulations 2015 (CDM) to eliminate, reduce or control foreseeable risks during construction, maintenance and use of a structure.

As SuDS are no more hazardous than natural waterbodies, health and safety concerns are not accepted as a reason for their exclusion in development. Potential health and safety risks can be overcome through good SuDS design, and should be balanced against the benefits for health and well-being. Public perception of risk can be addressed through community engagement and education.

7.15 Affordability

The costs of SuDS are generally lower than conventional piped and tanked drainage (Defra, 2011). Where SuDS are integrated into the design at an early stage, they become part of the above-ground landscaping and building design, and there is less need for expensive hard-engineered solutions, such as over-sized pipes and underground storage.

Full lifetime costs should be taken into account. SuDS have low maintenance costs over their lifetime, with surface features like swales able to be maintained within landscape maintenance contracts. However, the costs of replacing/refurbishing permeable paving can be high.

The multiple benefits of SuDS should not be underestimated when assessing costs and benefits, as they can make SuDS schemes attractive to other organisations, who may be able to offer partnership funding opportunities and engage local communities.

SuDS design considerations:

- Consider SuDS design at an early stage and consult with all stakeholders to identify funding opportunities.
- Prioritise source control and surface systems to avoid hard engineered and deep excavated solutions.
- Choose low maintenance designs, which can be maintained under standard landscaping contracts.
- Deal with waste on-site.
- Involve the community in maintenance.
- Fully assess the wider benefits when evaluating a SuDS scheme (e.g. CIRIA SuDS Manual Table 35.1, CIRIA B£ST Evaluation Tool)

8 Retrofitting SuDS

Drainage and sewer networks have a limited capacity. One of the challenges as towns grow and intense rainfall happens more often, is that these drainage systems can become overwhelmed, and cause flooding. Pipe networks can be upgraded to increase their capacity, but this is a very costly solution.

An alternative solution is to use SuDS to disconnect the existing drainage system from sewers or highway drains, and to direct it into a watercourse, or allow it to infiltrate into the ground. Community level retrofit SuDS schemes can also help alleviate pressure on combined sewer systems thereby reducing the likelihood and frequency of sewer spills. Retrofit SuDS are recognised as a significant component of Southern Water's Clean River and Seas Plan for the Solent[16].

Where SuDS are incorporated after the initial development of an area, or are used to improve the existing drainage situation, this process is known as 'SuDS retrofitting'.

This can be achieved at a range of scales, for example, rainfall from the downpipe of a house can be diverted into a green roof or raingarden, rather than the sewer system. During redevelopment of a town centre, runoff from pavements and roads can be drained into swales or permeable paving, rather than into an overloaded highway drainage network. Alternatively, runoff from a larger urban area could be diverted into a new storage area in a park.

8.1 Considerations for retrofitting SuDS

Opportunities to retrofit SuDS are most likely to be realised when they are considered early in any redevelopment or renovation plans. This may require close cooperation between developers, planners and risk management authorities, and could involve joint funding. For example, retrofitting a public area upstream of a development site could help to manage surface water runoff entering the site and enhance the existing neighbouring street-scene.

Retrofitting SuDS provides an opportunity not only to remove rainfall from the sewer network, but also to remove concrete and hard surfaces. This helps to create green spaces and to make public spaces in towns and cities better places for people and wildlife to live.

When planning redevelopment or refurbishment which will not significantly change a site layout, consider opportunities to:

- Remove existing surface water connections from foul or combined sewers. This can also enable capacity within the foul or combined sewers to allow additional foul flows;
- Replace old, impermeably paved surfaces with permeable paving surfaces or connect them to new filter drains or bioretention areas as part of re-landscaping; and
- Where front gardens are being converted for parking, use features such as pervious paving and raingardens to provide parking space without causing additional runoff onto the road.

Care should also be taken to avoid inappropriate retrofitted measures that would prevent effective drying and shorten the life of buildings. For instance, traditional buildings are at risk from flooding and need to dry out slowly when flood events occur.

~~8.1.2~~8.1.1 In the home

Everyone can play a role in bringing SuDS to the Isle of Wight, for example by:

- Replacing paved surfaces with grassy and permeable ones, which allow water to soak through e.g. permeable paving or gravel on driveway;
- Fitting SuDS on property, where possible e.g. water butts, rainwater harvesting, green roofs, rain gardens; and

- Incorporating SuDS when refurbishing or extending a property, or build a new property.

~~8.1.3~~8.1.2 In the community

Communities can act together to push for good quality SuDS in new developments, as well as identifying opportunities to retrofit SuDS into public spaces by:

- Taking an interest in development within the area, and becoming involved with any community engagement events for new developments;
- Identifying locations which might benefit from retrofit SuDS e.g. parks, car parks, public seating areas;
- Raising ideas to the local authority, wildlife organisations, or trying to implement them as a group; and
- Monitoring the maintenance of SuDS in your community and identifying when/where there are issues.

8.2 Case studies

8.2.1 Sandown Pathfinder Scheme

The Sandown Pathfinder Scheme aims to use a range of techniques to manage storm overflows and surface water flooding in the catchment, which covers more than 90% of the population of the island. A range of solutions are being trialled, including retrofit SuDS to slow and reduce the flow of water entering the combined sewer system.

Measures include managing the roof drainage from 25 large buildings, installing thousands of slow-drain water butts (Figure 8-1) on homes in Gurnard/Cowes, installing raingarden planters in businesses, schools and community sites, and working with Island Roads to create greener roadside drainage features[16].

The project is being delivered by Southern Water's Clean Rivers and Seas Task Force in partnership with Isle of Wight Council, the Environment Agency and Island Roads[17].

16 Southern Water (2023) The Solent – Isle of Wight pathfinder project. Available at: The Solent - Isle of Wight pathfinder project (southernwater.co.uk)

17 Southern Water (2023) Residents learn more about how Southern Water is tackling storm overflows on the Isle of Wight. Available at: https://www.southernwater.co.uk/the-news-room/the-media-centre/2023/february/residents-learn-more-about-how-southern-water-is-tackling-storm-overflows-on-the-isle-of-wight

Figure 8-1: Installed slow-drain water butt in Havenstreet (source: Southern Water)

8.2.2 SuDS in schools

A joint initiative between Southern Water and the Department of Education is supporting Isle of Wight schools in adopting SuDS to manage their risk of flooding and reduce the impact of heavy rainfall on sewer systems[18]. This has included the installation of features such as swales (see Figure 8-2: A swale at Nettlestone Primary School (source: Southern Water) and raingarden planters (see Figure 8-2) which are able to both hold and slow the flow of rainwater across roofs and hardstanding play areas. This controls the rate and volume of surface water entering the sewer network, which reduces the likelihood of sewer flooding and storm water releases into rivers and the sea.

More than 40 schools across the Isle of Wight have participated so far, with 50 more schools signed up for the next phase of the project. This project is part of the work being undertaken by the Southern Water Clean Rivers and Sea Taskforce, which is focussed on significantly reducing storm overflows across its regions through innovative approaches, such as nature-based solutions. This project recognises the value that community SuDS can have on reducing flood and pollution incidents, as well the wider environmental, social and climate adaptation benefits that can be realised through well-designed SuDS. To meet these aims, the project also places an emphasis on partnership working between businesses, schools and councils.

18 On the Wight (2023) Isle of Wight schools partner up with Southern Water to combat flooding risks. Available at: Isle of Wight schools partner up with Southern Water to combat flooding risks (onthewight.com)

Figure 8-2: A swale at Nettlestone Primary School (source: Southern Water)

Figure 8-3: Raingarden planter at Nettlestone Primary School (source: Southern Water)

8.3 Useful information

For more information on retrofitting SuDS see:

- Susdrain: Combining urban design & SuDS.
- Local Government Association: Retrofit SuDS.
- CIRIA: Retrofitting to Mange Surface Water (C713)
- ICE: SuDS Route Maps (Retrofitting)
- Urban Design London - Designing Rain Gardens: A Practical Guide
- UK Rain Garden Guide
- Royal Horticultural Society - Front gardens: permeable paving
- Royal Horticultural Society - How to green your grey front garden
- Royal Horticultural Society - Managing water in gardens
- Environment Agency - Guidance on the permeable surfacing of front gardens
- Homebuilding and Renovating - Green Roofs: Types, Costs & Installation
- Isle of Wight Council – Driveway document
- Royal Horticultural Society - Green roofs
- Livingroofs.org
- WWT - Gardening for wetlands – adding a wetland to your garden

Appendices

A Appendix A: Guidance on Isle of Wight Local SuDS Design Standards

B How SuDS can support other legislation and policies

Legislation / policy	Implications	SuDS benefit						
		Climate change resilience	Managing flood risk	Improve water quality	Enhance biodiversity and green infrastructure	Provide amenity, health and well-being	Enable sustainable development	Improve historic environment and landscape character
National								
Flood and Water Management Act (FWMA) (2010)	Established Lead Local Flood Authorities (LLFAs), giving them responsibility for managing the risk of flooding from surface water, groundwater and Ordinary Watercourses (often described as 'local flood risk'). Schedule 3 of the FWMA introduces changes to the legislation relating to SuDS. These changes have not yet been enacted.	✓	✓					
National Flood and Coastal Erosion Risk Management Strategy (Defra, 2020)	'Climate resilience places' (Strategic objective 1.4) - Risk Management Authorities to use nature-based solutions (including SuDS), and improve the environment through investments in flood and coastal resilience. 'Today's growth and infrastructure resilience in tomorrow's climate' (Strategic objective 2.1) – all new development will contribute to making place resilient to flooding and climate change.	✓	✓		✓		✓	
Flood and Coastal Erosion Risk Management Strategy	The Environment Agency will work with the Association of Sustainable Drainage Authorities to support lead local flood authorities to promote best practice in incorporating sustainable drainage	✓	✓		✓		✓	

Legislation / policy	Implications	SuDS benefit						
		Climate change resilience	Managing flood risk	Improve water quality	Enhance biodiversity and green infrastructure	Provide amenity, health and well-being	Enable sustainable development	Improve historic environment and landscape character
Road Map to 2026	systems for new development.							
UK Climate Change Risk Assessment (2022)	Priority Risk Area 7: Risks to human health, wellbeing and productivity from increased exposure to heat in homes and other buildings. Emphasises role of urban planting and landscaping in providing shade and reducing the future risk of overheating in the built environment.	✓			✓	✓		
National Planning Policy Framework (NPPF) (MHCLG, 2021)	Section 8. Promoting healthy and safe communities *Para 92(c): "enable and support healthy lifestyles, especially where this would address identified local health and well-being needs – for example through the provision of safe and accessible green infrastructure"*				✓	✓	✓	
	Section 11. Conserving and enhancing the natural environment. *"Contribute to conserving and enhancing the natural environment and reducing pollution"*			✓	✓		✓	

Legislation / policy	Implications	SuDS benefit						
		Climate change resilience	Managing flood risk	Improve water quality	Enhance biodiversity and green infrastructure	Provide amenity, health and well-being	Enable sustainable development	Improve historic environment and landscape character
	Section 14. Meeting the challenge of climate change, flooding and coastal change. Para 154: "*New development should…avoid increased vulnerability to the range of impacts arising from climate change…ensure that risk can be managed through suitable adaptation measures, including through the planning of green infrastructure*."	✓	✓		✓		✓	
	Section 14. Meeting the challenge of climate change, flooding and coastal change. Para 169: "Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate". *Requirements for SuDS to take account of LLFA advice, have minimum operational standards and lifetime maintenance arrangements in place, and provide multiple benefits.*		✓				✓	
	Section 15. Conserving and enhancing the natural environment Para 174(e) "*Development should, wherever possible, help to improve local environmental conditions such as air and water quality*".			✓			✓	

Legislation / policy	Implications	SuDS benefit						
		Climate change resilience	Managing flood risk	Improve water quality	Enhance biodiversity and green infrastructure	Provide amenity, health and well-being	Enable sustainable development	Improve historic environment and landscape character
Planning Practice Guidance: Flood Risk and Coastal Change (2022)	All four pillars of SuDS now need to be met.	✓	✓	✓	✓	✓	✓	
	Clear requirement for 'SuDS Strategy' within planning applications for major development.						✓	
	Wider SuDS benefits acknowledged e.g. cooling, carbon sequestration, biodiversity net gain etc.	✓			✓			
Town and Country Planning (Development Management Procedure) (England) Order (2015)	Designates Isle of Wight Council, as LLFA, to be a statutory consultee on surface water drainage proposals for all major developments.		✓				✓	
Environment Act (2021)	Sets out the opportunity for Local Authorities to prepare local nature recovery strategies, detailing the priorities for recovering or enhancing biodiversity in the area				✓			

Legislation / policy	Implications	SuDS benefit						
		Climate change resilience	Managing flood risk	Improve water quality	Enhance biodiversity and green infrastructure	Provide amenity, health and well-being	Enable sustainable development	Improve historic environment and landscape character
25 Year Environment Plan (2019)	Sets out UK government reform of environmental management, following exit of the European Union. Mitigating and adapting to climate change identified as key to managing pressures on the environment.	✓						
	Chapter 1 Policy 5 (Reducing risks from flooding and coastal erosion) includes 'ii - Putting in place more sustainable drainage systems', to be achieved in partnership by the risk management authorities.		✓					
	Chapter 3 Policy 3 (Greening our towns and cities) includes 'i – Creating more green infrastructure'.				✓			
	Chapter 3 Policy 1 (Helping people improve their health and wellbeing by using green spaces) includes 'ii – Promoting health and wellbeing through the natural environment' and Policy 2 (Encouraging children to be close to nature, in and out of school) includes 'i – Helping primary schools create nature-friendly grounds'.					✓	✓	

Legislation / policy	Implications	SuDS benefit						
		Climate change resilience	Managing flood risk	Improve water quality	Enhance biodiversity and green infrastructure	Provide amenity, health and well-being	Enable sustainable development	Improve historic environment and landscape character
EU Water Framework Directive (2000)	Improving the water quality of receiving waters such as rivers, streams and groundwater is an obligation under the WFD. Local targets are outlined in the Thames River Basin Management Plan (RBMP) (2009, draft - 2022)			✓				
Wildlife and Countryside Act (1981) (as amended)	Legislation which protects animals, plants and habitats in the UK. Under the Act, WBC has a duty to consult Natural England on any planning applications which may negatively impact on a SSSI.				✓		✓	
Conservation of Habitats and Species Regulations (2017)	Regulations which identify and conserve European designated sites and protected species. Careful management of impacts on water quality and biodiversity is a key consideration for SuDS close to European sites.			✓	✓			
Natural Environment and Rural Communities Act (2006)	IoWC has a duty to conserve, restore and enhance biodiversity. Section 41 identifies Habitats and Species of Principal Importance for Biodiversity in England.				✓			

Legislation / policy	Implications	SuDS benefit						
		Climate change resilience	Managing flood risk	Improve water quality	Enhance biodiversity and green infrastructure	Provide amenity, health and well-being	Enable sustainable development	Improve historic environment and landscape character
Green recovery of the economy and society after COVID-19 (UK Government, 2022)	UK Government plans for a resilient recovery from the impacts of the Covid-19 pandemic, which includes using nature-based solutions to tackle the linked challenges of public health, climate change and biodiversity.	✓			✓	✓		
National Model Design Code (MHCLG, 2021)	Provides guidance on the production of design codes, guides, and policies for developments. Highlights the importance of planting and landscape features to provide shading, habitats, cooling, air quality improvements and carbon sequestration, as well as attractive places to live and work.	✓			✓		✓	
Health and Social Care Act (2012)	Established Council Health and Wellbeing Boards and strategies.					✓		
Regional								
Water Resources Management Plan for 2020-2070	Outlines plan to sustainably secure water supply for the next 50 years. On Isle of Wight, there is an aim for 'better use of existing water'. Also identifies action to implement nitrate reduction measures at water sources on the Isle	✓	✓	✓				

Legislation / policy	Implications	SuDS benefit						
		Climate change resilience	Managing flood risk	Improve water quality	Enhance biodiversity and green infrastructure	Provide amenity, health and well-being	Enable sustainable development	Improve historic environment and landscape character
	of Wight.							
Drainage and Wastewater Management Plan – Level 1 Regional DWMP (Isle of Wight)	Identifies aim to work in partnership with Local Authority, developers, catchment partnerships and community groups, to separate rainwater from foul and combined systems using SuDS. Also outlines aims for Southern Water to adopt SuDS and work on SuDS retrofit projects in urban areas.	✓	✓	✓				
Position Statement Nitrates (2022)	For all planning applications that involve a net increase of residential units, the IWC requires the applicant to demonstrate that their development would not cause harm to the Solent protected sites as a result of drainage that would result in a net increase in nutrients. Emerging technologies / innovative solutions such as SuDS and wetlands can reduce the level of nutrients, although quantifying this to the degree required to secure compliance is not mature. No development shall take place until a scheme for the drainage and disposal of surface and foul water from the			✓				

Legislation / policy	Implications	SuDS benefit						
		Climate change resilience	Managing flood risk	Improve water quality	Enhance biodiversity and green infrastructure	Provide amenity, health and well-being	Enable sustainable development	Improve historic environment and landscape character
	development hereby permitted, has been submitted to and approved in writing by the Local Planning Authority.							
Local								
IoW Strategic Flood Risk Assessment (2010)	For larger developments, the Council requires the management of surface water and the associated green infrastructure to become an integral part of the masterplanning process and the development design. Aspiration to see surface water runoff rates and volumes reduced from the current condition on previously developed sites.		✓	✓	✓		✓	
IoW Area of Outstanding Natural Beauty Management Plan (2019-2024)	AONB is easily accessed, having the ability to play a positive part in the health and wellbeing of the whole local community. Semi-natural habitats are identified as providing a valuable resource in managing the speed at which water moves though the landscape reducing flooding. Opportunities for the management of rainwater, including uptake of sustainable drainage, are identified.	✓	✓		✓	✓		✓

Legislation / policy	Implications	SuDS benefit						
		Climate change resilience	Managing flood risk	Improve water quality	Enhance biodiversity and green infrastructure	Provide amenity, health and well-being	Enable sustainable development	Improve historic environment and landscape character
Biodiversity Action Plan/Habitat Action Plan (2000-2005)	Habitat Action Plans provide a framework for conserving and enhancing biodiversity on the IoW. The Action Plan for each habitat identifies objectives and targets which SuDS should aim to meet.				✓			
IoW Health and Wellbeing Strategy (2018-2021)	Promotes sustainability, positive mental health and wellbeing, as well as promoting physical activity for children and older people. Green spaces are identified as contributing to personal wellbeing.				✓	✓	✓	
Playing Pitch Strategy (2020)	References the importance of drainage systems in managing waterlogging and poor drainage of sports fields to improve the facilities.		✓					
Open Space Assessment (2020)	Open spaces are required to achieve multiple benefits, including as health and wellbeing and climate change mitigation and adaptation. Wherever possible IoW Council should look to open spaces to deliver multiple functions, including: recreation, green travel routes, shading from the sun, connectivity for wildlife, as well as water interception, infiltration and storage.	✓	✓	✓	✓	✓	✓	

Legislation / policy	Implications	SuDS benefit						
		Climate change resilience	Managing flood risk	Improve water quality	Enhance biodiversity and green infrastructure	Provide amenity, health and well-being	Enable sustainable development	Improve historic environment and landscape character
IoW Catchment Flood Management Plan (2009)	Identifies SuDS as a way to manage flood risk from new development within the Lower River Medina and Gurnard Luck sub-area.	✓	✓				✓	
Isle of Wight Shoreline Management Plan (2011)	Objectives include supporting an integrated approach to spatial planning, contributing to sustainable communities and development, and seeking opportunities to enhance the natural environment (e.g. through habitat creation). Considers future impacts of coastal erosion, sea flooding and landslides.	✓	✓		✓	✓	✓	✓
West Wight Coastal Flood and Erosion Risk Management Strategy (2016)	Environmental mitigation / improvement – including managed realignment and habitat creation.	✓	✓		✓			
Infrastructure delivery plan (2018)	References the expectation within the emerging Island Planning Strategy for development to integrate on-site sustainable drainage systems.	✓	✓				✓	

Legislation / policy	Implications	SuDS benefit						
		Climate change resilience	Managing flood risk	Improve water quality	Enhance biodiversity and green infrastructure	Provide amenity, health and well-being	Enable sustainable development	Improve historic environment and landscape character
IoW Housing Strategy (2020)	Supports opportunities to use development to conserve and enhance local landscape, biodiversity and access to green space.				✓	✓	✓	
Island Planning Strategy (2021 - draft)	Emerging Local Plan policies require reduction and management of post-development runoff. Long term management and maintenance of SuDS must be demonstrated. Specific policies within the Monkton Mead catchment area (EV15) require the SuDS management train to be applied.	✓	✓	✓			✓	✓
Local Flood Risk Management Strategy (2023 – draft)	Sets out the Council's short and long term approach to managing flood risk from local sources, including surface water flood risk. SuDS can contribute to achieving the action plan for the strategy.	✓	✓				✓	✓

C Maps

C.1 Fluvial and tidal flood risk

C.2 Surface water flood risk

C.3 Groundwater flood risk

D Validation checklist

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