

Improving Places with Effective Sustainable Drainage Systems

Chris Osborne, Inland Flood Risk Manager, BCP Council

and

Katherine Van Etten, Senior Landscape Architect, Dorset Council



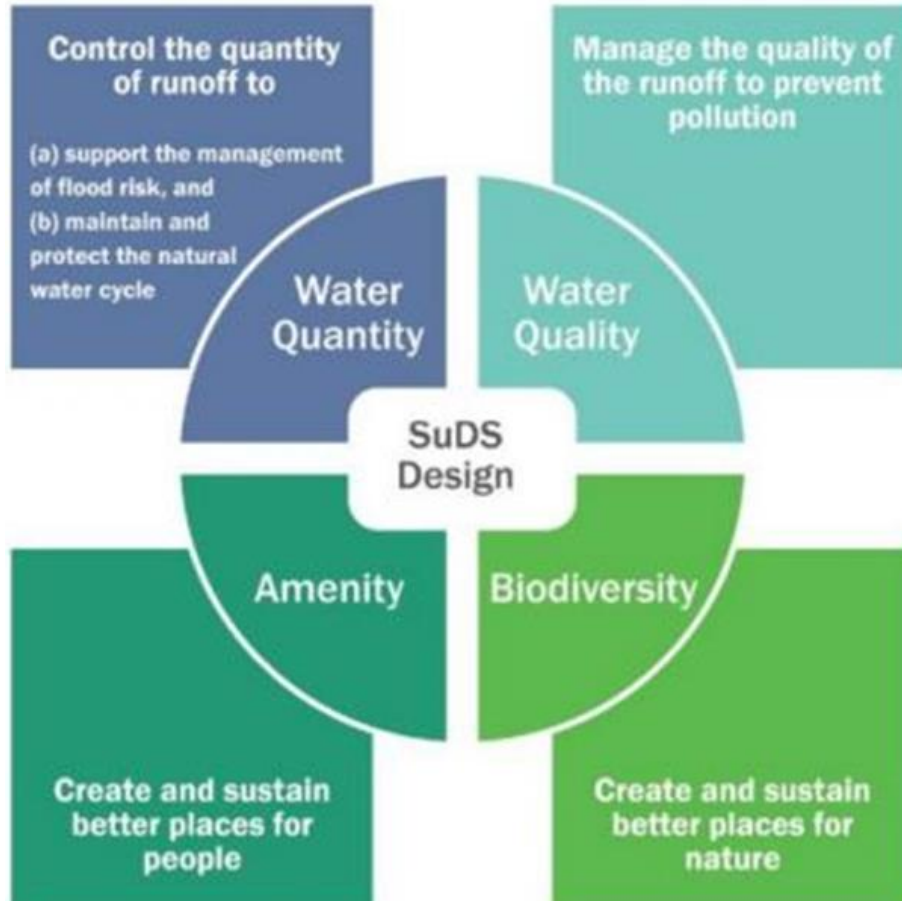
Introduction

Chris Osborne – Inland Flood Risk Manager

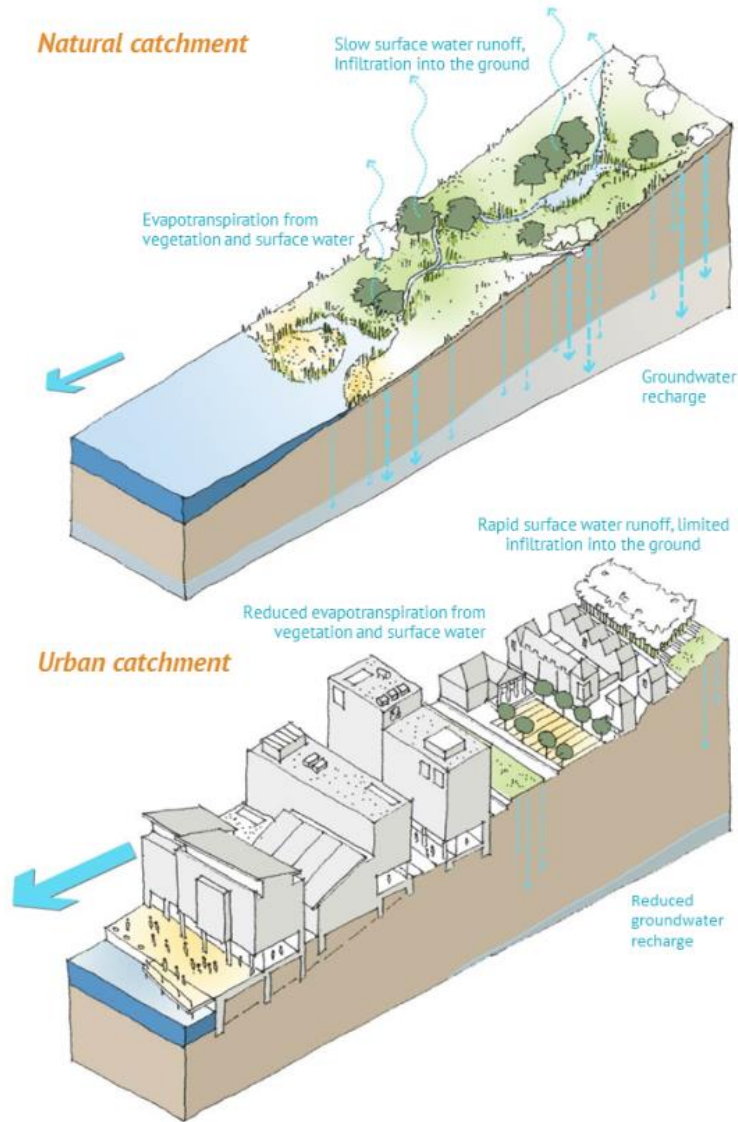
- Quantity
- Quality

Katherine Van Etten – Senior Landscape Architect

- Amenity
- Biodiversity



What are SuDS (Sustainable Drainage Systems)?



SuDS is an approach to draining surfaces in a way which mimics the natural environment and processes as closely as possible.

By:

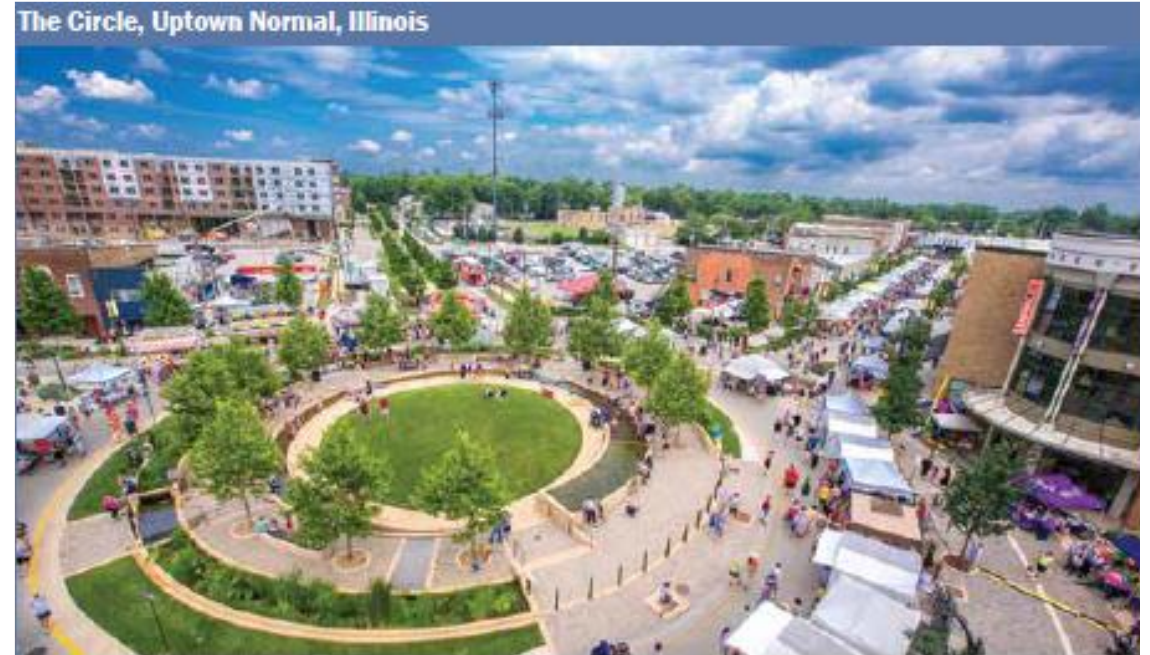
- Reducing pollution and protecting water quality.
- Contributing to biodiversity and Green / Blue Infrastructure.
- Contributing to amenity and placemaking and avoiding over engineered, over developed urban environments.

What are SuDS (Sustainable Drainage Systems)?

SuDS is an approach to draining surfaces in a way which mimics the natural environment and processes as closely as possible.

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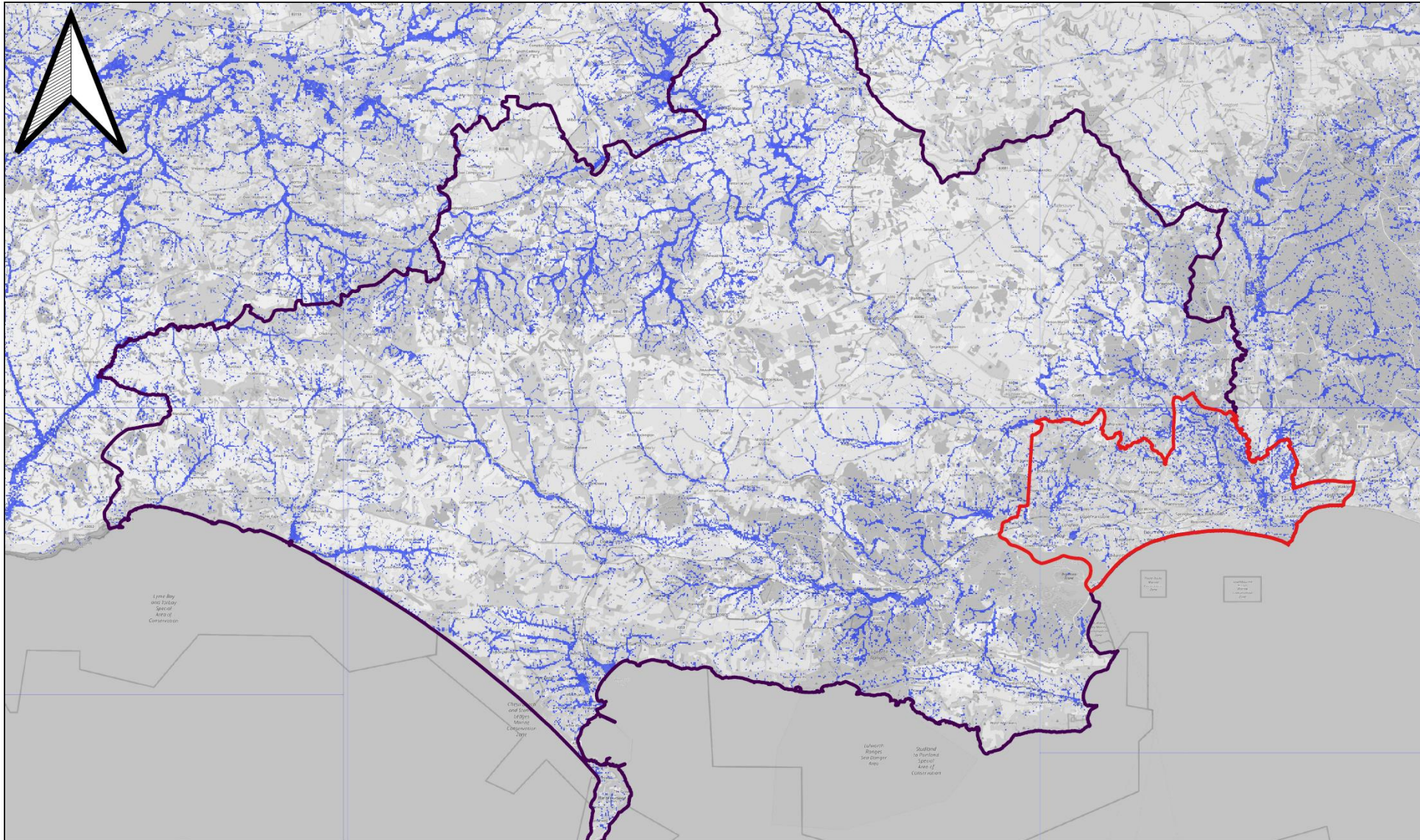
- Managing rainfall as close to where it lands as possible.
- Mitigating loss of infiltration and increased runoff.



So why use SuDS?.....

Chris Osborne, Inland Flood Risk Manager, BCP Council

The Scale of the Problem



Chris Osborne, Inland Flood Risk Manager, BCP Council



The Scale of the Problem



Jason Roberts Photography

Officers were called to Queens Drive on Saturday night

Liverpool 2 min read

Liverpool flood deaths: Two die after driving car into floodwater

Updated 28 Aug



Watch: Flood waters surround a plane at Frankfurt International Airport

Europe

Flood waters hit Frankfurt airport and underground station

Updated 17 Aug ■ 1 min read



Michael Nicholls

The fire service said the driver of the Tesla was unable to open the car door but managed to get out

Leicester

Ashby de la Zouch: Car half-submerged in floodwater under bridge

Updated 2 days ago ■ 1 min read



Floods have forced people in Beijing to flee on rubber boats

China

Beijing floods: Deadly rains batter China capital as new storm looms

Updated 1 Aug ■ 2 min read



Butlin's in Minehead was hit by heavy rain

Somerset

Minehead Butlin's closes after flood damage in Somerset

Updated 2 days ago ■ 4 min read

The Scale of the Problem

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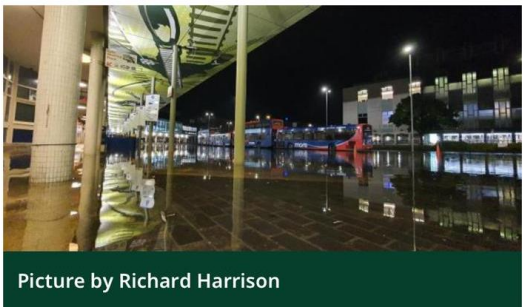
Have your say!

LOCALIQ

Winterborne Kingston village hit with heavy flooding

16th January

WEATHER



Picture by Richard Harrison

Flooding brings chaos across Dorset and the New Forest

16th January

EAST DORSET



By Sarah Cartlidge
@sarahcartlidge
Audience and Content Editor



6 Comments

TRAINS were disrupted, roads closed and buses delayed as flooding caused chaos across Dorset and the **New Forest** on Monday.

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Darmowe przekazy do Polski!

WYŁÓD TERAZ

LENI 1000

Train services in Dorset delayed or cancelled due to railway line flooding

5th October 2021

DAILY ECHO

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-7.24%

Solaria (SOL)*

Trade now!

Firefighters called to flood in Poole home on Christmas Eve

24th December 2022



Flooding at the Bakers Arms Roundabout. Picture: Dorset and Wiltshire Fire and Rescue Service. (Image: Dorset and Wiltshire Fire and Rescue Service)

Firefighters also pushed a car to safety after it became stuck at the Bakers Arms Roundabout at 5.49am.

Flash flooding in Weymouth as thunderstorms hit Dorset

19th May

Wareham fire crew rescue driver from flooding

1st February 2021

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Sanctuary Care

Dorset Hospital emergency department hit by flooding

24th March

DORSET COUNTY HOSPITAL



By Cristiano Magaglio
@CristianoJourn
Community Reporter



5 Comments

Dorset County Hospital's emergency department has flooded.

Chris Osborne, Inland Flood Risk Manager, BCP Council



...And Teslas could get trapped here too!



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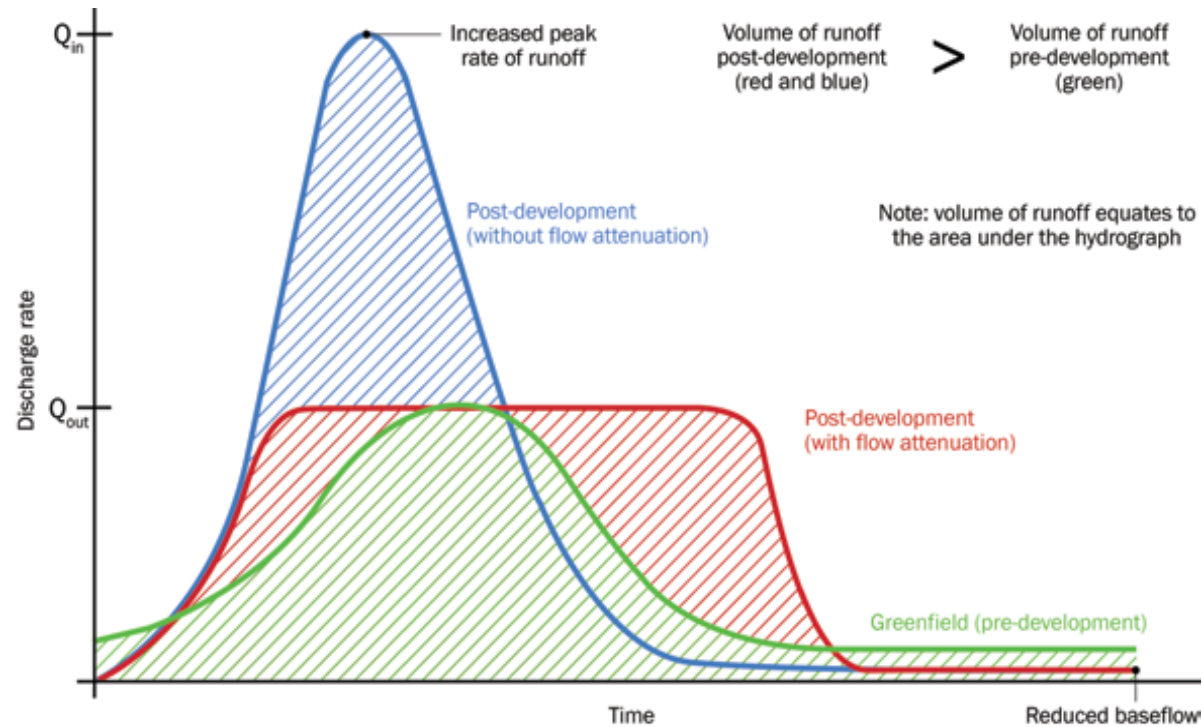
Torrential rain floods Dorset homes ahead of bank holiday weekend
28th August 2020



- Road under Dorchester West Bridge.
- August 2020 Dorchester Flood event.
- Resulted in a Section 19 Flood Investigation.

HOWEVER,...

- SuDS **can't** fix the problem alone, but they **can** help AND;
- Are needed to ensure that development doesn't make the problem worse.



Chris Osborne, Inland Flood Risk Manager, BCP Council

Planning Requirements

- National Planning Policy Framework (NPPF):

Para 169:

“Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should:

- a) take account of advice from the **lead local flood authority**;*
- b) have appropriate proposed **minimum operational standards**;*
- c) have **maintenance arrangements** in place to ensure an acceptable standard of operation for the lifetime of the development;*
- d) where possible, provide **multifunctional benefits**.”*

Planning Requirements

- National Planning Policy Framework (NPPF):

Para 167 (paraphrased):

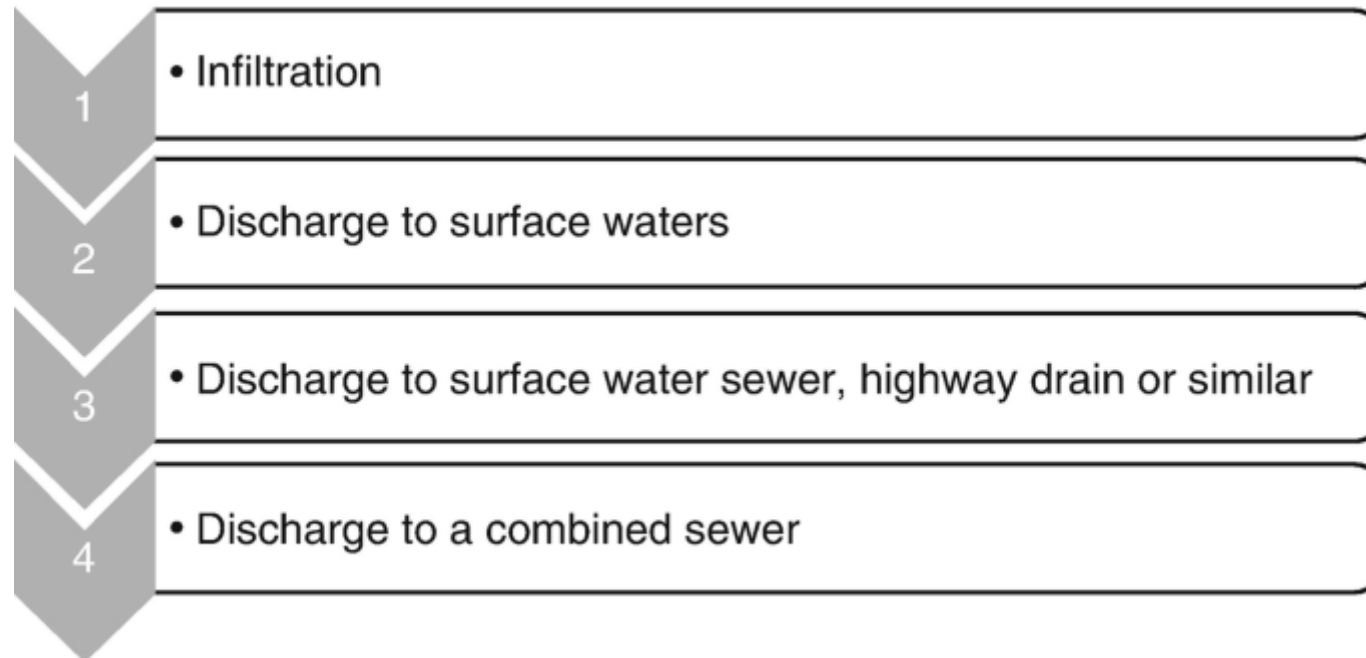
“Development should only be allowed in areas at risk of flooding where, in the light of this [Flood Risk] assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:

....

c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate”

The SuDS Hierarchy...

National Planning Policy Guidance (NPPG, para 056)



Regulatory Limitations / Barriers to “good” SuDS

- Planning Policy does not require use of SuDS for all development.
- Developers are not required to reduce runoff, just not make it worse!
- SuDS hierarchy does not include re-use of rainwater, use of interception features or prioritise use of above ground storage!
- Multifunctional SuDS are only required “*where possible*”.
- “Right to connect” under Water Industry Act.
- Lack of enforceable technical standards.

Regulatory Limitations / Barriers to “good” SuDS

- Maintenance arrangements are left to developers to decide.



Technical Concerns



1. Establishing Infiltration Rates (BRE 365).

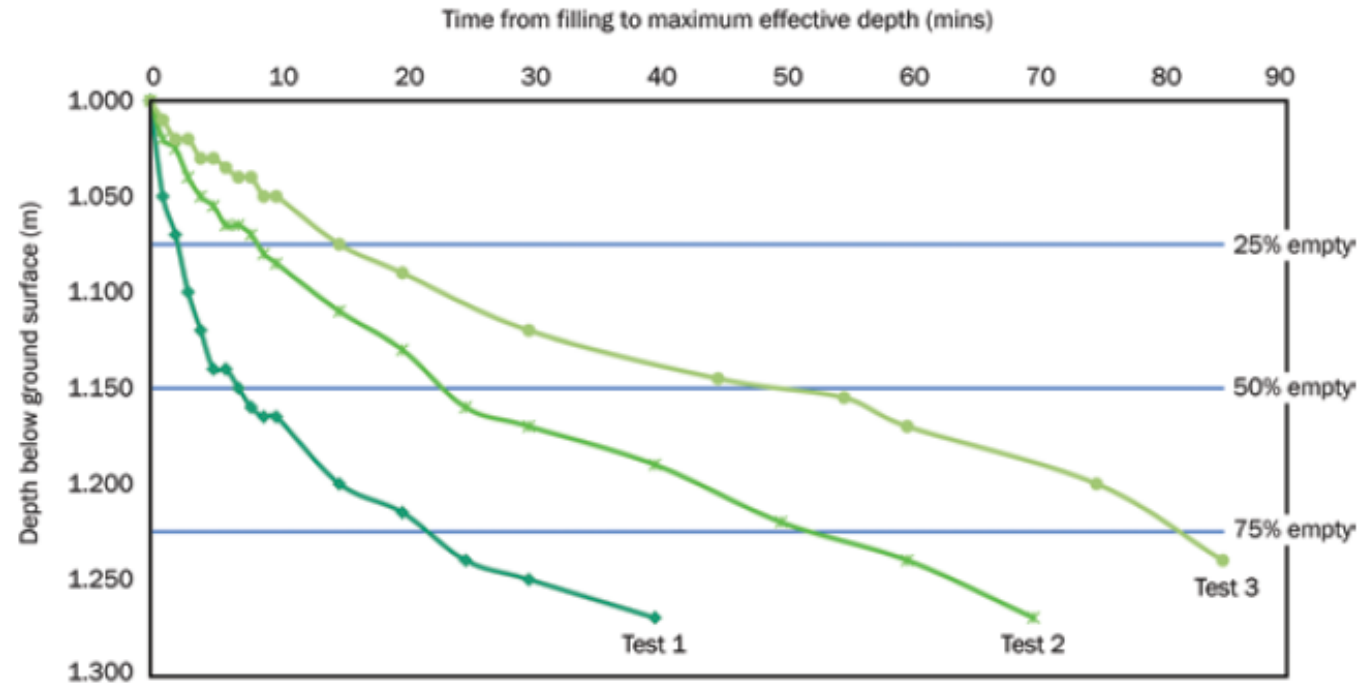


Figure 25.5 Example of reduction in infiltration rate with successive tests

2. Estimation of existing runoff rate (Greenfield, Brownfield or both).
3. Monitoring Ground Water levels.

Technical Concerns

- 4. Access for maintenance.
- 5. Loading and Exceedance.



Interception & Water Quality

- Attenuation systems are good holding back water during heavy rainfall events, **but not during smaller storms.**

However, even clay type soils will support some infiltration before they are saturated...

...So interception should be used to drain the first 5mm of any rainfall event to help reduce discharge volumes.

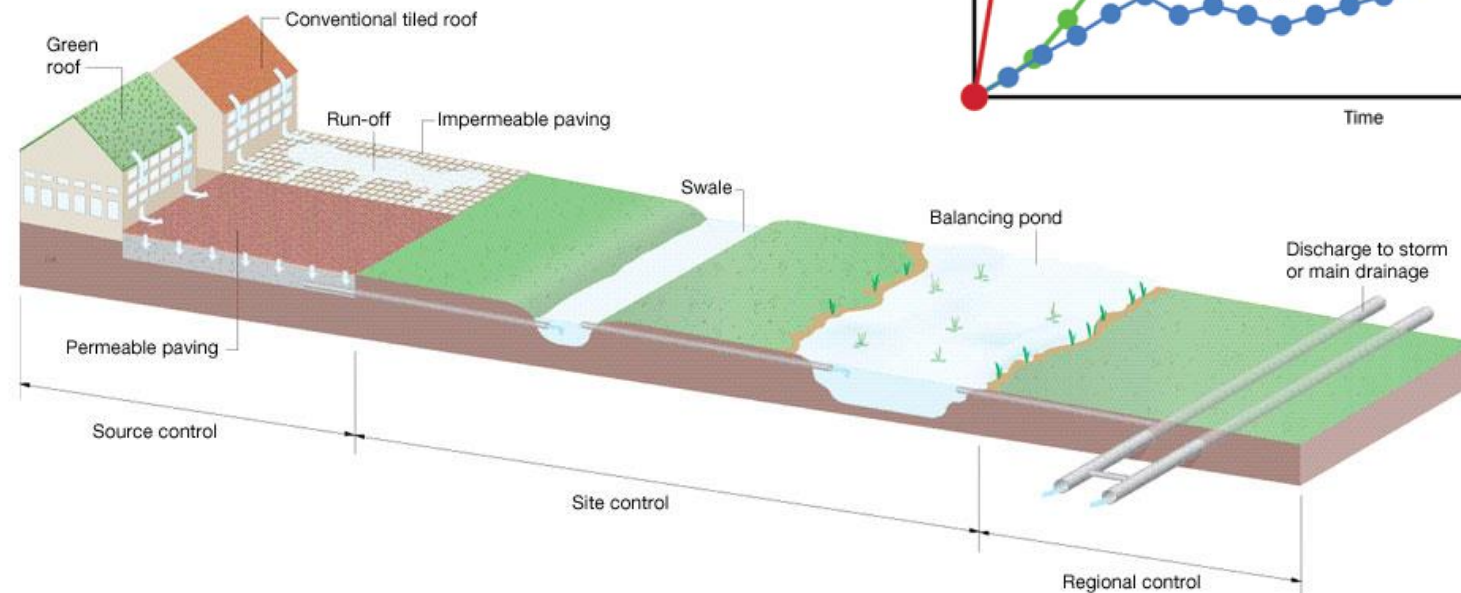
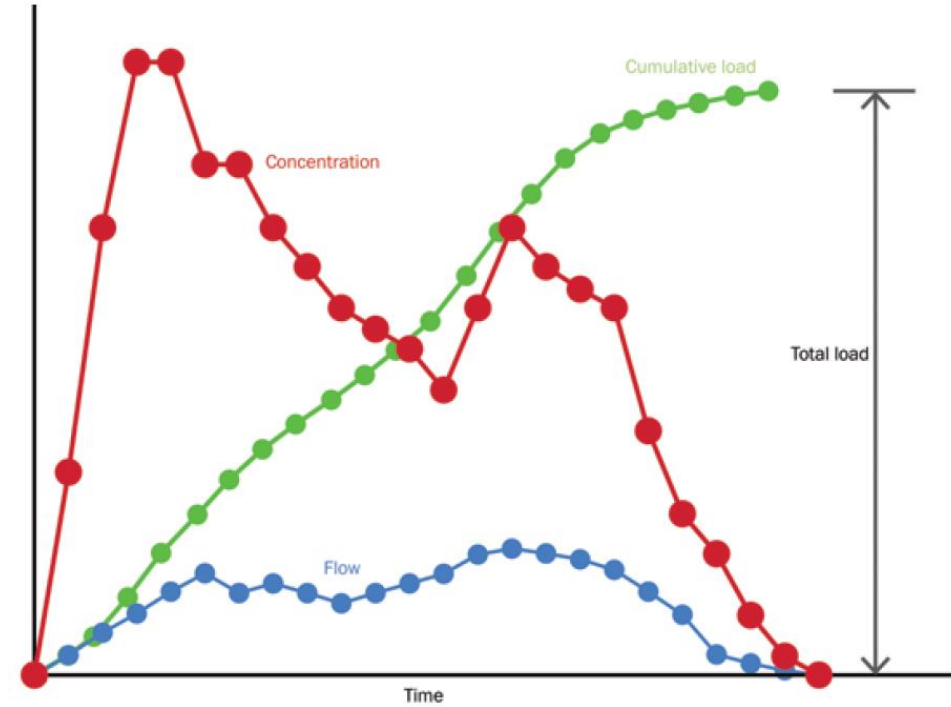
AND:

To control water quality.



Water Quality

- Quality of water discharging from a developed site is not constant.
- Typically, the first 5mm discharging from a site has a higher concentration of pollutants.
- As the storm progresses, discharge from the site improves.

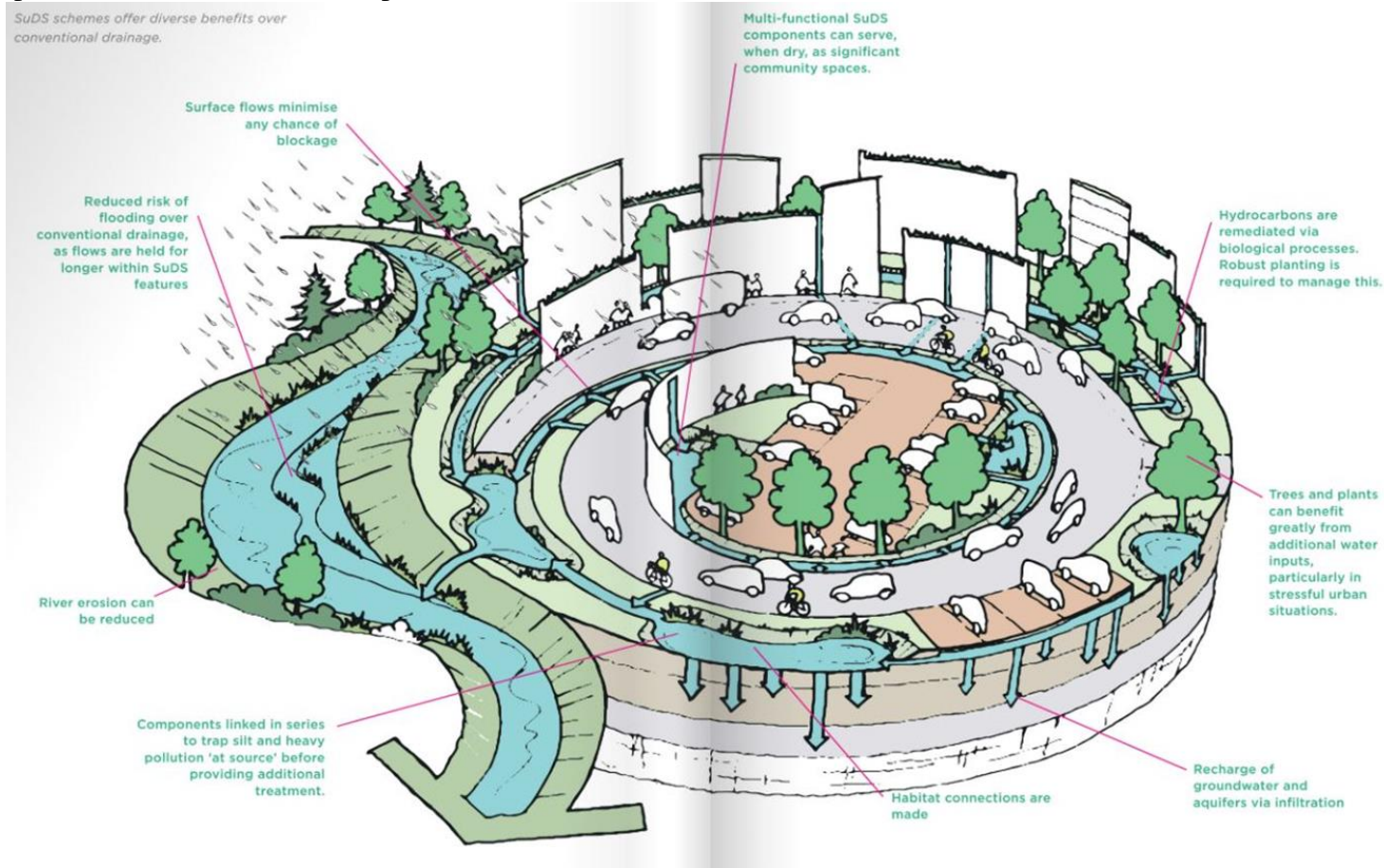


Finally....

**Without the use of a pump,
water always flows downhill 😊!**



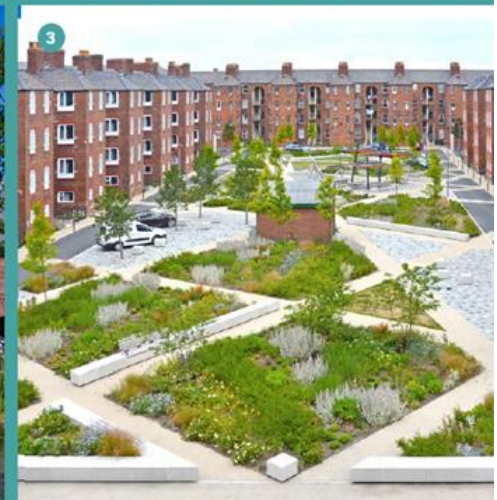
SuDS Amenity & Biodiversity



Resilient, sustainable, connected placemaking

Katherine Van Etten, Senior Landscape Architect, Dorset Council

SuDS - Strategic planning to detailed design



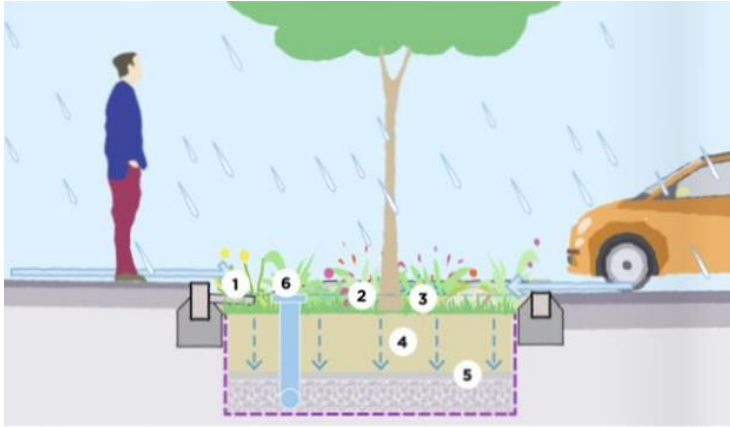
SuDS Design & Biodiversity



Enhance the amenity increase
Biodiversity
Publicly accessible
Appropriate planting
Soil
Materials
Adoption/maintenance



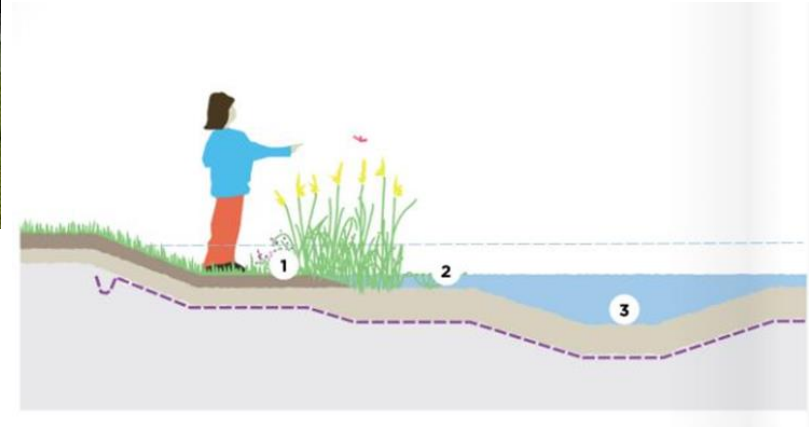
SuDS variety of treatments



Bioretention areas / raingarden



Capture it, Slow it,
Clean it, Use it, Lose
it, Release it slowly



Basin, pond, wetland



Detention (dry) basins, swale



Katherine Van Etten, Senior Landscape Architect, Dorset Council



Case Study

- Low visual quality
- H& S issues
- No multi-functional benefits
- Inaccessible
- High land take
- Discourages the use of outdoor spaces / 'healthy living' places
- Limited biodiversity benefits
- Lack maintenance
- Does not address the four pillars of SuDS



Curtis fields, Chickerell

SuDS Local Planning Policy

- **West Dorset Local Plan (LP) text 2.4.7 SuDS** should be incorporated within development proposals. Also mentioned within allocated sites
- **North Dorset LP Policy 13 Grey Infrastructure Sustainable drainage solutions** should be incorporated into all new development of ten dwellings or more. Also mentioned in allocated sites.
- **East Dorset and Christchurch LP Policy**
 - **ME3** incorporating Sustainable drainage where possible.
 - **ME 6** All developments will be required to demonstrate that flood risk does not increase as a result of the development proposed. This will primarily be through the use of Sustainable Drainage Systems (SUDS) and a range of flood resistance and resilience measures. **Space for such measures should be set aside within larger developments.**
 - **13.40** The Councils will prepare SPD on flood risk and Sustainable Drainage Systems

SuDS Legislation/Policy Requirements

- **National Planning Policy Framework**

167 & 169. *Major developments should incorporate sustainable drainage systems*

169 d) *where possible, provide multifunctional benefits.*

134. Development that is not well designed should be refused

174. Planning policies and decisions should contribute to and enhance the natural and local environment

180 Biodiversity

Biodiversity 10% NET gain on all development Nov 2023

- **National Planning Practice Guidance NPPG 2022** Para 055 *applicants need to submit a sustainable drainage strategy*

- **Natural England Green Infrastructure Principles 4**

- **Flood and Water Management Act Schedule 3 DEFRA - 2024**

- SuDS mandatory on all new development



SuDS a way forward

- Early LLFA and planning discussion
- Clear information SuDS Strategy
- Equal weight to 4 pillars
Quality, Quantity, Amenity, Biodiversity
- Appropriate design
- Successful maintenance / adoption
- Set standards in a Design Code & improve understanding



SuDS Best Practice



- CIRIA- SuDS manual C753
- CIRIA – SuDS Construction Guidance companion to above
- CIRIA - C808F Using SuDS to reduce phosphorous in surface water
Susdrain.org for further case studies
- Cambridge City Council
- Enfield Council Sustainable Drainage Design and Evaluation Guide
- Essex Design Guide SuDS
- Wessex Water SuDS Adoption Standards 2021