

Floods or SuDS?

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EXPERT SOFTWARE FOR A SUSTAINABLE ENVIRONMENT



- Working with nature
 - Smart Urban Drainage Systems
- Global experiences
- Innovation & joined up thinking -
to provide multiple community benefits
- Conclusions





Sustainable rainwater management

Traditional approach:

" Drainage is the natural or artificial removal of surface and sub-surface water from an area" – Wikipedia

Smart or sustainable drainage:

" Use of rainwater on site for the common good"
- rainwater is an asset, not a problem!





Sustainable rainwater management

SuDS, WSUD, LID, green infrastructure, blue-green corridors

Most significant change to rainwater management in our lifetime



- Climate change
- Energy security and costs
- Extreme weather events
- Resource depletion
- Recycling
- Water scarcity.....
- Species extinction
- Legislation
- Carbon pricing
- Business resilience



- Climate change
- Extreme weather events
- Water scarcity.....

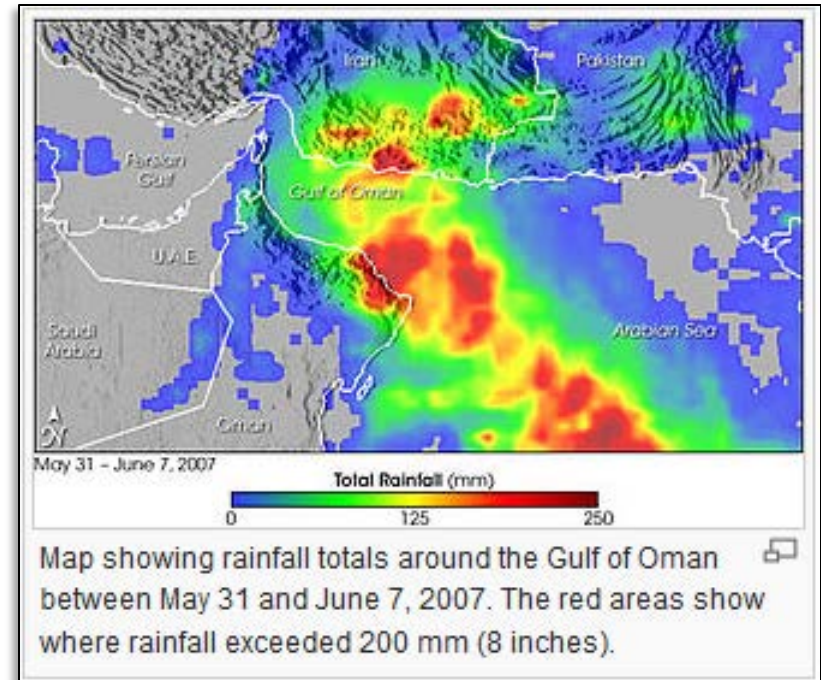
Cyclone Gonu which hit Oman in June 2007

*Courtesy of Simon Wilson
Five Oceans Environmental Services LLC,
Muscat
www.5oes.com*



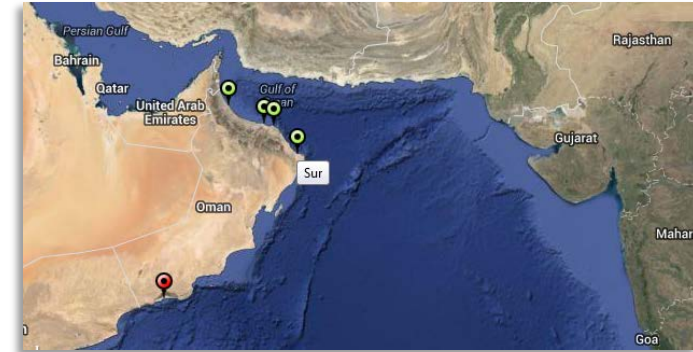
Cyclone Gonu, Oman

- June 2007
 - 610mm near eastern coastline
 - 150mm AAR (coast)
 - ~100mm AAR (Oman)
 - 460 & 750mm AAR Hajar & Dhofar



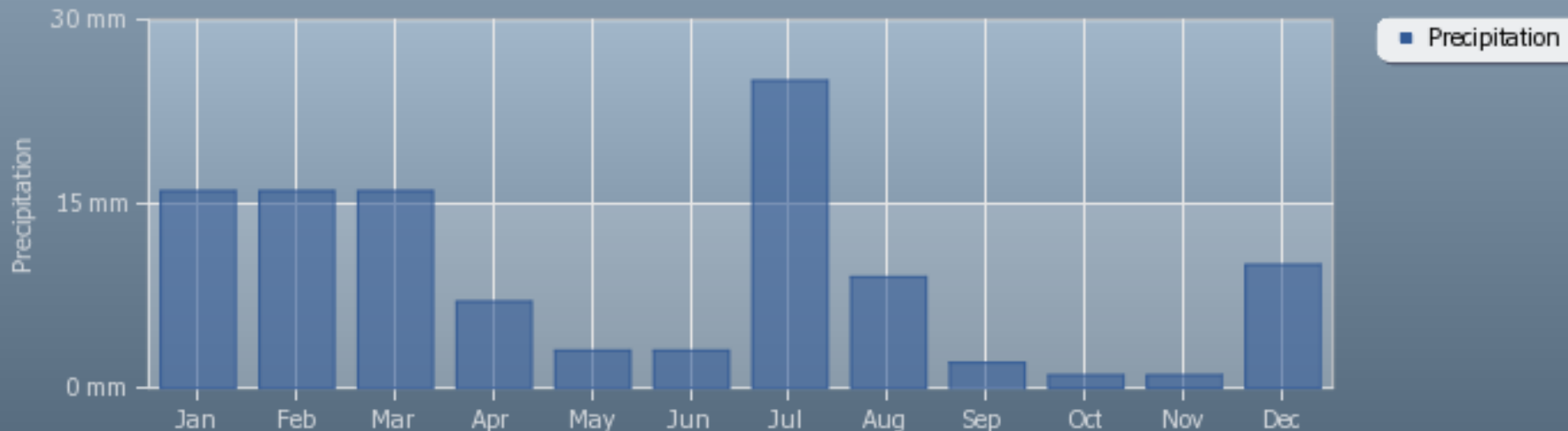
Cyclone Gonu

- **Sur**
 - 610mm near eastern coastline (Cyclone Gonu)
 - 150mm AAR (coast)
 - ~25mm July Average



Average monthly precipitation over the year (rainfall, snow)

This is the mean monthly precipitation, including rain, snow, hail etc. Show in [Inches](#) »



Concerns in the GCC...& UK

- June 2007, Oman



- July 2007, Thatcham



– don't build over a watercourse





Working with Nature

Courtesy of [Placemaking.com](https://www.placemaking.com)
Nadine Bitar





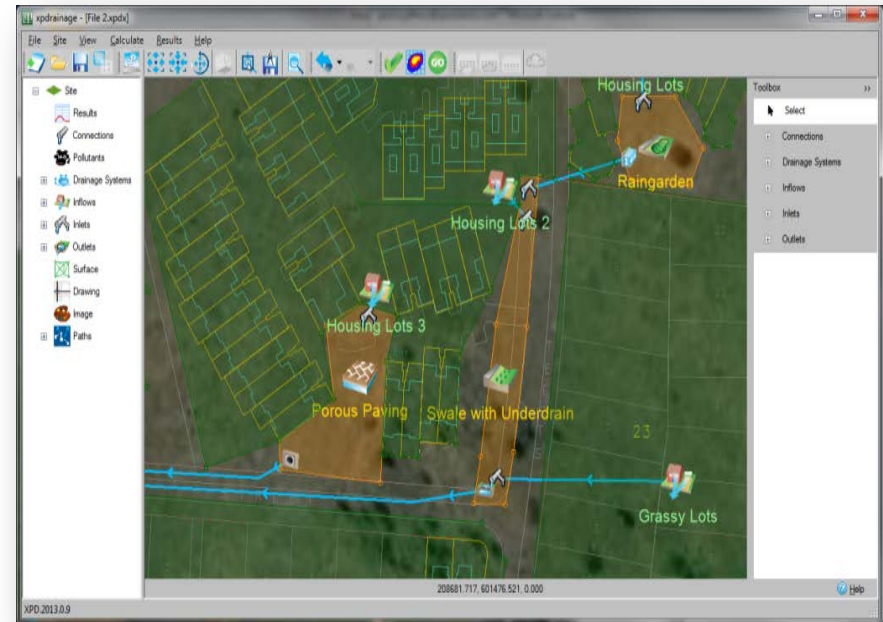
Prepare for consequences if we don't





Multiple Benefits = Multiple Disciplines

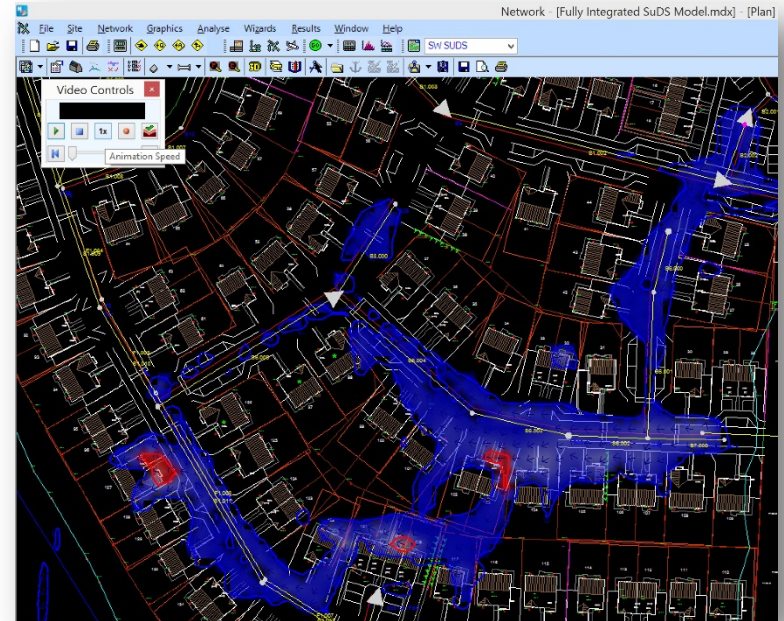
- Civil Engineers
 - Municipalities
 - Consultants
 - Developers
- Landscape architects
- Sustainability Managers
- Urban Planners
- Regulators
- *Software suppliers*





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Sustainable rainwater and surface water management



Need:

- Major change to urban planning
- Change to the way we value drainage
- *Major change to the way we design drainage*
- *Management of the Environment*

ie in harmony between economic growth, social development & environmental protection



GSAS Sustainability Criteria

Global Sustainability Assessment System

- **Urban Connectivity**
- **Site**
- **Energy**
- **Water**
- **Materials**
- **Indoor/Outdoor Environment**
- **Culture & Economic Value**
- **Management & Operations**

Joined up Thinking!





Changed design process

- Take account of natural flows on site
- Pre-development and post-development similar for flows and water quality
- Storage and pollution removal at source
- Use a variety of stormwater controls
- Treatment train approach - distributed across site
- Affordable, robust & maintainable



Treatment train

- *Green roofs*
- *Swales*
- *Ponds*
- *Wetlands*
- *Bioretention*
- *Rain gardens*
- *Planters*



- *Porous paving*
- *Household tanks*
- *Municipal tanks*
- *Rainwater harvesting*
- *Pipes*
- *Channels*

Guidance

Flood Risk Management Plans: what they are and who's responsible for them

Organisations: [Department for Environment, Food & Rural Affairs](#), [Environment Agency](#) and [Welsh Government](#)

Page history: [Published 1 May 2014](#)

Policy: [Reducing the threats of flooding and coastal change](#)

Topic: [Environment](#)

Collections: [Flood risk management plans \(FRMPs\)](#)

Primary category: [Flooding and coastal change](#)

- EU Floods Directive (2007)
- Flood Risk Regulations (2009)
- Flood Risk Management Plans (FRMPs) highlight the hazards and risks of flooding from rivers, the sea, surface water, groundwater and reservoirs



Department
for Environment
Food & Rural Affairs



Llywodraeth Cymru
Welsh Government



Environment
Agency



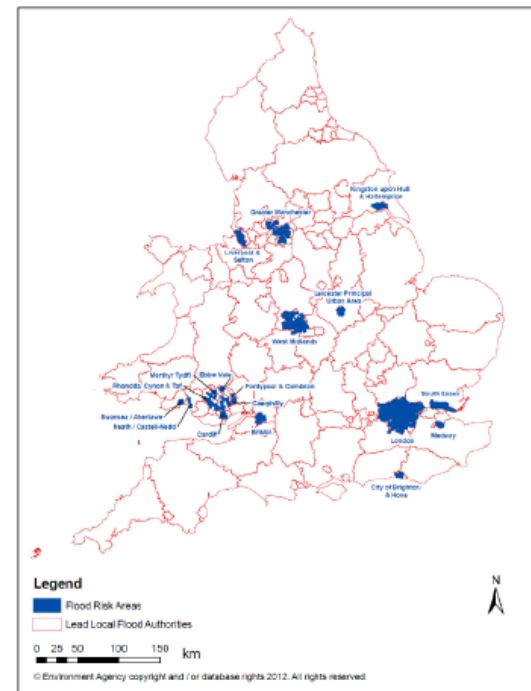
Cyfoeth
Naturiol
Cymru
Natural
Resources
Wales

Flood Risk Management Plans – April 2014

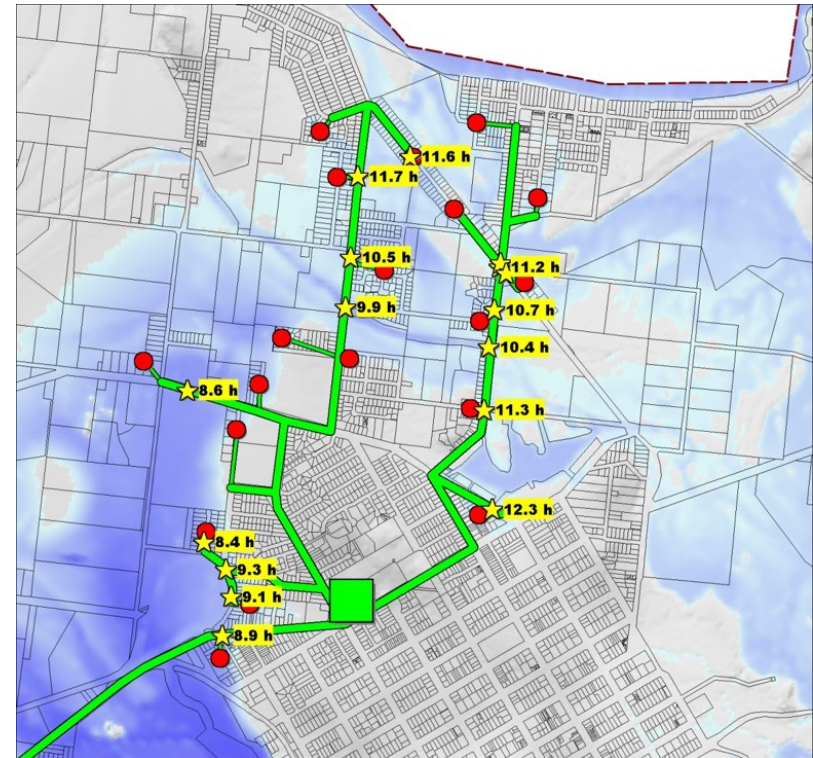
Flood Risk Areas in England and Wales

Map of agreed Flood Risk Areas in England and Wales

The Flood Risk Areas were identified through the Preliminary Flood Risk Assessment (PFRA). This identified where the risk of flooding from local flood risks is significant (see [government guidance](#)).



- EU Floods Directive (2007)
- Flood Risk Regulations (2009)
- Flood Risk Management Plans
Evacuation routes & time





For the future: SuDS Research Project

A Systematic, Multi-Criteria Decision Support Framework for Sustainable Drainage Design

Quantifying Green Values:

From Good Feelings to Real Numbers

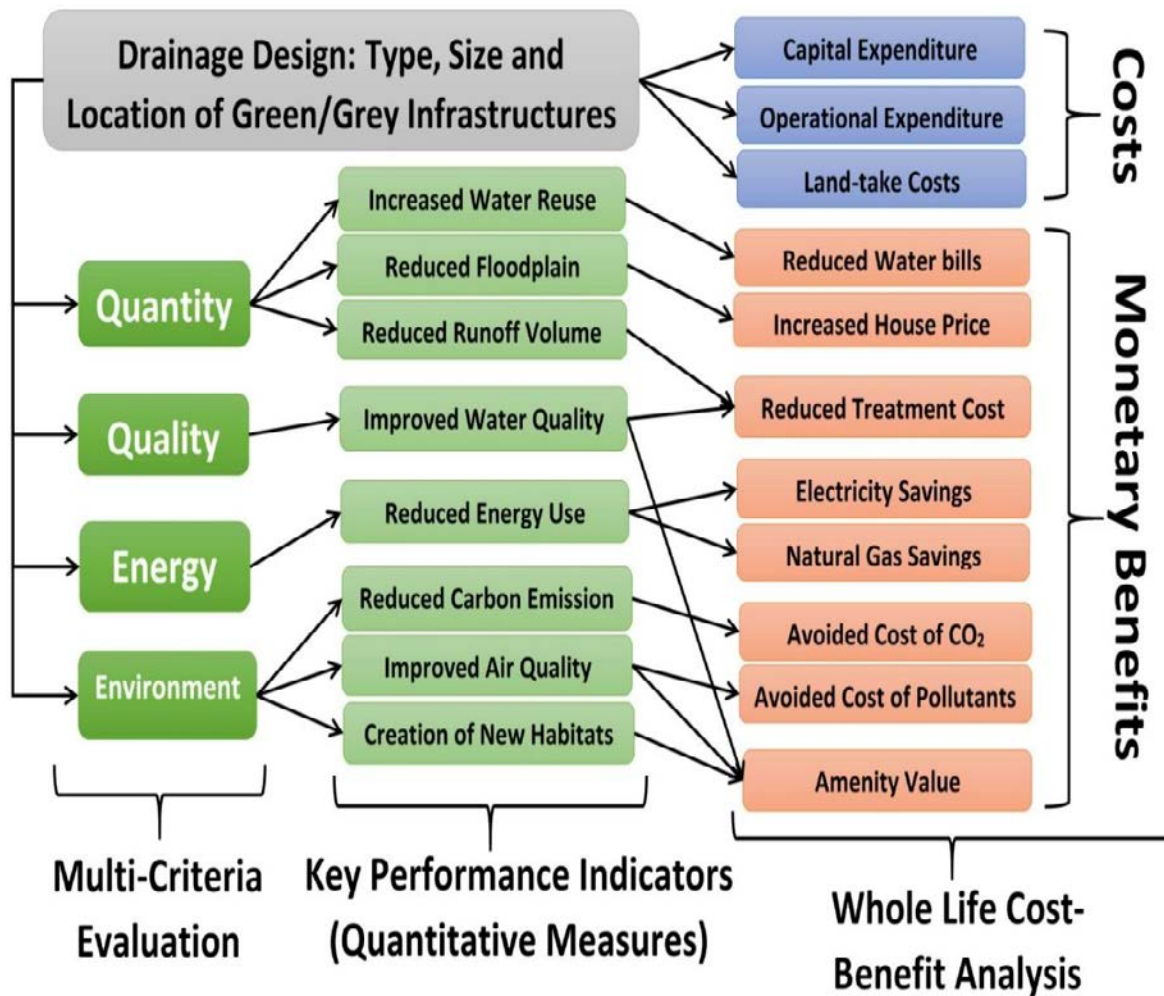
October 2010 to September 2014

Exeter University & XP Solutions – STREAM EngD

Jo-fai Chow,

Dragan Savić, David Fortune, Zoran Kapelan, Netsanet Mebrate

Results – Performance indicators



Floods;

- FRMPs now being developed: Deadline December 2015
 - Mapping & evacuation routes being assessed
 - Lots of global experience, unfortunately!

SuDS;

- Traditional drainage systems fail under extreme events
- Identify overland flood flow paths at the outset
 - think SW management (blue/green corridors)
- Plan to provide multiple benefits from the start

The logo consists of the letters 'XP' in a bold, dark blue, sans-serif font. A thick blue curved line starts from the bottom left and arcs across the top of the slide.The logo features the letters 'XP' in a bold, dark blue, sans-serif font, with the word 'solutions' in a smaller, lighter blue, sans-serif font positioned to the right and slightly below the 'P'.

Thank you for listening

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www.xpsolutions.com