Wood Street, Cardiff Central Square
Submitted by Arup

Awards category
Regeneration and retrofit – small scale (less than one hectare)

Lead or collaborating organisation(s)	**Arup, Cardiff Council, Knights Brown, GreenBlue Urban**
Location of SuDS	///modest.wool.herbs

1. SuDS overview

SuDS components used	• 6No. rain gardens • 15No. tree pits
Size of the scheme and its local context	0.72ha Client: Cardiff Council Drivers: Council commitments through policies such as One Planet Cardiff and the Transport White Paper, Schedule 3 of the Flood and Water Management Act (Wales), Well-being of Future Generations Act (Wales).
Approximate age of scheme (years)	1 year 1 month (construction complete March 2023)
Benefits of the scheme	• Manages local flood risk • Improves water quality of storm runoff into River Taff • Improved combined sewer resilience • Increased biodiversity • Significantly improved amenity infrastructure including sustainable transport
Briefly describe the scheme	Located in Cardiff City Centre, Wood Street was dominated by imposing buildings, narrow pavements and high traffic flows. Formed of entirely impermeable surfaces, rainwater entered the combined sewer system and was pumped a mile downstream to Cardiff Treatment Works. Now water is naturally treated and discharged to the adjacent River Taff, increasing resilience through nature-based solutions. Part of the wider Central Square development this project connects several critical hubs, consolidating several competing requirements through effective design and delivery. Key project outcomes: (a) create an attractive, functional public realm (b) improve sustainable transport infrastructure (c) use sustainable water management principles to reduce flood risk and improve water quality. Wood Street removes 6,800m^2 of impermeable area from the combined sewer network – now passively filtering runoff, relieving limited sewer network pressures, and reducing pumping and treatment requirements. Construction challenges such as many buried utilities were overcome by innovative designs and effective collaboration. This project demonstrates how nature-based solutions, creative thinking and collaboration can repurpose our car-centric streets into resilient multi-functional spaces. Narrowed lanes, widened pavements and segregated cycleways seamlessly integrate with 25 new trees and 180m^2 of biodiverse pockets that double up as flood-mitigating sponges, filtering highway runoff before draining to the river.

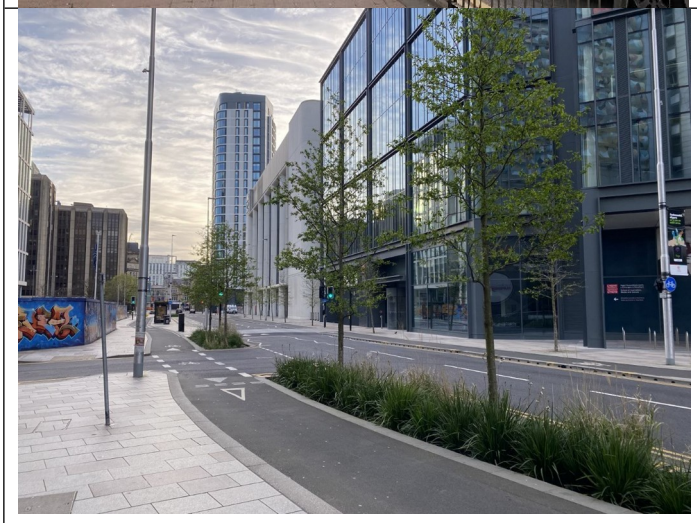
2. SuDS details

No.	Question	Answer
1	What difference has this scheme made to the local community or area?	This project removed 6,800m2 of impermeable area from the combined sewer and provides resilience up to the 1 in 100yr rainfall event in a catchment typically very challenging to separate storm flows. Road space has been reallocated to create wider pavements, integrated seating areas, cycling infrastructure and new interesting green spaces. The controlled cycleway crossing is a UK-first to help blind and partially sighted people cross safely, with the design advised by disability groups. Previously a grey city centre street, this project improves air quality by introducing 25 semi-mature trees, 6 large biodiverse rain gardens and 3 sedum-roofed bus stops.
2	What is exceptional about this scheme beyond a standard approach?	Given the site constraints all SuDS features were constructed through excellent collaboration between designer, contractor and client. The project team had to consider a range of scenarios from city-centre road closures during events that see tens of thousands of people walking to the 90,000-seater Principality Stadium and also worked with the police to consider potential terrorist threats facing the stadium and the BBC Wales headquarters. This project was the first city centre scheme to achieve approval from the SuDS Approval Body (required for Schedule 3 in Wales) and so set the new benchmark for urban retrofit SuDS projects in Wales.
3	How much work went into getting this scheme realised?	In construction schemes like this, one of the easier components to “value engineer” are the trees and planting. However, the client, designer and contractor all understood the benefits of nature-based solutions and so worked together for a common goal. This was achieved through multi-disciplinary coordination meetings to discuss potential clashes and through designer-contractor workshops during construction to discuss any challenges and collaboratively propose a solution. Although some designs were slightly amended to work with actual site limitations such as unknown utilities the outcomes remained the same and all trees and planting were installed as shown in the designs.

4	Is this scheme part of a masterplan or integrated into other initiatives?	Cardiff's city centre has undergone significant transformation over the past decade. High quality development has helped create a distinct contemporary city centre, evidenced through increasing visitors to Cardiff. Wood Street is the primary street that brings together the wider Cardiff Central Square development which includes new office and retail, a new bus station, the central train station and several significant organisations such as Legal and General, BBC Wales, Cardiff University and HMRC. In 2019 Cardiff Council published the city's cycle strategy which would introduce 30km of new cycle routes. This project forms a key part of the city-centre network.
5	What value does this scheme provide to the local area and beyond?	Wood Street serves as a gateway into the city centre and improves accessibility from more deprived adjacent southwest wards. Improved visibility of the streetscape is important to increase safety and to encourage more people to walk. The now tree-lined street provides greater connection to green spaces, particularly important for those who work in Central Square or use this as a commuting route. Cardiff hosts several international-scale events throughout the year and these are an excellent opportunity to showcase the best of Cardiff. Wood Street provides an important first impression to visitors arriving from the bus, coach and train stations.
6	What challenges/problems needed to be addressed to realise this scheme?	High number of utilities – due to limited flexibility of SuDS positions within the masterplan the team had to be creative to generate sufficient soil volumes for tree health and attenuation capacity including constructing underneath the cycleway. The site is generally very flat, so the team worked closely with the highways designers to manipulate levels to encourage water to flow on the surface into the SuDS features. Where necessary, shallow kerbs and channels supplement the conveyance of runoff. The many stakeholders were engaged though the design and delivery to identify any potential conflicts and provide ample opportunity to resolve these issues.

7	How does the scheme address related issues such as water scarcity, nutrient neutrality, or biodiversity net gain?	Water positive – previously the Wood Street catchment drained into the combined sewer. This project utilises a recently laid surface water sewer from adjacent development and slowly discharges into the River Taff. Nutrients – highway runoff can contain high concentrations of contaminants including heavy metals and microplastics. This project treats three times the interception runoff (first 5mm). The project introduces 11 variants of shrubs, grasses, perennials and bulbs and 4 tree species. Planting was carefully selected to withstand the existing conditions of air quality, orientation and soil moisture but also uses native species that attract pollinators to help with the local biodiversity.
8	Is learning from the scheme continually captured and communicated? Please give examples.	Lessons learned from this scheme have been shared through delivery of online webinars, in-person events and holding guided tours. Wood Street will be featured as the Welsh case study at an ICE event in April 2024 "*Retrofitting SuDS in the urban environment*" alongside case studies from Scotland and England. Soil specification – there were challenges during SuDS soil installation learning was shared with GreenBlue Urban and other key stakeholders in Cardiff and Welsh Government to inform future schemes. This exercise included hearing from best practice of other successful retrofit schemes such as Sheffield Grey-to-Green and Mansfield Green Recovery.
9	What approaches/measures are taken to ensure the scheme is properly managed and maintained?	Cardiff Council agreed a 5-year maintenance period to be carried out by the contractor. After 5 years the planting would have fully established and Cardiff Council will adopt the assets and maintenance responsibilities. Silt management was carefully considered and predominantly captured at the surface. Where silt traps had to be below ground level, these sumps were within gully grates to allow easy maintenance using traditional cleaning methods. No chambers are located within the cycleway as this would result create a hazard to cyclists during maintenance. Manholes were positioned off the road as far as possible to improve safety during access.
10	Have you collected any feedback on your scheme? What do people say about it? Can you provide any quotes?	Ian Titherington (Welsh Government): "*Wood Street is an exceptional example of what can be achieved with SuDS in a heavily developed city centre. The SuDS locations fit perfectly within vehicle, cycle & pedestrian movements, whilst also maximising catchment interception. Such successful schemes will be a catalyst for other UK cities to do the same*." Dan De'Ath (Cabinet Member for Strategic Planning and Transport): "*Wood Street has been transformed. Not only does the street look far better than previously with additional planting and a new road layout, but the engineering will also ensure that the road doesn't flood in bad weather*."

3. **Supporting materials**

Image (low resolution)	Caption	Image credit
	[Before Location 1, 2018] Previously this street was designed for cars and was not a pleasant experience for pedestrians let alone cyclists.	© Dan Tram
	[After Location 1, 2024] Looking into the city centre, the 25 trees soften what used to be a very grey and unattractive street. The position of the rain gardens were positioned away from pedestrian desire lines and provide an extra degree of separation between vehicles and cyclists to improve safety.	© Dan Tram

	Drone photo capturing four rain gardens and 5 tree pits seamlessly integrated into the improved public realm. The scale of work included new cycle lanes, widened pavements within a busy city centre.	© Knights Brown
	[Before Location 2, 2018] The former St David's House (right) has been demolished to open up the public realm. A new public square has been created for people to enjoy.	© Dan Tram

	[After Location 2a, 2024] The north lane and pavement diverts all surface water runoff into rain gardens and the south areas draining to buried tree pits. Filtered water is then discharged into the River Taff 70m west of the site.	© Dan Tram
	[After Location 2b, 2024] The pavements have been widened and new cycle lanes have been added to make this street more attractive and useable for people. A public square has been created the serves new retail and office space.	© Dan Tram

	[Before Location 3, 2016] Large junctions, wide lanes, busy street furniture and awkward pedestrian crossings were characteristic of Wood Street.	© Google
	[After Location 3, 2024] New integrated seating allows people to enjoy the improved public realm. The benches double up as a physical deterrent of crossing the road and rain garden, improving safety, encouraging pedestrians to use the designated crossings.	© GreenBlue Urban