

## Climate Innovation District, Leeds



### SuDS used

- *Green roofs*
- *Rain gardens*
- *Permeable pavements (reinforced soil and gravel)*
- *Detention basins*

### Benefits

- *Significantly reduces surface water run-off from the site*
- *Provides treatment to run off from trafficked areas before discharging to the River Aire*
- *Contributes to an attractive and ecologically rich landscape*
- *Significantly reduces the amount of buried infrastructure that would be associated with a traditional drainage scheme (pipes and tanks)*
- *Successfully delivers within all four pillars of SuDS*

### 1. Location

Climate Innovation District, Leeds LS9 8FB

## 2. Description

The Climate Innovation District is a £250m car-free housing development in Leeds on a brownfield site and is the largest sustainable development in the UK. It aims to create sustainable, low carbon communities, providing a great setting for home and family life. It incorporates more than 500 low carbon homes, across the phases, alongside manufacturing, offices, a car-free school, multi-generational building, community facilities and a climate resilient public realm. The houses built will be the first family houses in the city centre for over 90 years. The development straddles the River Aire, south east of the city centre and to ensure those living there are encouraged to be car-free, the development links both sides of the river with a new footbridge. The city of Leeds suffered devastating floods on Boxing Day 2015 and preventing surface water from entering the city's drainage network is key.

## 3. Main SuDS components used

The development is one of the most comprehensive SuDS systems in the UK combining a range of different methods for dealing with surface water run off. The fact that the development sits alongside the river is a great starting point for innovation in SuDS design, as all the surface water collected on site can be discharged into the river in a controlled way. Components include;

- Green roofs are provided to all of the new houses, they are created using the perennial herb Sedum Acre. This layer of vegetation retains rainwater and promotes evapotranspiration, providing a level of attenuation that will prevent large volumes of water pouring into the downpipes during sudden downpours.
- Raingardens are provided to the front of all of the properties and collect roof water from individual downpipes. The raingardens retain a significant amount of water in the soil matrix which is taken up by the planting and in extreme events water enters the reduced fines drainage layer which runs in continuity with the reduced fines sub-base beneath the permeable, landscaped streets.
- The streets across the site consist of either reinforced soil or reinforced gravel, there are no hard, impermeable surfaces. The surface is constructed above a no fines sub-base which provides attenuation of surface water prior to discharging to the River.
- There are a series of detention basins across the site which will be utilised for play and other functions in dry conditions and will provide strategic, site wide attenuation in extreme events.
- Over half the development is open green space. There are wildflower meadows and beds of edible plants and older trees have been retained, as well as new trees and shrubs which have been planted to help slow down surface water filtration.

## 4. How it works

- The design decision made at the outset (which was kept to throughout) was the absolute maximisation of SuDS within the proposed development. It was almost as though the utilised SuDS features were selected first and then the rest of the development was designed around them.

- Significantly reduces surface water run-off from the site – rainwater is constantly slowed and treated before it ends up in the river.
- The idea is to catch the water where it lands, so the landscape is permeable, like a big sponge. Then the water trickles out into the river through outfalls in a gabion wall along the River bank.
- Provides treatment to run off from trafficked areas before discharging to the river
- Raingardens can store large amounts of rainwater and host a variety of plants. In normal rainfall conditions, water is collected within the raingardens and gets used up by the plants as they grow, so will never make its way into the lower levels. It is only during bigger rainfall events that the sub-base will be called into action for storage.
- Contributes to an attractive and ecologically rich landscape
- The discharge rate for the site was restricted to greenfield QBar to ensure downstream flood risk was reduced
- A SuDS Management Train was developed for the scheme which involved all bar one features sitting within the ‘Interception’ category
- All storms up to the 1 in 100 year critical event including 40% allowance for climate change are stored within the site.

## 5. Specific project details

- Significantly reduces the amount of buried infrastructure that would be associated with a traditional drainage scheme (pipes and tanks)
- Civils, highways, structures and drainage disciplines were coordinated internally during the design process, along with architects, landscape architect and mechanical and electrical engineers. Regular design team meetings and an effective data sharing process allowed for a swift and integrated ‘one team’ approach.

## 6. Maintenance & operation

- The SuDS are privately maintained by a management company appointed to the Community Trust although residents are actively encouraged to look after the features to promote collective community ownership
- Maintenance was considered throughout the various design stages to ensure access throughout.

## 7. Monitoring and evaluation

- A programme of monitoring will be undertaken on completion of the development. This will be managed by the management company in close collaboration with the developer Citu who are heavily invested in research and development and are keen to utilise a similar approach across future sites as well as making a wider impact, or ripple effect, and changing the way that other developments are designed and delivered with a view to accelerating the transition to zero carbon cities.

## 8. Benefits and achievements

Benefits include;

- Only in the case of a 100 year storm should the basin fill up.
- The entire landscape is permeable and functional
- The development mimics nature
- The SuDS features also add amenity value for residents and the wider community bringing health and wellbeing benefits too.
- Every area is landscaped but still wholly functional eg despite the soft appearance, the areas are capable of being trafficked by emergency vehicles.
- It is only during bigger rainfall events that the sub-base will be called into action, in normal conditions, water is collected within the rain gardens
- Extensive tree planting across the site plays a major part in reducing the volume of water reaching the river.
- Significant reduction in the amount of buried infrastructure normally associated with a traditional drainage scheme (pipes and tanks)

The scheme is already being recognised for its sustainability and innovation having won the Sunday Times 2019 Sustainable Development of the Year and it was a finalist in the NCE Impact in Climate Resilience category. The development was also featured by New Civil Engineer as an exemplar of flood resilience / management of storm water.

## 9. Lessons learnt

- The most significant lesson learnt was around the importance of communication with the site team. Whilst the drawings and specifications were clear, we found there to be significant value in meeting with the site operatives and talking them through the principles of the scheme, so that they knew what we were trying to achieve, and the detail of what we were proposing. The importance of site operations to avoid over compaction of soils, maintaining clean working areas and protecting no fines sub-base etc.

## 10. Interaction with local authority

- The Local Authority (Leeds City Council) have been engaged throughout and are now treating the scheme as an exemplar with site visits arranged for their technical teams to visit the development.

## 11. Project details

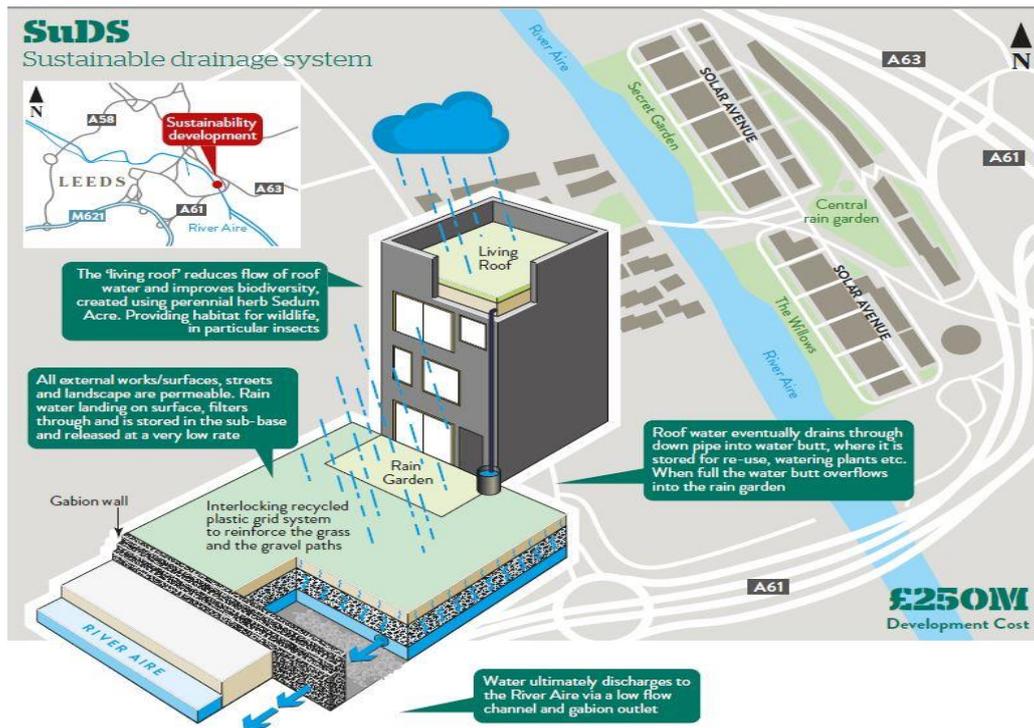
**Construction completed:** *Project is currently in construction with parts of Phase 1 (320 homes) completed. Future phases are in planning.*

**Cost:** *£250 million development*

Extent: Not known

## 12. Project team

Clients	<ul style="list-style-type: none"> <li>• Citu</li> </ul>	
Designers	<ul style="list-style-type: none"> <li>• Citu</li> <li>• White Arkitekter</li> <li>• Layer Landscape</li> <li>• Civic Engineers</li> </ul>	
Contractors	<ul style="list-style-type: none"> <li>• Citu</li> </ul>	



Sketch of the SuDS Strategy (credited to NCE)



*Rain Gardens at some of the houses*



*Gabion Baskets for flood prevention along the river*



*Flood and drainage measures along the river*



*Secret Garden looking to the Willows*



*Creation of the Rain Gardens*



*Early site photos of the urban landscape construction*