Cambrian North Basin, Llanelli

SuDS used

- *Detention Basin*

Benefits

- *Reducing combined sewer overflow pollution events.*
- *Biodiversity and habitat creation.*
- *Amenity value through benches and linking cycle paths.*

1. Location

People's Park, Park View Terrace, Llanelli, SA15 3HA; 51°40'59.4"N 4°10'13.8"W

2. Description

Cambrian North Basin and its associated landscape features has transformed 3,600 m^2 of an unused historic landfill site into a landscaped area with amenity value. The purpose of the 2,100 m^2 basin is to attenuate 1 ha of newly separated highway, private car park and roof drainage to reduce peak flows in the combined sewer. It is part of a wider £8m project aiming to reduce Combined Sewer Overflow (CSO) pollution events to Shellfish Waters at Cambrian Sewage Pumping Station (SPS) from 52 to 10 per year to meet National Environment Programme (NEP) targets. The Cambrian North Basin will contribute by reducing CSO pollution events by five per year.

Fig 1 Cambrian North Basin before construction (February 2016)

Fig 2 Cambrian North Basin artist's impression

Fig 3 Cambrian North Basin after construction (August 2017)

3. Main SuDS components used

The detention basin is 2 m deep and attenuates 200m^3 of rain water from the upstream catchment. A gabion wall, landscaped mound, sediment forebay and boulders form part of the hard landscaping.

Fig 4

Fig 5 Sediment forebay

Fig 6 Gabion wall and fencing

Fig 7 Landscaping boulders

4. How it works

In approaching the design the SuDS train was considered to make the most of evapotranspiration and water quality benefits. However, due to the low ground levels and 350 m distance to the nearest river the 1 ha surface water runoff could not be taken by gravity to a watercourse, therefore it had to be managed locally. During optioneering four solutions were considered 1. Surface water pumping station 2. Traditional below ground storage tank 3. Geocellular storage and 4. Above ground detention basin. The whole life cost analysis showed options 1 and 2 to be significantly more expensive. The geocellular storage was 10% cheaper than the basin but a basin was selected due to the added value it would bring to the community and environment; based on previous basins in Llanelli managing water on the surface could reduce runoff volumes by up to 60%.

Several design challenges were encountered due to site constraints. The glacial till, historic landfill, proximity to a deep pond and high groundwater meant a soakaway design was not feasible. To address this a lined basin was proposed with a clay stank and fin drain. The basin is designed to attenuate the first 20 mm of rainfall and will not flood in a 1 in 100 year + climate change event. The underdrain slowly releases water to the combined sewer at 1l/s, when the water exceeds 300 mm depth the emergency overflow takes the runoff to a local waterbody.

There are more than 17 different species of plants as well as numerous species of native grasses and wildflowers which improve biodiversity and are good for pollinators, providing microhabitats for

insects, invertebrates and amphibians. Although water quality is not a driver, as the water remains in the combined sewer, the plants will provide filtering, sedimentation and treatment benefits.

Amenity value has been added through promoting sustainable travel and health and wellbeing through the design. A new footpath provides important connections for the existing desire lines between the Llanelli Town Centre and the Wales Coast Path, previously linked by highway. Furthermore, the project has created three seating areas encouraging socialising and managing water on the surface has increased awareness of sustainable water management within the community.

Fig 8: Bench and path linking footpaths

Fig 9 Bench

5. Specific project details

The project brought together Arup landscape architects, geotechnical and civil engineers and environmental consultants who developed the design with Morgan Sindall, considering buildability from the outset. A 3D model was created to manage the reuse of the 3,000 m^3 basin excavations.

Fig 10 Cambrian North Basin excavations

Early stakeholder engagement was key as the basin is directly outside 11 properties and adjacent to a Community Centre. A public engagement event was held in the Community Centre with 30 residents attending. The team responded to concerns about parking disruption by creating an additional resident parking area at the end of the street and a new access track for construction vehicles avoiding the residential area. Due to the extent of work across Llanelli a dedicated drop in centre and communications officer was available. Many written compliments were received during construction praising the friendly and considerate workforce. Upon completion a public opening day

encouraged community spirit and celebrated the success of the project, with local councillors attending.

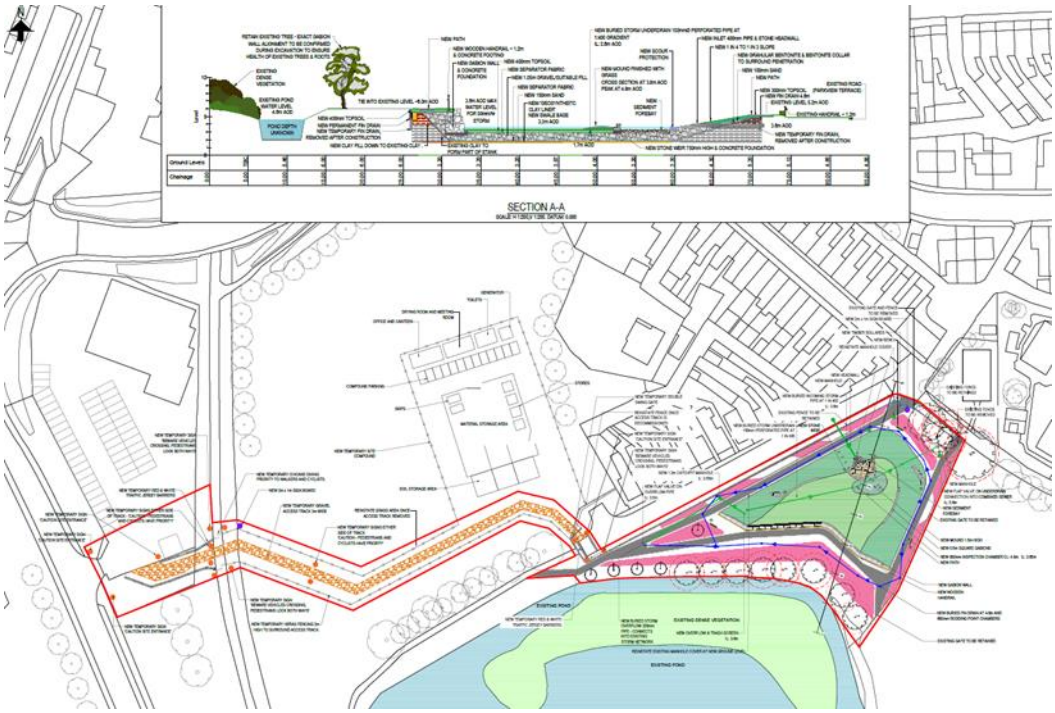

Fig 11: Additional parking area and construction specific access track

Fig 12 Community opening day (August 2017)

6. Maintenance & operation

Cambrian North Basin is part of a pilot with Carmarthenshire County Council, Welsh Water and Morgan Sindall regarding the long-term operation and maintenance of SuDS. Morgan Sindall are maintaining the basin for one year post-construction, then handing the maintenance to Welsh Water. The basin will be maintained by Welsh Water, as a critical asset communicating with their

sewer system, but the surrounding landscape features will be maintained by Carmarthenshire County Council. A review of the pilot period is scheduled for May 2018.

7. Monitoring and evaluation

Monitoring of the flow reduction in the combined sewer will occur once the wider £8m pollution reduction work is completed in June 2018. The peak flow removal of the basin is predicted to be 146l/s.

8. Benefits and achievements

Cambrian North Basin is industry best practice, following on from the extensive SuDS implemented in the town over the past 5 years. Many external parties have visited the basin including Welsh Government, Swansea Council, Natural Resources Wales, ITV and other water companies. The project won the Best Overall Project within the Welsh Water Capital Delivery Alliance in March 2018.

9. Lessons learnt

Key challenges and lessons learnt include

- Site constraints: The constraints of the narrow streets and limited parking required a bespoke traffic management plan.
- Planting: Early engagement with the nursery supplier is recommended to accommodate potential stock shortages and planting outside season. Providing sufficient watering to plants in the first months during establishment is critical to the long-term success of the planting.
- Benefits: Monitoring water quality benefits as well as flow impact will bolster the case for SuDS and enhance the case study and industry knowledge.

10. Interaction with local authority

Carmarthenshire Council were involved early in the project through the quarterly Facilitation Meetings that exist as part of the wider town programme. This aided the planning application programme as the council had visibility of the project and understood the philosophy behind the basin. The Parks, Environmental, Flooding and Highways officers provided their input into the project through site visits and technical meetings, being particularly important as they have adopted the hard landscaping around the basin.

11. Project details

Construction Dates: July 2016 - July 2017

Cost overall project outturn: £2,678,918 (Solution Target Price £3,800,000)
Cost SuDS part (basin): £800,000

Cost design overall project: £130,000 Cost design SuDS part (basin): unable to extract from £130,000

Comparison with geocellular storage: £700,000

Comparison with traditional below ground storage tank: £1,300,000

Comparison with surface water pumping station: £1,200,000

Extent overall project: 1.6 ha of impermeable area Extent SuDS: 1 ha of impermeable area

12. Project team

Funders	• Welsh Water
Clients	• Welsh Water
Designers	• Arup
Contractors	• Morgan Sindall • T&M Landscapes