

# Home Development, Merthyr Tydfil



## SuDS used

- *Rainwater harvesting source controlled attenuation systems managed flows from roof areas. Each system was combined with rainwater harvesting for further effect on discharge rates and increase in site sustainability*
- *Roads and hard standing areas controlled with oversized pipe and vortex control.*

## Benefits

- *Meet best practice guidance by using source controlled techniques as well as rainwater harvesting.*
- *Highly space efficient design increased building density, therefore increasing development value.*
- *Each home combined with rainwater harvesting, providing a 50% reduction in potable demand; making homes more sustainable as well as providing a tangible payback due to lower metered water rates.*
- *Meets all of Welsh best practice criteria; greenfield rates, use of source control techniques, and water reuse.*

## 1. Location

Winchfawler, Merthyr Tydfil.

## 2. Description – (New Build Small Scale SuDS)

Development of 8 new homes in Merthyr Tydfil. Due to ground conditions and plot size, infiltration systems were not possible. To reduce flood risk, a stipulation was placed on the development for a peak discharge rate of 5l/s.

The flows from each home's roof is heavily attenuated at source through a rainwater harvesting SuDS system. Each plot is limited to a discharge rate of 0.1l/s. The system combines controlled attenuation with rainwater harvesting; each home's toilets and washing machines using rainwater, reducing demand and providing further attenuation.

Flows from the road and other hard standing areas are held within an oversized pipe within the road and released via a 5l/s vortex control.

Pollution is controlled downstream.

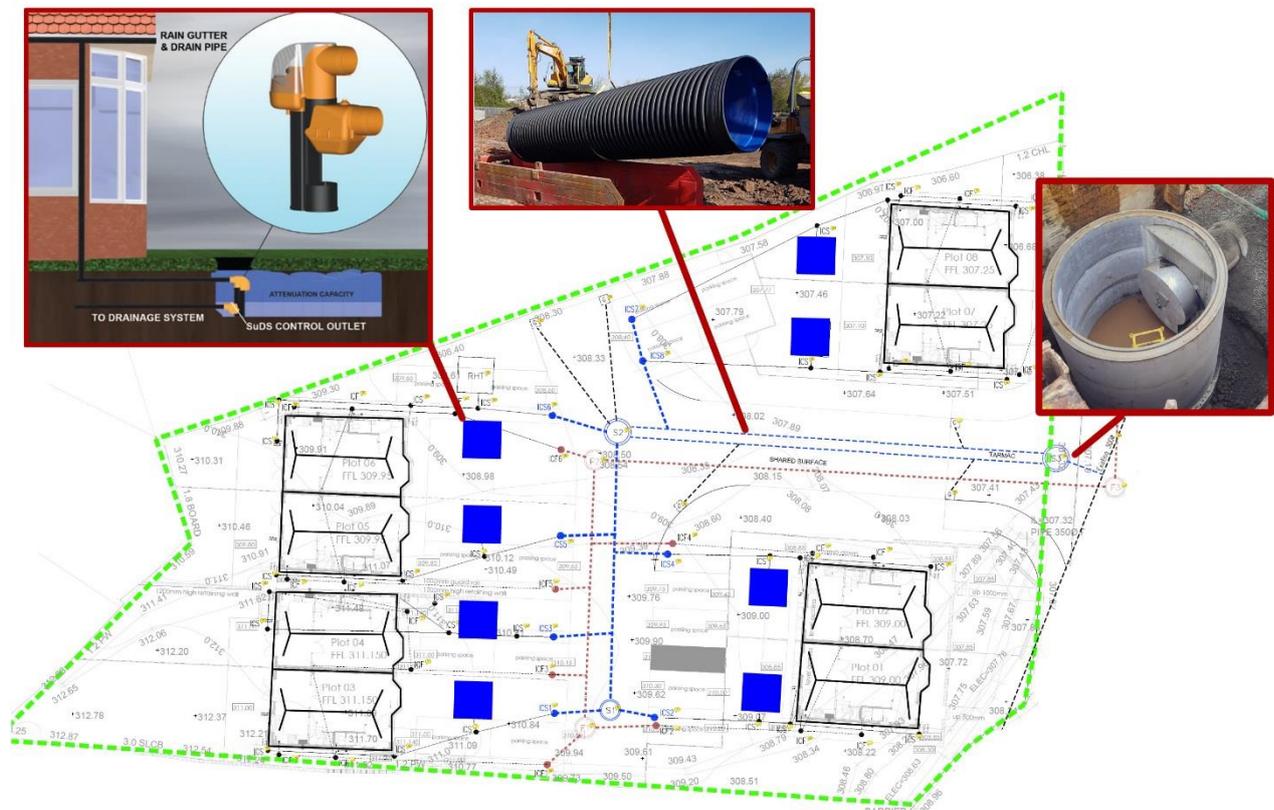


Fig 1

## 3. Main SuDS components used

- 8X 5m<sup>3</sup> rainwater harvesting units, calibrated to 0.1l/s discharge rate.
- 8X Domestic Rainwater Harvesting systems. (Included within attenuation system.)
- Oversized pipe storage structure: 700mm diameter, 22m length, 10.7m<sup>3</sup> volume.
- Vortex control, 5l/s design head 1.3m

## 4. How it works

Each roof area is diverted into a rainwater harvesting storm attenuation device. When the stormwater enters the tank it is filtered very heavily; removing debris such as leaf matter.

A proportion of the water entering the tank is **detained** for rainwater harvesting use. This provides excellent source control as well as adding sustainability and cost savings to the home.

Once the stormwater reaches a predetermined level within the tank, the water is released at a very low controlled rate (0.1l/s) through a small 5mm orifice.

The tank size and orifice size is calibrated using industry recognised modelling software. All calculations were provided to 1:100 year return periods with a 30% climate change uplift.

*NB: Although our research shows rainwater harvesting has a profound effect on attenuation, this is not included in calculations due to the difficulty in modeling.*

Discharged water is cascaded into a secondary SuDS system. A typical oversized pipe storage structure and vortex control.

## 5. Specific project details

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## 6. Maintenance and operation

The rainwater harvesting systems are fully self cleaning and require a single visual check per year.

Operation of rainwater harvesting is automatic and free from any manual operation. The water used is filtered heavily and stored underground rendering it clean, clear and safe.

Secondary SuDS on the site are maintained by a suitable contractor.

## 7. Monitoring and evaluation

The systems were delivered in batches allowing an engineer to check and sign off each installation.

All systems are performing correctly during running.

## 8. Benefits and achievements

- Meeting best practice guidance for source controlled attenuation and use of rainwater harvesting.
- Highly cost effective solution; other designs without rainwater harvesting would have required around twice the volume of secondary storage. This would have resulted in the loss of at least one plot to accommodate storage. **With huge cost implications to the developer.**
- Significant uplift in development sustainability due to use of rainwater harvesting. Combined, the systems should save over 500,000L of water per year.
- Self cleaning, user maintained units reduce long term cost to the developer and other parties.
- Combining SuDS with rainwater harvesting provides an efficient and cost effective solution rather than separate units.

## 9. Lessons learnt

- Source controlled attenuation systems do exist and can be cost effective.
- Rainwater harvesting can be combined with storm attenuation systems to combine infrastructure and reduce costs.
- Source controlled attenuation of roof areas provide significant reduction in secondary (*site level*) attenuation volume requirement. This reduces the space requirement and allowed for maximum building density.

## 10. Interaction with local authority

Stipulations set by local authority to manage flood risk. Design accepted with use of hydraulic calculation. Commended for meeting best practice guidance with use of source control and rainwater harvesting.

## 11. Project details

### Construction completed:

Ongoing.

### Cost:

5000L rainwater harvesting dual gravity feed systems RRP £3450+VAT Considerable, discount applied due to scale. All design/hydraulic calculations included in cost. Secondary SuDS costs undisclosed.

**Extent:** Approximately 0.3 Ha

## 12. Project team

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|-------------|--|
| Funders     | <ul style="list-style-type: none"><li>• How Refreshing Ltd</li></ul> |
| Clients     | <ul style="list-style-type: none"><li>• How Refreshing Ltd</li></ul> |
| Designers   | <ul style="list-style-type: none"><li>• Rain Active Ltd</li></ul>    |
| Contractors | <ul style="list-style-type: none"><li>• How Refreshing Ltd</li></ul> |