



Rainwater Harvesting Feasibility Report for Planning

New Junior School - St Helen's, Northwood

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1.0 Introduction

Couch Perry Wilkes (CPW) have been appointed by St Helen's School as Building Services Consultants and, in this capacity, have prepared this brief report to appraise the design options for reducing the mains cold water demand of the proposed new Junior School building on their site in Northwood.

The building has no kitchen demand, as catering facilities are located centrally on the site within another building. There are also no changing facilities and associated showers within the new building and, as a consequence, the MCW demand is limited to flushing WCs, handwashing facilities and Cleaner's Sinks. The installation of a green roof is also proposed for the single storey elements of the new building.

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2.0 Rainwater Harvesting System

A rainwater harvesting system could be installed to recover the rainwater from the roof and providing water suitable for flushing toilets.

The capital cost of a system suitably sized to serve the new building, as supplied and installed by Stormsaver, would be £16,100. This would incorporate 20,000 litre storage tank complete with pre-tank filter, overflows, access turret, service ducts, connection to BMS, and UV disinfection.

However, in order to accommodate this system, the following other items would also be required:

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|--|-----------------------|
| 1. Associated civil works including earth moving, concrete, trenching, and making good/backfilling. | Capital Cost: £16,200 |
| 2. Services distribution including buried grey water, buried drainage and additional grey water in building. | Capital Cost: £12,500 |
| 3. Additional plant space for controller and pump sets | Capital Cost: £4,000 |

Therefore, the actual total additional capital cost for a suitably sized rainwater harvesting system would be £48,800.

Calculations provided by Stormsaver advise that:

- The system's predicted annual collection of rainfall is 424m³.
- Utility combined MCW costs are £1.98/m³
- Saving associated with system would be £839.52/annum.

Therefore, the simple payback of the system not including for inflation or increasing MCW supply costs would be in the order of 58 years.

With a life expectancy of only 25 years, the system would not be expected to pay back within its anticipated lifetime.

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3.0 Green Roof

A green roof is proposed for the single storey elements of the new building which is likely to incorporate the Bauder Intensive roof system, featuring:

- 75mm Reservoir boards,
- 400-600 Bauder substrate
- Lightweight growing material which featuring 25% organic material
- Manufactured and used in accordance to FLL guidelines.

The substrate sits on a filter fleece, a 75mm Bauder reservoir board, protection mat and PE foil separation layer. 60% of annual rainwater retention will be retained in the substrate layer, when the substrate layer is at capacity any additional rainwater will be drained into the reservoir boards and retained to be used when the substrate layer needs additional water. Under heavy rainfall conditions the reservoir may become full and overflow through weep holes in the top of the (egg crate structured) board. The water would then flow to roof outlets. The reservoir boards hold a maximum of 21.5 l/m². This system works on slopes from 0 – 15 degrees.

This system will have the effect of attenuating the rainwater run off which would typically be recovered if a rainwater recovery system was installed. However, as the roof system holds the water, much more water is able to evaporate before reaching the ground, rendering the rainwater harvesting system much less efficient than with a traditional roof as it is able to recover far less water in the first place.

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4.0 Water Saving Design Measures

In order to demonstrate a commitment to reducing the annual water demand of the proposed new building, there are a number of design options that could be adopted into the domestic services design operating independently of a rainwater harvesting system.

The following measures would also be in line with the BREEAM water reduction measures associated with achieving credits Wat01 and Wat02:

- Low flow taps – limiting the flow that each tap can deliver at the outlet.
- Sensor operated taps
- Sanitary supply shut off – using a PIR and solenoid valve to shut off water supply to unoccupied areas.
- Major leak detection – using two sub-meters and a computer to continually compare flow rates along external pipe runs to alert users to any leaks.
- Flow restrictors – limiting the pressure of water to areas receiving too much. For example on Ground Floors of high rise buildings and outlets close to the incoming water main.
- Low flush volume WCs – reducing the flushing volume of WCs using specially designed WCs.

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5.0 Conclusion

While the inclusion of a rainwater harvesting system would clearly reduce the annual water demand associated with flushing WCs, the capital cost and payback (approx. 2 times greater than anticipated life of system) would not demonstrate a commercially viable solution to the school.

The inclusion of green roofs to the single storey elements will further hinder the efficiency of the rainwater harvesting system, when considered against a traditional roof structure, while making the cleaning of the collected water more difficult to ensure green residue does not form within the WC pans. The green roofs will give their own benefits to the proposed new building in relation to improved thermal envelop (reduced energy consumption associated with heating), increased thermal mass (reduced energy consumption through passive cooling) and natural drainage attenuation.

As the overall predicted MCW demand for the proposed new building is considerably less than that of a typical school building, along with the unattractive payback period and the proposed new green roof installation, it would be our recommendation to implement the other water saving measures in line with the water reduction credits of BREEAM, as detailed above in order to further reduce the MCW demand on the proposed new building.

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6.0 Further Reading

More information is available on the products mentioned in this report at the following websites.

Stormsaver website:

<http://www.stormsaver.com/>

Bauder Green Roofs:

<http://www.bauder.co.uk/green-roofs/intensive-roof-gardens>