

Arch 464
ECS
Spring 2023

Name _____

Quiz #2

"Just add water!"

Crofts Street, Cardiff, is a carbon positive modular housing project comprising nine two-bedroom townhouses, designed to be carbon positive in operation and built on brownfield land for council rent. Surprisingly, the project overview has nary a mention of water-use strategies.

Your role is to analyze the building and site for opportunities to included responsible water use.



All images: RSHP architects' web site.

Context. The project is located just north of central Cardiff at 51°30' NL. It has a humid climate dominated by cloudy days throughout the year. Summers are mild/humid and winters are cool/humid.

READ THE ENTIRE QUIZ BEFORE YOU BEGIN!



Crofts Street, Cardiff, is a modular housing project comprising nine two-bedroom townhouses

Project overview

Crofts Street, Cardiff, is a carbon positive modular housing project comprising nine two-bedroom townhouses, designed to be carbon positive in operation and built on brownfield land for council rent. It is the city's first modular scheme and was awarded Welsh Government Innovative Housing Funding.

The INNO design, led by RSHP and AECOM and delivered by @HOME, uses a 'fabric first' approach to optimise the performance of each unit against weather conditions, fire, and acoustics. This system reduces operational energy consumption, which can lead to major cost savings on utility bills for residents.

The townhouses prioritise the use of sustainable materials, which means that they have less embodied energy than other buildings. With these considerations, the scheme is expected to surpass the current (Part L1A 2013) Building Regulations standards by 142% for regulated carbon emissions and 42% in fabric energy efficiency.

The homes use roof-mounted solar panels with electric heat pumps instead of gas to provide energy. Mechanical ventilated heat-recovery and natural ventilation are used to provide efficient year-round comfort to all internal spaces. As a result, the Predicted Energy Assessment (PEA) for Crofts Street indicates a negative emission of at least -1.66 tonnes of CO₂ per annum per home.

This shows that the simple addition of solar panels is sufficient to generate more energy than is required to run the regulated building services (i.e. heating, hot water, lighting, pumps, and fans). The scheme also promotes the efficient use of land, developing it at a practicable density in line with neighbouring developments and pre-war terraces.

The ground floor of the houses has a brick slip system, reflective of the brick materiality that defines adjacent homes. Above this, Oko Skin cladding is arranged in the same orientation, but is double in width. The different premises are identified by tonal differences between respective doors, windows, and Juliette balconies.

Environmental Certification
Annual CO₂ emissions (predicted):
KgCO₂eq/m² Negative emission of at least
-1.66 tonnes of CO₂ per annum per home

—RSHP web site



These photos highlight the natural areas in the front and back gardens of the flats,



Site plan indicating that the flats are oriented a bit west of true north. The plans shown are for the upper floor indicating bathroom location.



More imagery on the contrast between front and back gardens and their context.

8 pts. 1. **Identify and sketch** four (4) opportunities to implement management of **stormwater** that falls on the roof and site. Cite evidence from prose, plans, and photos throughout the quiz to **validate** your critique.

1.

2.

3.

4.

6 pts. 2. **Propose two** possible strategies for managing the graywater that is generated in the flats. Cite evidence from the plans and photos throughout the quiz to **validate** your critique. **Sketch and explain each strategy** to illustrate how it would function.

1.

2.

4 pts. 3. In the UK high efficiency toilets (HETs) are required by code. **Recommend** toilets for the flats that will meet or beat code. **Sketch** your recommendation in section.

2 pts. 4. Use your answers for questions 1 through 3 to diagram the best resulting water management scheme for this project.