

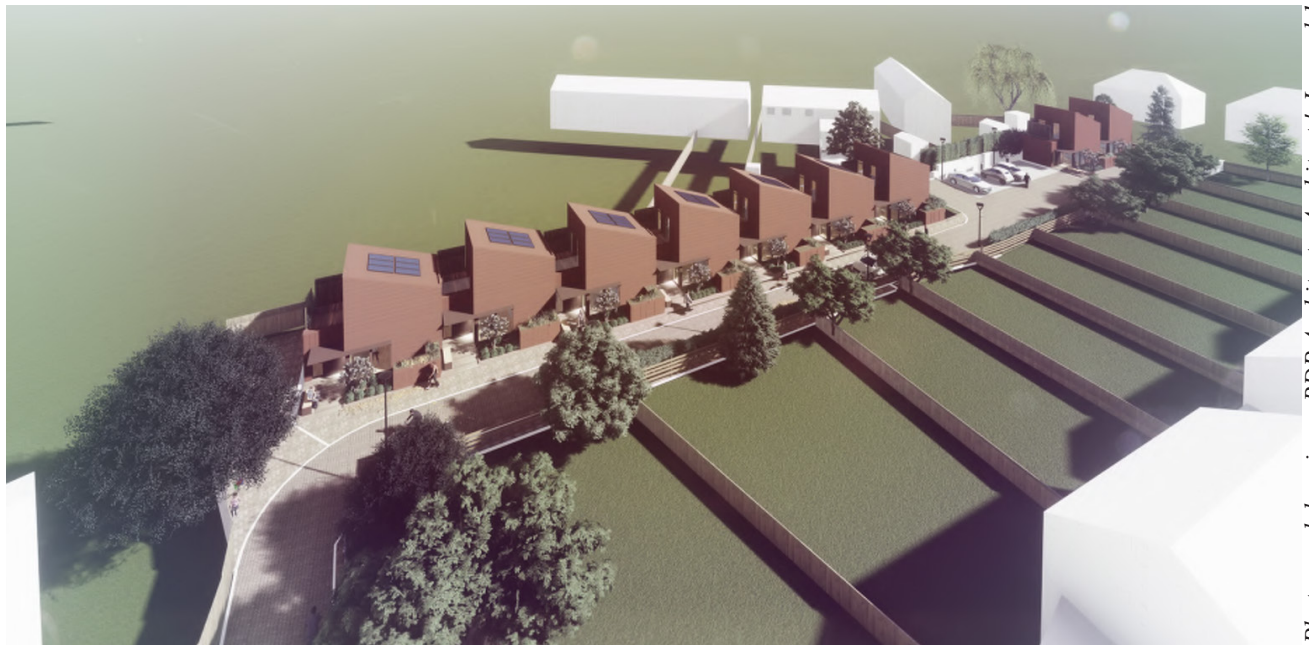
Arch 463
ECS
Fall 2022

Name _____

Quiz #3

"Mind the Gap House Concept"

Imagine that you've just been hired as an entry-level architect-in-training at BDP's Bristol office. Because of your extensive training in eco-architecture, especially passive and active systems, you've been assigned to help develop the Gap House concept to a viable and effective state.



Schematic design for the Gap House concept on Bell Close in Bristol. North is to the left.

Site context: The Bell Close site is rotated about 15 degrees counterclockwise from from true north-south. See Google Earth view to the right.

Climate context: Bristol, UK is located west of London near the Irish Sea and thus has a mild maritime climate with warm summers and mild winters, peppered by rain throughout the year. Prevailing winds are from the SW and NE. London is the closest EPW weather station.



Google Earth view of the site's existing garage foundations (outlined in blue arrows). North is up.

BDP gets go-ahead for one-bedroom eco-homes in Bristol

The scheme for Bristol City Council will see the modular homes built on a sloping, L-shaped site at Bell Close, which was formerly occupied by garages for surrounding homes. The two-storey homes are designed for single-family occupancy. The existing garage foundations, which total 227m², will be dug up before the homes are built on the same site. There will also be a new access road and parking. The homes will look west over the access road at ground-floor level and northwards at first-floor level. The homes will have private amenity space on their upper floors, with privacy screens to avoid views into adjoining gardens.

The Gap Houses would be contemporary, cost effective, net zero homes, largely factory built using modern methods of construction (MMC), to minimise disruption in the existing neighbourhood. Designed to fit into small garage sites which are often disused in many cities and neighborhoods, the homes will be super-insulated for minimal heating requirements and include renewable energy with solar PV panels and air-source heat pumps, resulting in minimal environmental impact and low running costs. The stylish, contemporary house is made up of an open-plan kitchen-living area and bathroom on the ground floor, with a bedroom and storage on the first floor. Large windows allow for maximum natural light. The houses generously meet national space standards for a one bedroom unit.

The buildings will have stained wood cladding, referencing neighbouring homes, while their height and scale will be “in keeping with the backlands nature of the other dwellings within the wider street scene,” according to a planning report by Bristol council officers, who added that the “proposed design is modern and innovative and would transform a backland site and contribute positively to the character and appearance of the area.” The application was approved by a Bristol City Council planning committee on Wednesday 12 October 2022.

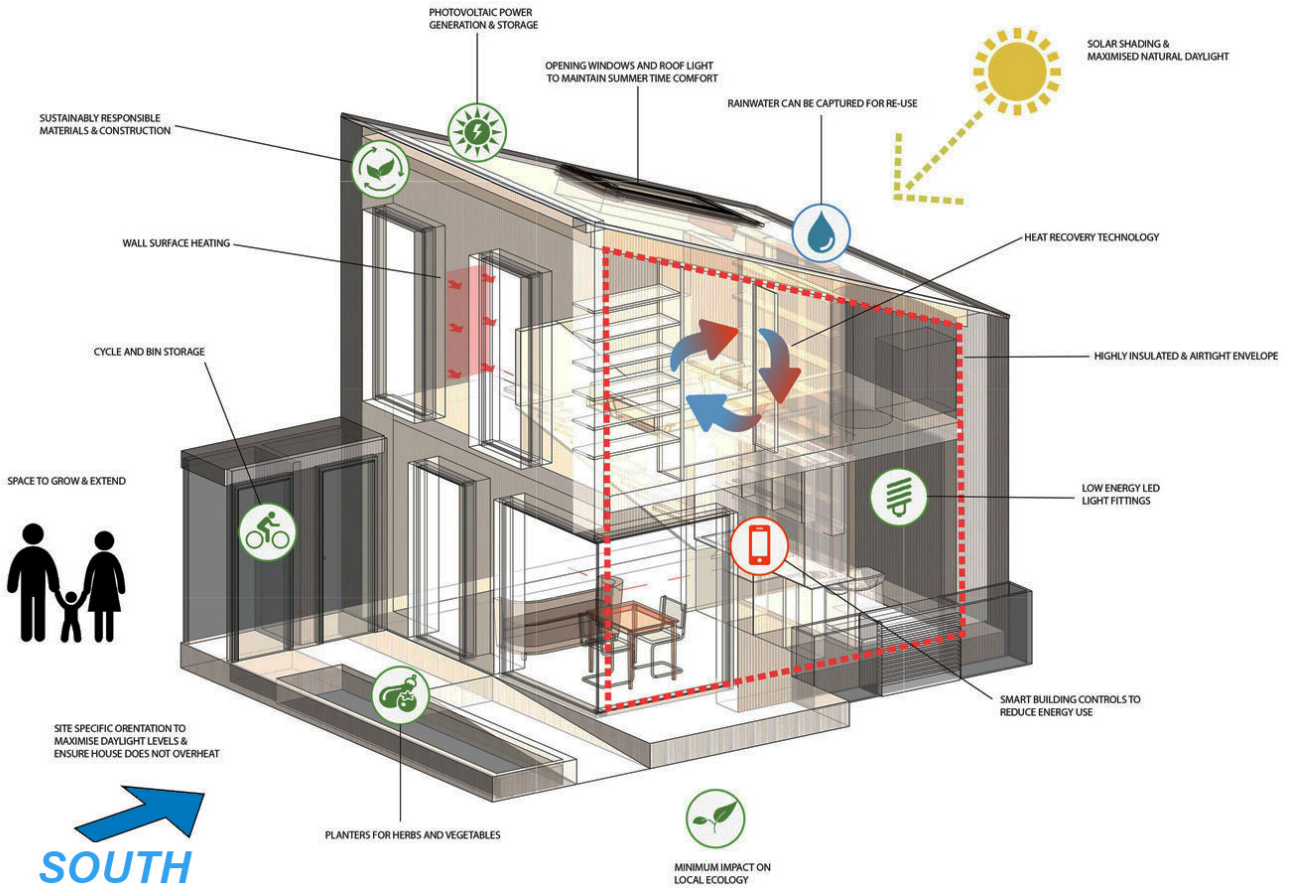
The homes, which will be delivered by Etopia, belong to BDP’s Gap House range—a concept for “factory-constructed, contemporary, and cost-effective eco-homes designed to fit into small urban spaces.” The homes are manufactured from timber and feature roof-top solar panels as well a highly insulated envelope. They offer opportunity for mass customisation through standardization of the chassis—using cross laminated timber (walls and floors) and structural insulated panel systems (roof)—and personalization of internal and external finishes/layout. A digital twin can be made in advance then manufactured with economies-of-scale. This also allows the capture of data through pre and post occupancy evaluation.

Martin Jones, landscape architect director in BDP’s Bristol studio, said: “There are thousands of disused and run-down garage plots up and down the country that are ripe for intelligent repurposing, so we hope that this project will pave the way for other similar schemes in the future. The Gap House provides an opportunity to revitalize neighborhoods, promote community cohesion, and help address the acute housing needs of our cities and towns.”

—*Will Ing Architects’ Journal*, 17 October 2022

Passive Strategies First

Here's the concept drawing for the Bell Close site.



On the next page analyze the effectiveness of the top three passive strategies—
heating, shading, and ventilation. Show how each could be improved and explain why.



Refined schematic design for the Bell Close site in Bristol with a west-facing window added.

Passive strategy analyses

9 points 1. Fully explain each strategy and discuss how effective each one is and suggest improvements for meeting the design goal—tackling the climate and ecological emergencies. Sketch as needed!

1. Solar Heating

2. Sun Shading

(continued next page)

Passive strategy analyses (cont.)
3. Natural Ventilation



Cutaway schematic (looking east) of the Bristol Gap House concept with early afternoon sunlight.

Active strategy analyses

6 points

2. Fully explain each strategy and **discuss** how effective each one is/could be and suggest improvements for meeting the design goal—tackling the climate and ecological emergencies. Sketch as needed!

1. Photovoltaics

2. Solar Hot Water

Insulation strategy analysis

5 points

3. **Design the CLT wall section** that meets the super-insulation goal. **Give** the rationale for your material and framing choices. Opaque software may be a great help in the wall section design. Sketch as needed!

Extra Credit

3 points Explain how an air-based active solar heating system could be implemented for the Gap Houses. Discuss its advantages and disadvantages. Use **sketches** to help explain your critique.