HOUSING FESTIVAL

BELL CLOSE

Innovation in Practice

commissioned by Etopia

Housing Festival
Lessons Learnt Series

BRISTOL CITY COUNCIL

Beard

BDP.

etopia

Editors summary

Housing Festival strongly believe that sharing lessons learnt is key to providing valuable insight for future developments and maximising the rate at which best practice is advanced, affecting positive change for society.

In our Lessons Learnt series, we interview project teams delivering MMC housing to hear their stories, highlight outcomes and produce evidence-based lessons learnt reports, which can be shared widely to support positive growth in the MMC sector.

We are grateful to Etopia for sharing our passion for surfacing and sharing project-based learning, and commissioning a project-wide debrief informing this Innovation in Practice report.

In addition our joint thanks go to all those involved in this project who have engaged in this reflective process with us and shared their own stories, photos and insights.

Dr. Ellen Grist
Research And Evaluation Lead
Housing Festival

> It has been quite a journey of a project, although an enjoyable journey and a lot of a lot of lessons learned throughout, but in good spirit.
>
> **Beard (contractor)**

Key party information

Client
Bristol City Council

Main Contractor
Beard Construction

MMC supplier
Etopia UK (panelised SIP solution)

Architect
BDP

Project type
General needs social rented homes

Project start on site
April 2024

Project completion
July 2025

Project Overview

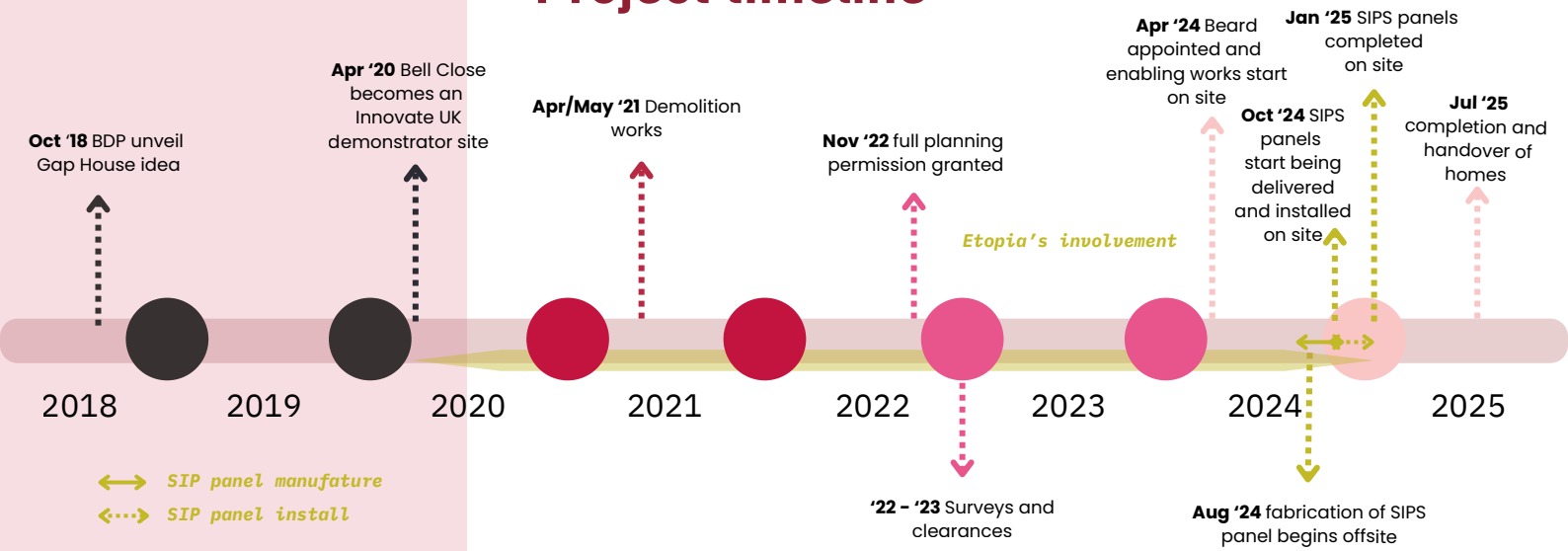
The Gap House project is a development of nine low-carbon one-bedroom, two storey homes built on a disused council-owned garage site on Bell Close in Horfield. The homes are 100% affordable for social rent.

Site transformation

Before (Dec 2019)

After (July 2025)

Project timeline



What people said

Over Beard's 135-year history, we've been involved in many residential projects, but none quite like this. Working with factory-made panels & within the limits of a small site has presented challenges that the team has embraced. It's been exciting to apply the innovative new methods to create sustainable, contemporary & affordable homes in the city.

Matt Cooper, Bristol Director, Beard

🏠 Innovative 'Gap Houses' being trialled on a Bristol City Council-owned garage site could help the city to bridge the chasm it faces in housing need

RIBA Journal

Who was involved

The Gap House scheme was designed by architects BDP and built by main contractor Beard and SIP (structural insulated panel) manufacturer Etopia. The homes have been commissioned and funded by Bristol City Council.

The one-bedroom homes will provide social rent homes for single occupants on the housing register.

Those involved in bringing this UK-first to fruition, have commented:

> Having first conceived the idea of the Gap House some years ago, it is fantastic to see the project coming to fruition and nearing the moment when people can start moving in. A once derelict site will have a new lease of life, revitalise the neighbourhood and provide high quality homes.
>
> **Adam Darby, associate architect, BDP**
>
> **Construction Index**

Credit: Etopia & BDP Design

> The council welcomes the progress of these innovative new homes for social rent, which will help meet housing need in the city. Utilising small pieces of brownfield land to deliver much needed affordable homes is a priority for the council and the learning from this, and other similar projects, will help us make better use of our smaller sites for affordable housing delivery.
>
> **Cllr Barry Parsons, Chair of the Homes and Housing Delivery Committee at Bristol City Council**
>
> **BDP News, Dec 2024**

How it began

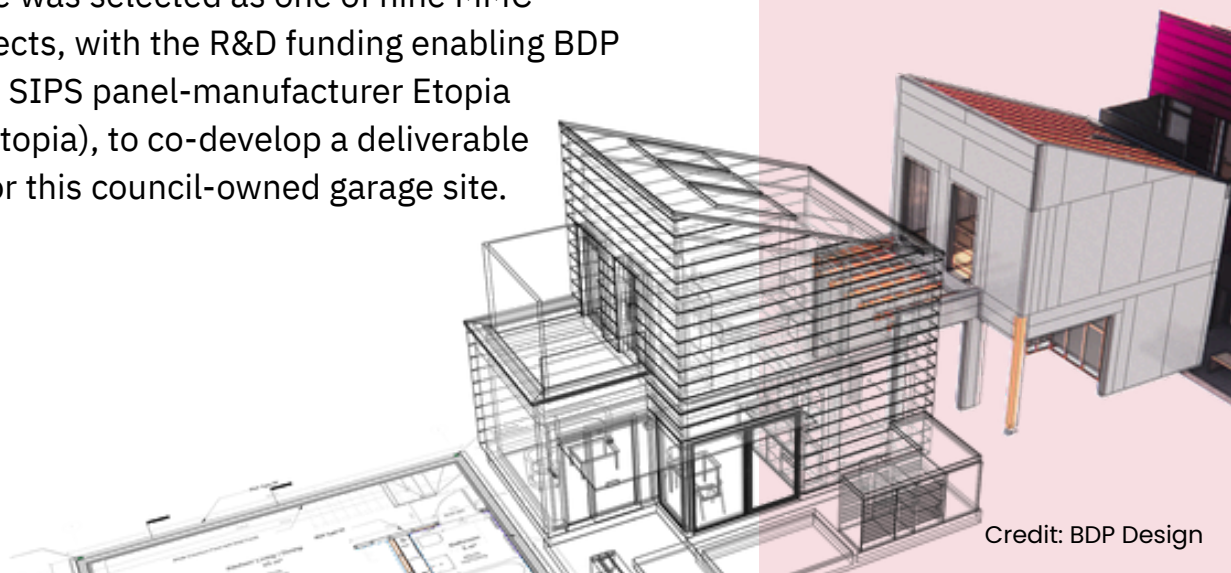
The Gap House is a contemporary eco-home designed to fit into urban garage plots.

Credit: BDP Design

> These homes have been specifically designed to revitalise often neglected garage plots, which can attract antisocial behaviour and are typically overlooked for new housing.
>
> **BDP (architect)**

Multidisciplinary design practice BDP unveiled their Gap House at the Bristol Housing Festival expo in 2018, as an illustrative design concept that could help the city unlock garage sites to meet the need for quality, affordable and sustainable housing. As part of the ongoing Bristol Housing festival initiative, the city council committed to identifying suitable sites and supporting pathfinder projects employing innovative solutions with the potential to help address the housing shortage in the city, - including the council-owned garage site at Bell Close.

In 2020, the Gap House became part of an Innovate UK funded R&D project with Bristol Housing Festival, called 'Enabling Housing Innovation for Inclusive Growth,' which looked at the potential of MMC to increase delivery of affordable homes in Bristol and address barriers to the delivery of new factory-manufactured homes. The Gap House at Bell Close was selected as one of nine MMC demonstrator projects, with the R&D funding enabling BDP to collaborate with SIPS panel-manufacturer Etopia (formerly Project Etopia), to co-develop a deliverable housing solution for this council-owned garage site.



Credit: BDP Design

The site

> The ideal Gap House sites are typically urban constrained back-land plots, set within existing communities
>
> **BDP (architect)**

This former garage site owned and managed by Bristol City Council comprised a L-shaped sliver of sloping brownfield land, orientated north-west to south-east and sloping approximately 2m over its length. It was accessed either via a pedestrian footpath to the North that connected Bishop Manor Road to Tilling Road, or by vehicle from the adjacent road, Bell Close. Some adjacent homes gained rear access to their properties from the site boundary.

The 20 former garages were demolished in May 2021 leaving 227sqm of concrete foundations. The site was disused, overgrown and prone to fly-tipping and anti-social behaviour.

However, being in the heart of a residential area, the site was well suited for new homes, being well connected with bus routes and rail services (with the nearest bus stop located 200m from the site) and close to a number of local amenities, leisure facilities and green spaces.

Credit: Bristol City Council

Widening the access road from 4m to 6.5m was critical in bringing this site forward for development. Properties immediately adjacent to the lane on each side were BCC owned and managed. Independent arrangements were made with each sitting tenant respectively to reach agreeable terms to facilitate the reclamation of land necessary to unlock the site.

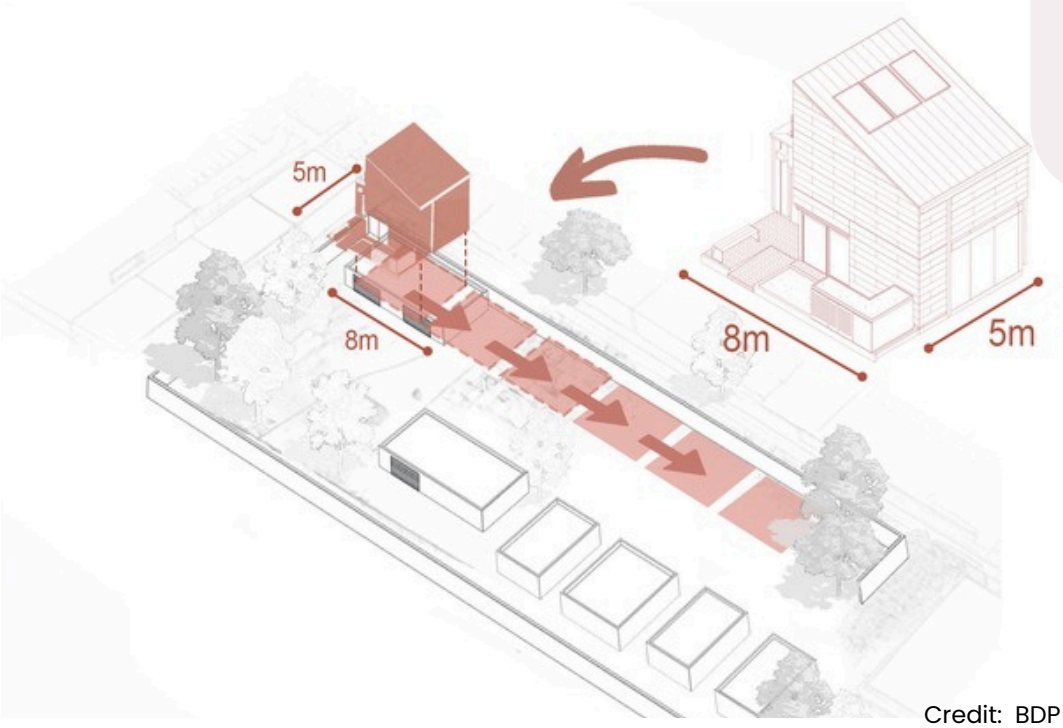
> "The only reason this site was unlocked was that we could widen the entrance — that was a bit of a stroke of luck."
> **Bristol City Council (client)**

Key Learning

In Bristol Transport Development Management (TDM) policies would likely have prevented residential development on this backland site without works to widen the access road. This was not to ease the construction process, but to limit vehicles accessing the future new homes. There were already 5 homes down Bell Close and further development would have been obstructed to limit the number of vehicles using the then narrow lane.

The GAP House solution

> The GAP House concept is to re-use the footprint of existing garages to create compact homes.
>
> **BDP (architect)**



Credit: BDP

Changes in car-ownership and modes of transportation, combined with aging facilities, has resulted in many garage plots falling into disrepair and becoming magnets for anti-social behaviour. Many of these disused, or deteriorating, garage sites are in the ownership of public bodies and are difficult assets to maintain.

The footprint of the GAP house has specifically chosen to match that of two typical garage plots, as a housing solution ready to ‘fill the gaps’.

Design

Aesthetic

The row of nine Gap Houses features a distinctive, contemporary design with generous windows, articulated facades and a palette of simple, high quality and sustainable materials. The formerly proposed charred timber cladding was replaced by an aluminium panellised system due to fire, maintenance and appearance concerns during the planning process. The red tone of the aluminium cladding is in keeping with the neighbouring houses on Bell Close as well as a number of houses on Rudhall Grove and Tilling Road.
Roof pitches are orientated to the south and angled as to optimise solar gain to the PV panels. The provision of benches outside each porch area has been designed to enable interactions between neighbours and foster community.

Credit: Etopia & BDP Design

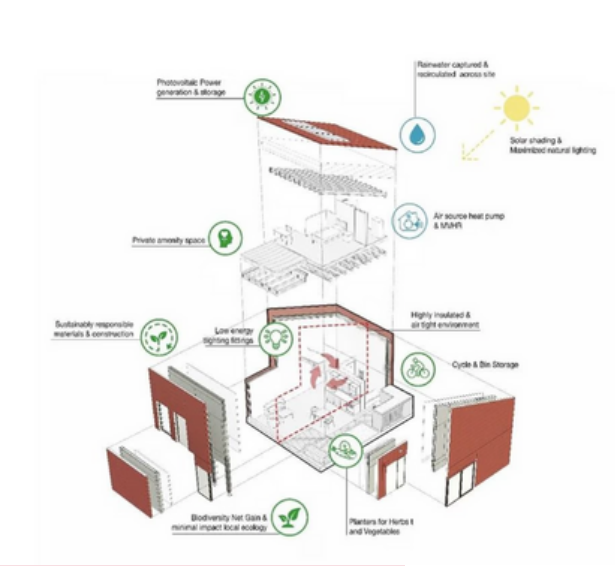
Layout

Each home is designed for a single-person occupancy. The ground floor has an open plan kitchen, dining and living area as well as a bathroom. The first floor has single bedroom and a plant room. A South/West facing garden area is provided to the front of the houses at ground floor, and a private terrace at first floor is accessed through the bedroom.

The first-floor windows look exclusively North-West down the site and there are privacy screens to the terrace to avoid views in to adjoining gardens, however the properties were still considered dual-aspect having large windows to the west and north from the kitchen/living space, as well as from the first-floor terrace.

Credit: BDP Design

Energy-efficiency



Credit: BDP Design

The homes include a high-performing thermal envelope, controlled airtightness, mechanical ventilation with heat recovery (MVHR) and LED lighting to limit energy demand and running costs. Air Source Heat Pumps (ASHPs) provide heating and hot water. In addition, each home has 1kWp of roof mounted solar photovoltaics (PV).
The completed properties were designated EPC B (SAP score 86) and achieved an airtightness of 1.74m3/hr/m2@50Pa, substantially below the 5m3/hr/m2@50Pa notional home in Building Regulation Part L.

Place-making

Credit: Etopia & BDP Design

The design includes provision of car and cycle parking, refuse and recycling storage, and hard and soft landscaping. To allow sufficient turning space for a fire-truck, 8 parking spaces have been provided for the 9 homes. Not meeting a parking ratio of 1 to 1 necessitated a detailed parking survey. 8 Pod Point EV charging points were installed for resident use, in line with Section 1 of the Building Regulations Part S.

Biodiversity

Credit: Etopia & BDP Design

Following an assessment, it was determined that the scheme needed to achieve a Biodiversity Net Gain score of 17.8%. The required uplift in biodiversity on the site was achieved through the provision of sedum roofs to the bin enclosures and wildflower planting onsite, enabled by reclaiming a small area of a large garden to a BCC owned home adjoining the site, which was between occupiers. 10 of the 35 replacement trees (calculated in accordance with BCC's tree felling compensation policy) were planted on site, with a financial contribution made for the remainder.

Space standards

Nationally Described Space Standards (NDSS) do not provide a minimum Gross Internal Area (GIA) for two-storey, 1-bedroom, 1-person (1b1p) dwellings, which these homes are. With a GIA of 48 sqm, the Gap House exceeds the minimum NDSS for a single-storey 1b1p home (37 sqm). In the absence of specific guidelines on how to apply space standards to this modern form of housing, the Planning Committee supported the application on the basis of the high-quality design proposal.

The final GIA falls short of the 58sqm required for a 2-storey, 2-person unit. Increasing the floor area was considered but the decision was made that these homes met the substantial need for non-family single occupant dwellings in the city, and that it would be made clear through the tenancy sign-up process that these homes were for single occupancy.

> In Bristol 55% of applicants on the housing register as of the 1st of April 2021 require a 1-bedroom property. The proposal would help to address a particular housing need in the city.
>
> **Planning committee Report**

Access and placemaking

Importantly, the new close on which these homes were to be built had to provide a turning space for a fire-truck and refuse lorry, which limited the overall number of homes and parking spaces that could be provided.

Herringbone patterned block pavers were specified for the surface finish to encourage low speeds and help designate this as shared space as opposed to part of the road network.

Key Learning

It was estimated that the brick paving to the road and access lane probably took ten times longer to install than tarmac would have taken. To benefit from MMC's enhanced speed on site, all aspects of the final solution have to be selected to support that objective.

Planning

Find the full suite of planning documents on the Planning Portal (ref 22/01608/FB)

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

Architects Journal, Oct 2022

AJ

The planning application for redevelopment of the site was made by CSJ Planning Consultants on behalf of Bristol City Council's HRA team (application reference: 22/01608/FB).

Following a pre-app in early February 2021, Bristol City Council launched a public consultation, which included an online presentation (22nd June), meetings with specific residents on Rudhall Grove to discuss the impact on their boundary, and a Ward Member Briefing. In total 182 responses were collected through BCC's Consultation Hub between June and July. 83% or respondents supported the principle of developing the site, although 37% of those had some concerns about the proposal.

In March 2022, a feedback response was circulated to local residents highlighting how the scheme had been changed and key concerns had been taken on board. During the final planning application process, 6 letters of objection were received with concerns including overlooking/privacy, light pollution from additional streetlamps, location of refuse bins, parking and whether space standards are being met.

The planning committee ultimately decided the provision of new social housing outweighed any harm to the amenity of the site's neighbours.

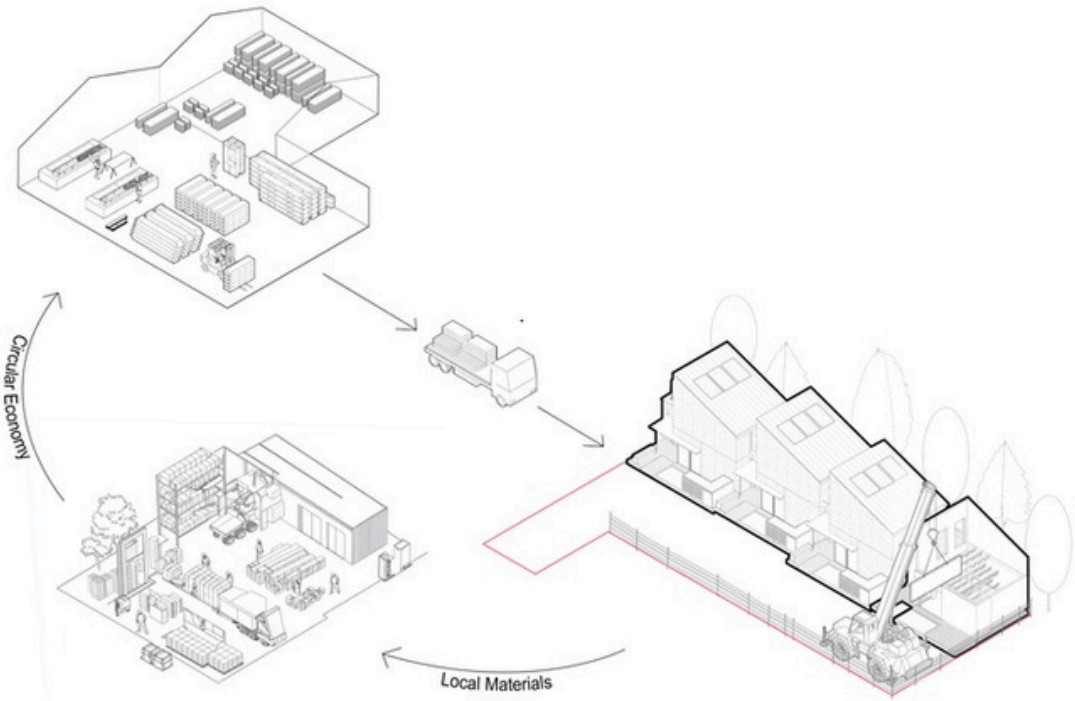
Following a planning committee (12 October 2022) full planning permission was granted on the 22nd of November 2022, subject to conditions.

> This application must be seen in the context of the City Council's support for the Bristol Housing Festival and its stated intention to experiment with different types of housing solutions to resolve the identified housing need in the city
>
> **Planning Committee report**

Procurement & delivery

In May 2021 BCC tendered a 1-year Pre-Construction Services Agreement (PCSA) contract, which was awarded to sustainable regeneration specialist EQUANS who helped prepare the RIBA Stage 3 information alongside the architect. Planning was submitted in March 2022 and granted in the November, the decision having been delayed by discussions about the refuse strategy and potential over-bearing.

The Design & Build contract was then put out for competitive tender in Jan 2023, with the condition of the use of MMC, which favoured use of the Etopia system. On the 24th April 2023, following a successful tendering process the construction contract was awarded to main contractor EW Beard Ltd. Having undertaken the initial concept design work, BDP were novated by Beard into the construction contract to see the project through to fruition.



Credit: BDP

Key Learning

Selecting the MMC system as early as possible prevents design rework, brings greater efficiency and helps unlock overall programme benefits.

Fire certification

In January 2024 full through-wall fire tests were found to be required for Building Control and NHBC warranty sign-off. The previous fire certification of Etopia's 4Wall SIPS panels (without the cladding), was not sufficient for this warranty provider (as they had been for others). Instead NHBC would only approve the design if local Building Control and the local fire department accepted it.

A fire engineer was appointed to assess the wall make-up, who applied fire engineering judgement and provided recommendations on enhanced details, including new internal fire linings. The fire engineers supporting statement report justified the performance of the SIPS panels used in conjunction with the external cladding and new internal fire linings, which was accepted by Building Control and NHBC. This added cost to the project and impacted the installation of the dry-lining and M&E.

> "One of the things that we have learned is the critical importance of understanding the varying requirements of local building control and different structural warranty providers."
>
> **EtopiaUK (manufacturer)**

This uncertainty and the additional due diligence needed to secure NHBC and Building Control sign-off, necessitated a bespoke approach to the construction programme. The works package was split into "enabling" and "main works" with a break clause built into the contract. If the main works were not positioned to progress (relevant sign-offs) by the trigger date then there was an option to "walk-away", leaving the site vacant and de-risked whilst alternative development options were explored. This break clause was not in the end required as sign-off was achieved before the contract with Beard was executed.

The role of CDM Principal Designer (RIBA Stages 4-6), and latterly the role Building Regulations Principal Designer (BRPD), that came into force during the project as part of the new Building Safety Act regime, was fulfilled by consultants RLB.

Key Learning

Technical compliance demands that the SIPs supplier, architect and design team engage very tightly, as early as possible. Strategic pathways for securing warranty and fire safety sign-off should be defined early.

Construction & Installation

Beard started the enabling works (widening the access road and site drainage) in April 2024. Unforeseen site conditions including a shallow gas main, damaged retaining wall and presence of asbestos from remains of the old garages, delayed the installation of the groundworks, which began in early May.

Credit: Etopia UK

Fabrication of the SIPs panels began in Etopia's production facility in Broadclyst, near Exeter, on the 7th August and took 6 weeks. Etopia have a stack-and-store manufacturing system for their 4Wall product, so some standard-sized panels were pre-made and just selected against the GAP House drawings. Other panels were bespoke and manufactured from scratch. The standard and bespoke panels were then joined together into large format panels up to 6m long.

Use of large format panels minimised the construction time onsite and helped support a structured workflow. Some of the elements that came in were 6.1 metres wide and only just fit 'it was close, but it did work'.

Key Learning

Optimise the size of the panels on a site-by-site basis where possible. Large format panels might be quicker to erect but access constraints might prevent them being brought onto site. Etopia have a '*whole smorgasbord of solutions for different jobs*'. Early engagement with MMC supplier(s) is key to identify both the right supplier and the right solution to overcome the specific site constraints. Cost efficiences can then be realised by tailoring the unit typology to optimise the system.

Key Learning

Detailed early ground surveys bring certainty and cost control.

> This was probably one of the tightest sites that we could use our long panel format for. But it was a great test for us and we managed to achieve it. So, it's a win for everybody.
>
> **EtopiaUK (manufacturer)**

Read more about overcoming challenges on site in Etopia's project case study here.

The panels were delivered on a 24ft rigid lorry. Being a 'flat-pack' panellised system, each house would have fitted on a single lorry with no requirement for a wide-load escort. In this instance, panels from neighbouring homes were batched together to better support a sequential construction process working down the site. On each lorry load the panels were pre-sorted and orientated in stillages (lifting frames, see figure) ready for efficient lifting and assembly.

Credit: Etopia UK

> "We had to play chess day-to-day to ensure everybody could do what was needed. Communication was key."
>
> **Etopia UK, (manufacturer)**

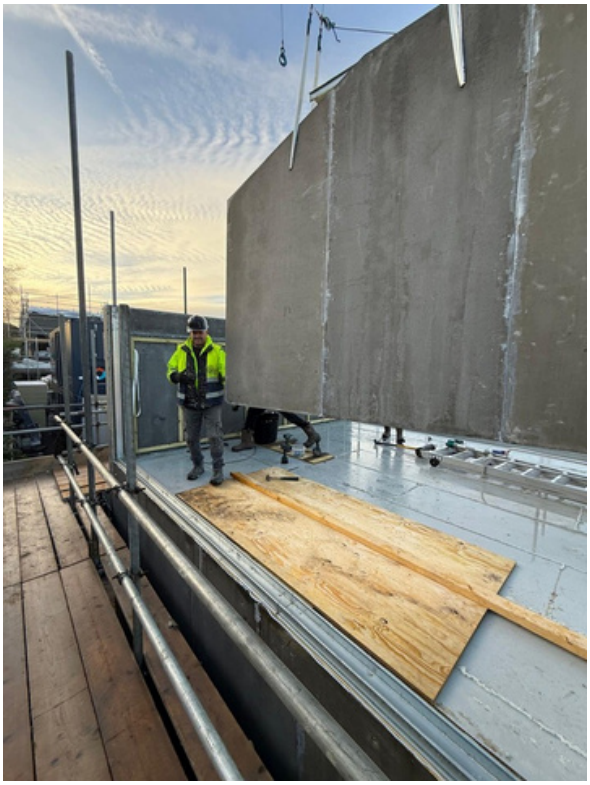
As a result of the delay starting the ground works, completion of the substructure of some of the homes overlapped the delivery and erection of the SIPS panels. Had the foundations been finished all the ground floor panels would have been installed as the first step, instead it was necessary to alternate between the erection of ground floor and first floor panels to pairs of houses working down the site, enabling all the sub-contractors to keep progressing. This wasn't ideal and slowed the installation process down, but everyone on site cooperated to ensure progress could continue. Communication was key.

The installation of the SIPs panels to each house took around 5 days between 4 people. The panels made of cement-based particle board and PU foam, were not susceptible to water ingress or damage during construction, so weather-related delays were limited to gluing the panels and craneage. When the crane was out of operation (due to high winds or restrictions imposed by local school hours or helicopters landing at the adjacent hospital - ad hoc), progress was made on non-mechanical lifting operations.

Credit: Etopia UK

As soon as Etopia's large format panels were secured in place (glued and screwed to engineered tracks pre-installed on the slab), follow-on trades could start working on the inside and outside of the homes simultaneously. A dry internal envelope was rapidly achieved by the installation of doors and windows.

> "The advantage of using SIPs panels is you only bring in what you need."
> **Beard Construction (main contractor)**



Credit: Etopia UK

Work to this row of detached homes followed a clear sequence, with homes furthest from the access road completed first. This supported near constant progress.

Key Learning

Planning site logistics and sequencing trades is critically important to support an effective build process on small sites.

Credit: Etopia UK

> You've got to keep neighbours informed. On one occasion I sent out over 400 newsletters. You've got to be nice and stay nice, help them out where you can...we had minimal complaints considering how close we were.
>
> **Beard (contractor)**

Proximity to neighbours

A key challenge on such a tight site was the proximity to neighbouring properties. Preserving good relationships with neighbours will always be a priority on these types of small, constrained sites.

Use of the SIPs panels (limiting the build time on site), in conjunction with a proactive and responsive approach managing the relationships with neighbours, minimised any disruption and friction.

Time-saving were made using the SIPs panels but other design choices resulted in time consuming tasks on site, which included:

i) The aluminium cladding came to site on a roll and was profiled and cut into panels on site.

ii) Laying the block paving to the access road was a time-consuming job exacerbated by the changing ground levels.

The SIPs panels forming the superstructure of the homes were completed in January 2025, with the project reaching Practical Completion on 17th July 2025.

Credit: Etopia UK & BDP

Handover

Tenant sign-ups immediately followed Practical Completion on the 18th July.

The properties were advertised to individuals on BCC's housing register through the Home Choice website. The new residents were supplied with a Home User Guide (HUG), to help them familiarise themselves with their new homes.

The kitchen included a double hob, integrated oven and under-counter fridge. Space and plumbing was provided for residents to install a washing machine.

Resident experience

Bristol City Council will evaluate residents' experience after 3-months of occupation as part of their Post Occupancy Evaluation (POE) process for tenants in new build homes.

Etopia has commissioned Housing Festival to undertake a 1-year POE focussing on the energy performance of the homes and residents' bills. The results of this study will be made available in Summer 2026.

Credit: Etopia UK & BDP

Read BDPs Press Release on the completed project, here.

> Using innovation and MMC, the Gap House concept has allowed us to build vital homes on a difficult site with limited access. I am also delighted that the new homes are low energy and sustainable, which will result in cheaper energy bills for future tenants.
>
> **Councillor Barry Parsons, chair of the Homes and Housing Delivery Committee at Bristol City Council.**
>
> **BDP Press Release**

Summary of key project learning

1. Partner with the right system provider
Selecting the MMC system and supplier as early as possible prevents design rework, brings greater efficiency, and helps unlock overall programme benefits.

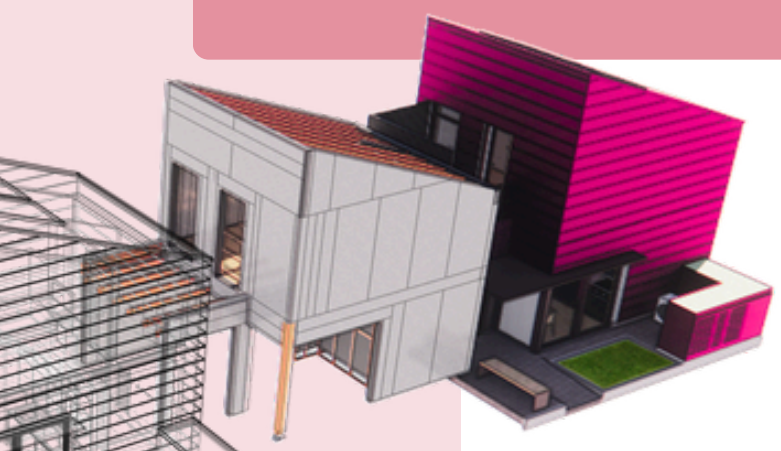
2. Collaborative design approach with architect and system provider
Cost efficiencies can be realised by standardising the unit typology/tailoring the design to optimise the system.

3. Early site due diligence
Detailed early ground surveys are required to bring certainty and cost control to projects. Early site due diligence is particularly important on small, brownfield sites.

4. Consult early
Vehicular movements in occupation (resident access, waste collection and turning of fire trucks) may impose greater constraints on the residential development of small sites, than the construction process itself.

5. Logistics to help inform site layout
Planning site logistics and sequencing trades is critically important to support an effective build process on small sites in a timely manner; early understanding can help optimise this.

6. Agree early route to compliance
Technical compliance around fire performance requires an agreed ‘route to compliance’ very early in the process to avoid delays around testing, or substantiation via an engineered approach.



October 2025

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