beeology.

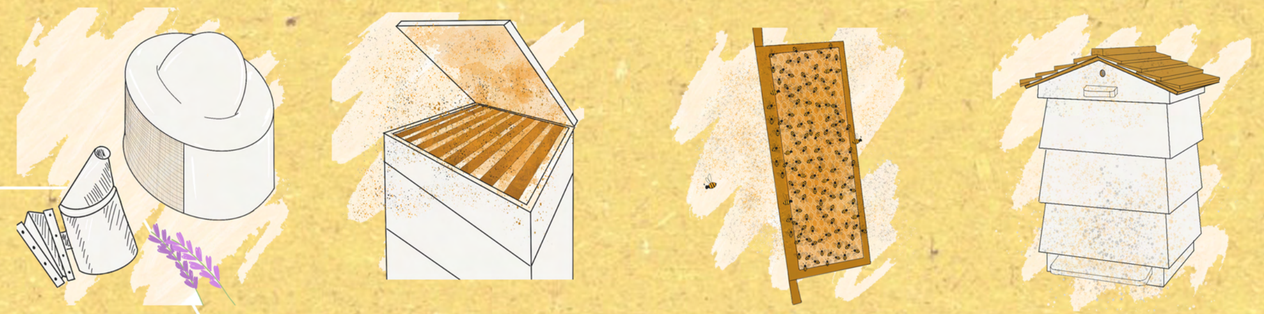
Functional analysis- how bees make honey

Site: Gibside Stables, Newcastle Upon-Tyne, National Trust

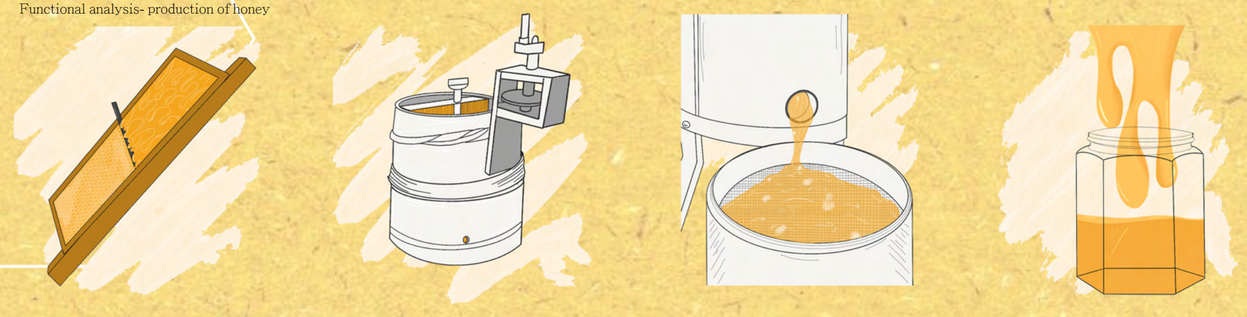
Brief: For my major project, my task was to repurpose a Georgian Stable block on a large National Trust estate. The National Trust are keen that the site retains ecological significance as key part of the heritage passed on from the original owner, Mary Elanor Bowes' in the 1700's. The staff at Gibside are achieving this through the conservation of plants and animals around their vast site. The client wanted the stables to become a destination in its own right on the estate, to engage with the ecological aspect of the wider estate and appeal to a wide audience (people who would visit throughout the week).

Concept: Due to Gibside's clear interest in conservation and botany, the introduction of a pollinator's hub seemed necessary. The bee population has unfortunately dropped by over half in the last 50 years. Bees pollinate 75% of our global food consumption therefore, it is imperative to 'save the bees'. A Beehub at Gibside would allow visitors to learn how to bee keep and produce honey, whilst also viewing apiculture scientists at work researching bees and their social communities. There are no research centres in the UK solely dedicated to apiculture therefore, this is the perfect opportunity to introduce one to Gibside and the Northeast.

Functional analysis- bee keeping



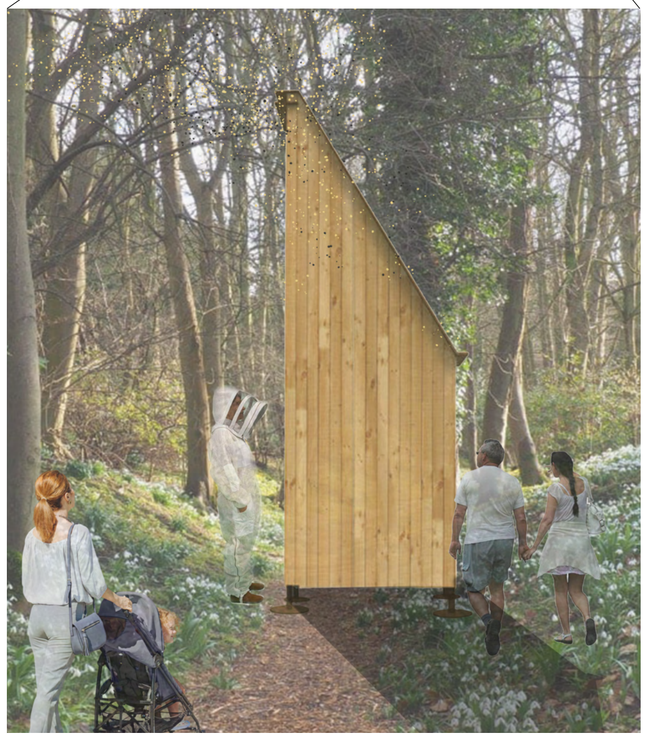
Functional analysis- production of honey



"In the last 5 years the bee population has dropped by 1/3. If bees were to disappear from the face of the earth, humans would have just 4 years left to live."
- Sir David Attenborough

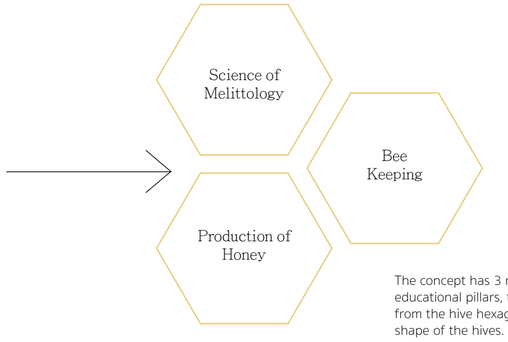
Initial concept collage with key functional features

The Gibside site plan, with pinned beehives which surround the site on the nature walks. The architecturally designed beehive by Francesco Faccin, which is 14 feet tall, this was so the bees when entering the hive would enter through the top to reduce the contact with people but allow them to be in populated places.

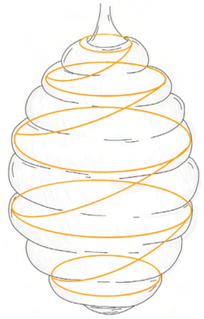


Concept drawing of courtyard

Strategic design decisions, stereotypical forms related to bees (honey comb and the hive illustrations), then simplified down to create 2 main concepts for the design, which have been key throughout the design process.



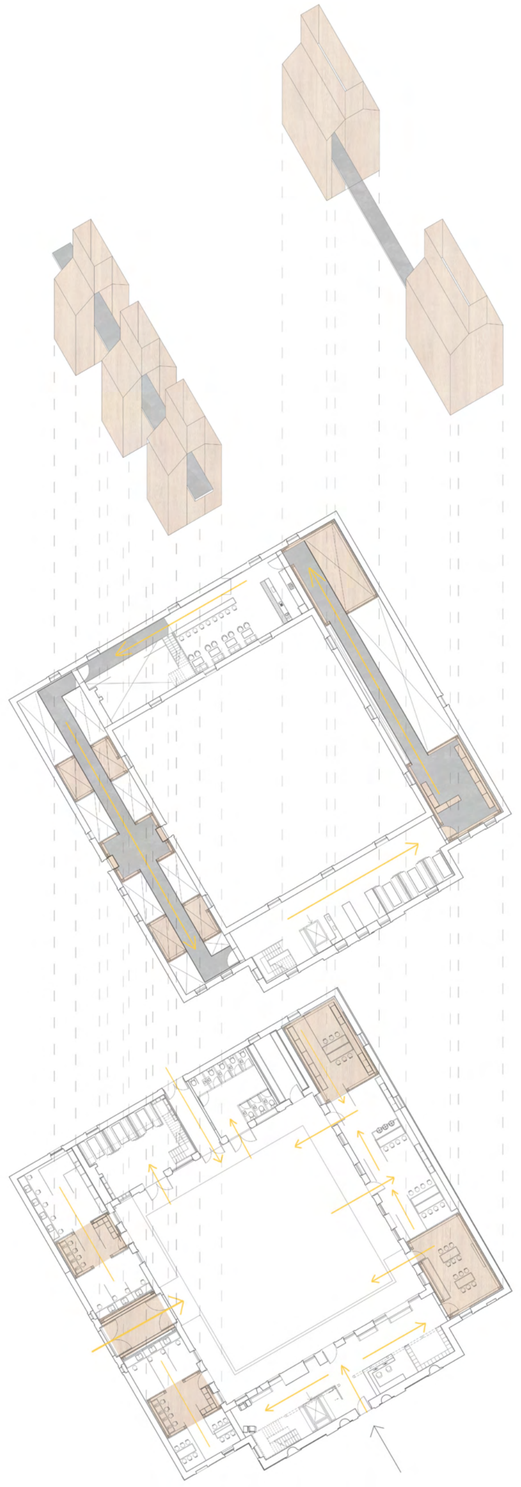
The concept has 3 main educational pillars, taken from the hive hexagonal shape of the hives.



Circulation within the building will follow the circular motion within a hive.

Honey comb images

A spatial diagram showing key intervention being inserted into the existing building shell. A circulation diagram has also been added to show the circular flow within the space, taken from the traditional hive form.



In Britain we have around 270 species of bee, just under 250 of which are solitary bees.

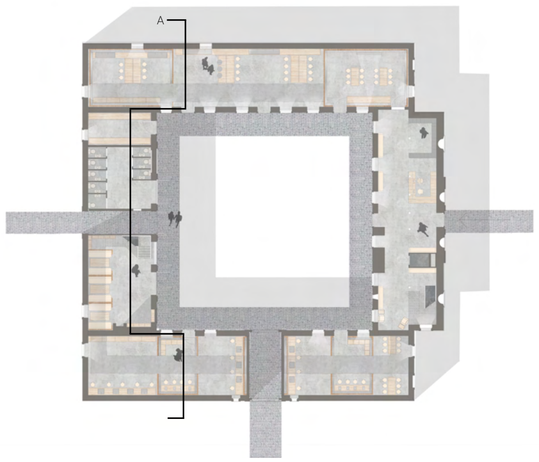
Science Lab with steel walkway above, Live beehives encased in glass located on first floor within original window opening

Timber seating pods with mezzanine above

Cafe and high bar seating

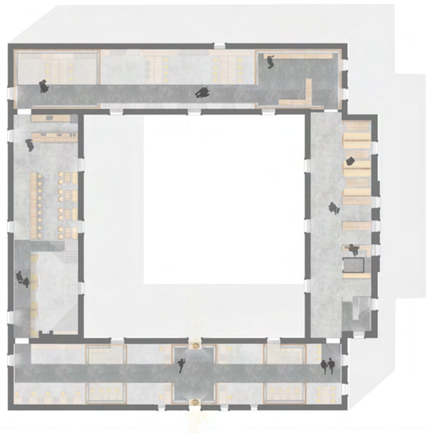
Storage room

Honey production workshop



Ground Floor

1 Reception
2 Lockers
3 Lift
4 Stairs
5 Seating
6 Teaching room
7 Workshop
8 Honey extractors
9 Honey potting space
10 Storage room
11 Toilets
12 Archway
13 Stairs
14 Timber pods
15 Book shelves
16 Science labs
17 Labs within pod
18 Wild flower garden



First Floor

1 Stairs
2 Lift
3 Retail space
4 Timber seating pods
5 Insect collection
6 Walkway
7 View point
8 Cafe
9 Seating
10 Walkway/mezzanine
11 Live bee hives, encased in glass
12 Timber pod insersions

A- Long staggered section

5m

This long staggered section shows the key intervention within the existing building shell. The design consists of five glowing timber structures inserted within the building shell, punching through the original roof structure and creating a nest within the building. Contrasting volumes throughout the spaces generate the sense of being a bee traversing from nest to nest. The design meets the necessary features for a public building like seating, a caf e , restrooms, and breakout spaces, whilst also having clear functional areas that meet the new bee research hub requirements.

What is killing our bees?

Parasites

Invasive species

Urbanisation without nature

Global warming

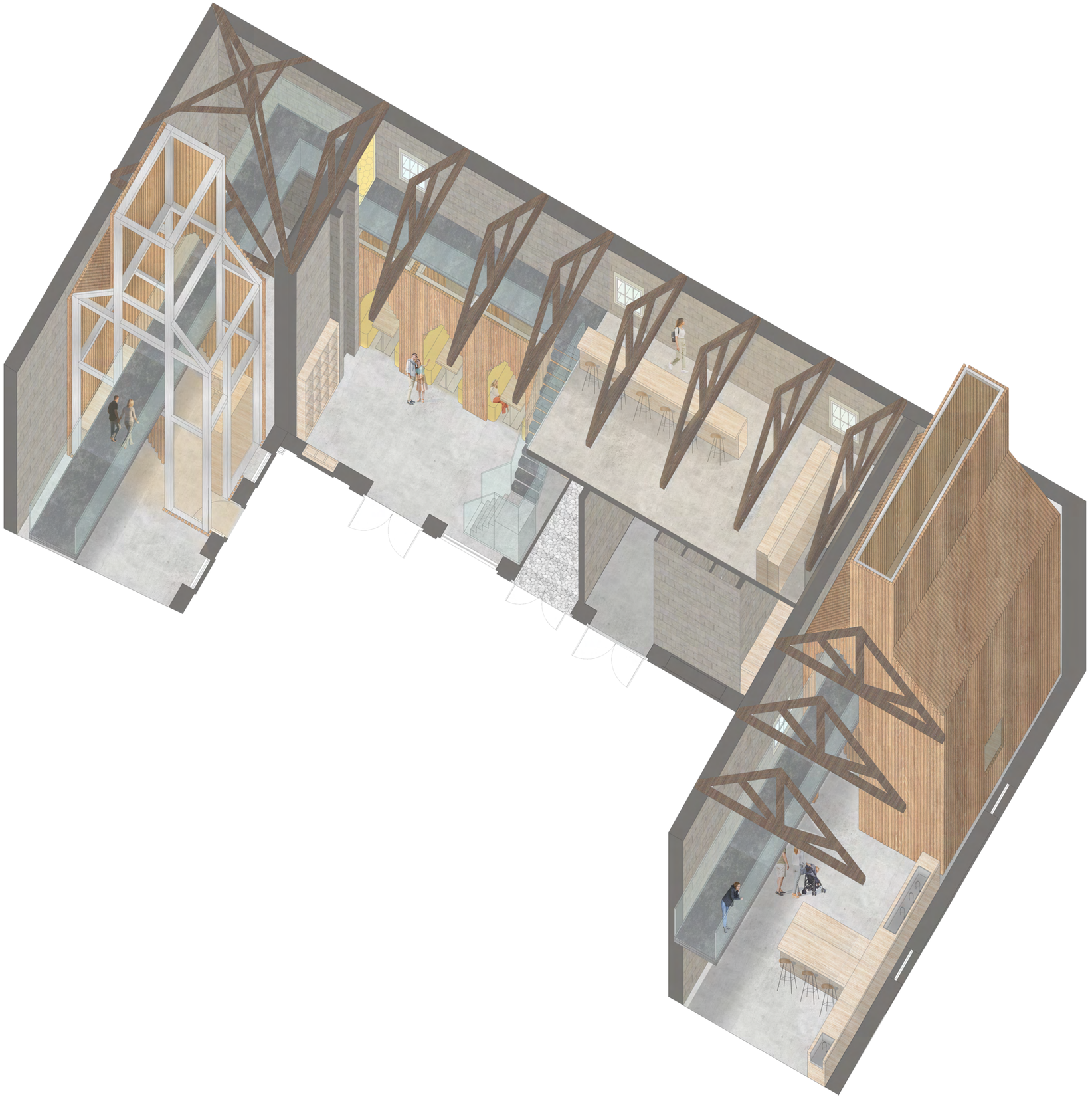
Pesticides

Human activities

Reduction in wildflowers

Honey production workshop

Within intervention/hive



Axonometric

10m

A hive of bees will fly over 55,000 miles to make 1lb of honey and can create 100lbs of honey in a year.

Environment Strategies

1. Ground Source Heat Pump- a clean method of heating an old building like Gibside.

2. Grass roof- on the internal courtyard roof line, encouraging biodiversity and more pollinators.

3. Motorized wall mounted long skylight- located within each timber hive, encourages diffused daylight, and natural vertical ventilation.

4. Solar panels- located on the external roofline to maximize solar gain.

5. Underfloor heating- on the ground floor of the building, as much of the first floor has been removed to add a lightweight steel walkway, where people will only dwell.

6. Acoustic treatments- implemented within the timber seating pods and hives to create better acoustic comfort and reduce sound being transmitted into other spaces.

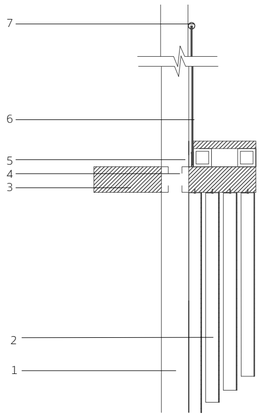
7. Existing materials- due to the building being existing/brown field, spatial reuse and the use of existing materials is key.

8. Biodiverse courtyard- a wildflower garden is important to encourage insects, pollinators and other animals which are key to Gibside's conservation plan.

1:20 Architectural model, section through existing building showing hive intervention

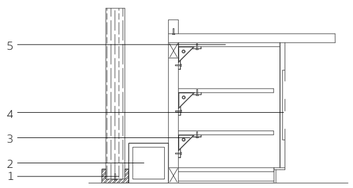
You can help the bees at home by planting flowers rich in nectar and choosing British honey, helping our local bee keepers.

1:5 detail of glass banister and steel walkway



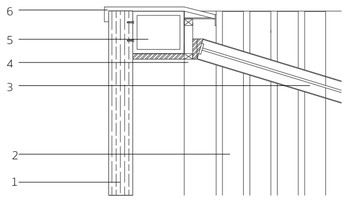
1 Steel hollow section beam
2 Suspended timber panels, with LED strip lighting
3 Steel floor joists
4 Stainless steel trace
5 Steel cover plate over glass panelling
6 Glass sheets
7 Glass with stainless steel top rail

1:5 detail of cabinet



1 Timber beam in steel connector
2 Steel hollow section beam
3 Steel bracket to support shelves
4 Cabinet door with integrated handle
5 Teak cabinet top

1:5 detail of skylight velux



1 Treated external timber panel
2 Timber panelling internal
3 Double glazed glass motorised skylight
4 Breather membrane
5 Connector bracket to skylight
6 Steel hollow section beam
7 Plywood top with sealant and flashing

1:20 detail section

1 Ground level
2 Existing cobble stone flooring
3 Added insulation with DPM
4 Underfloor heating pipework
5 Added concrete floor finish
6 Hollow section steel beam
7 Timber slats- 100mmx150mm
8 Existing stone wall with rubble infill
9 Timber bespoke cabinet
10 Steel framework supporting timber slats and steel walkway
11 Steel hollow beams to support walkway
12 Black steel walkway
13 Glass banister with steel handrail
14 Soffit
15 Skirted eaves
16 Guttering
17 Sparking felt
18 Roof tiles
19 Air ventilation gap- 50 mm minimum
20 Solar panels
21 Lead flashing
22 Motorized wall mounted long skylight
23 Lead flashing with plywood

1:20 detail section

5m