MANCHESTER SCHOOL OF ARCHITECTURE

Eco - expo

Lymm Hall

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LYMM HERITAGE CENTRE

ecospheric

MSA LIVE 23

Team

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Partners

The partners for this project are Ecospheric, who are an award winning Passive House consultancy based in Lymm, Manchester. The consultancy work on a variety of scales and types of projects ranging from multi-storey Passive House residential blocks to the sustainable retrofit of historic landed estates. The projects are driven by a desire to simultaneously reduce carbon and push technological innovation.

Ecospheric are currently based at Lymm Hall, an Elizabethan grade II* listed manor. The property hosts the Ecospheric offices, as well as a family and refugees. The dated construction style and historic character of the building result in it being a particularly hard to treat building in terms of retrofitting it to the UK's zero carbon targets. Ecospheric saw this building as an ideal opportunity to test out new environmentally sustainable technologies to help find solutions to retrofit the hardest to treat homes in the UK.

ecospheric

Agenda

eco-expo

Eco-expo is a design proposal for four installations within the grounds of Lymm Hall. The four installations aim to showcase a series of environmentally sustainable building construction and operation techniques. Through an integrated masterplan the proposals will become an exhibition of sustainable technologies. The four installations are:

01: a new build bothy within a berry orchard, that will act as an short-term holiday let on the site.

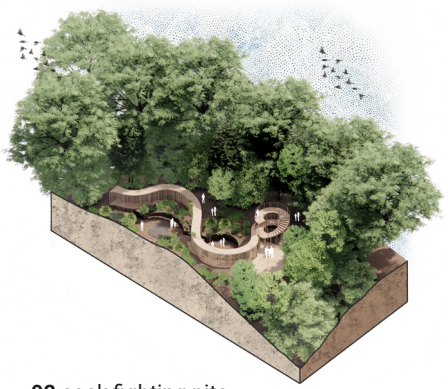
02: a retrofit of the existing abandoned cock fighting pits into a new public space.

03: a retrofit of the existing drained moat into a natural swimming pond and leisure space.

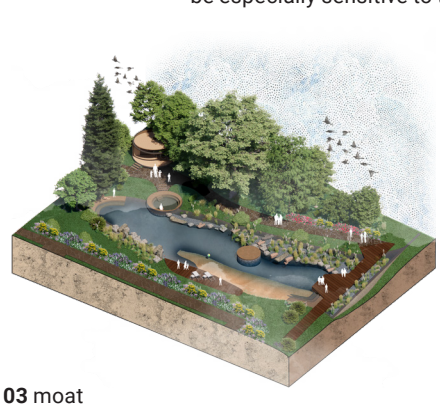
04: a retrofit of the existing Tennis courts into a multi-use space that facilitates tennis and energy generation.

The proposed installations will demonstrate technologies and strategies that reduce and minimise the embodied and operational carbon within our buildings. This in turn will hopefully stimulate further conversation within the local and wider community on how these techniques can be adapted into everyday practices. Whilst implementing sustainability strategies, the installations also have to simultaneously consider the historical character and importance of the site, which many of the local residents care deeply about. The listing status of Lymm Hall and the surrounding spaces on the grounds require the proposals to be especially sensitive to their context.

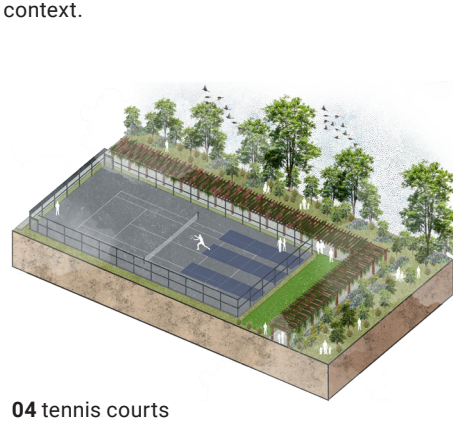
01 bothy



02 cock fighting pits



03 moat



04 tennis courts

Lymm Hall Estate

Site Visit

We organised a team visit to Lymm Hall to meet the collaborators and to get a better understanding of the site. Ecospheric had 8 individual projects that were available for us. The site visit allowed us to identify the briefs that would not be achievable within the time and resource restrictions of the project. We chose briefs that varied in size and criteria so that there was a diverse range of interests that could stimulate the undergraduates joining our team later on in the process. We performed a large proportion of our site analysis on site, taking photographs, tracking sun paths and noting the constraints and opportunities of the site.

Photographs of site visit

Existing Site

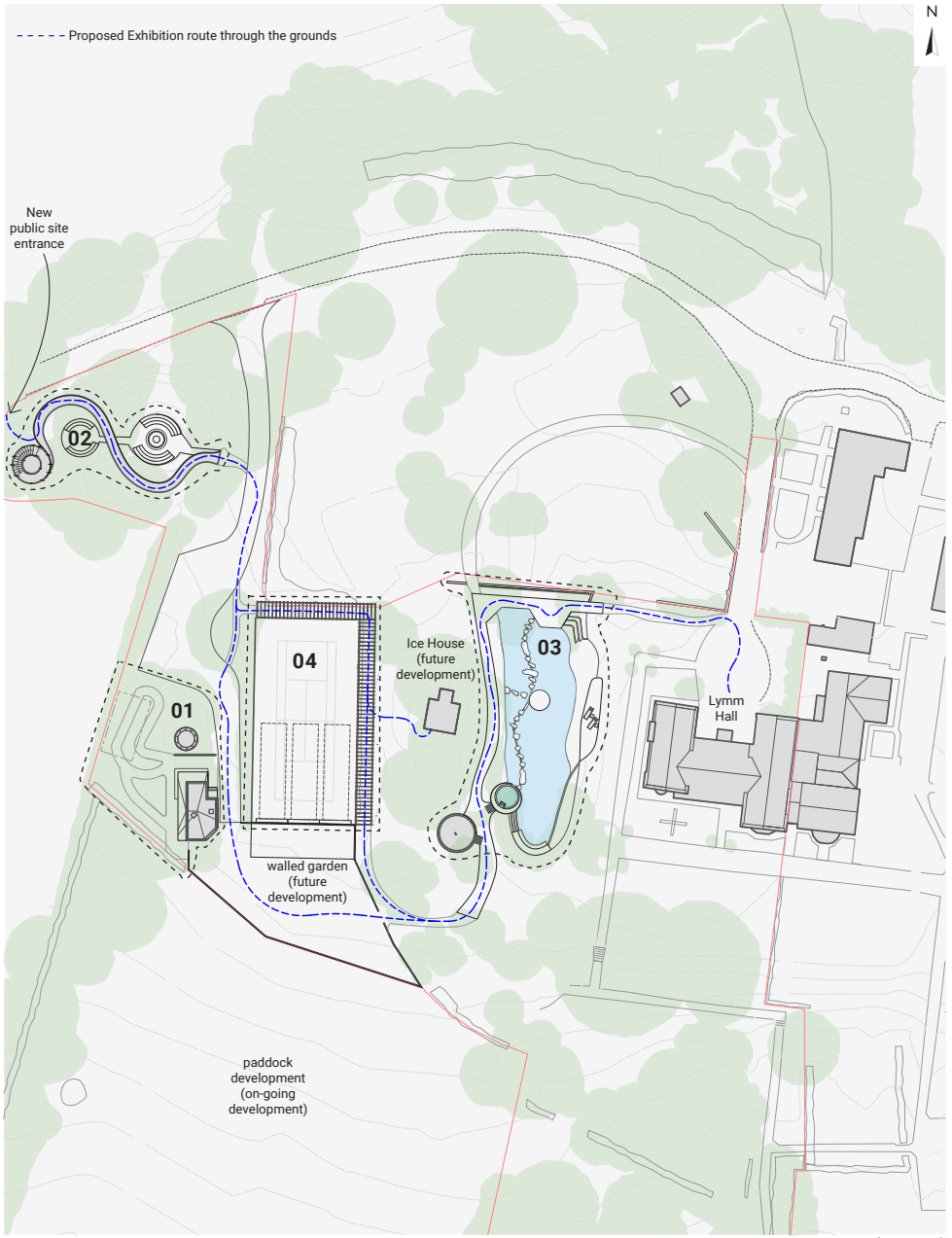
01 an existing berry orchard where a new build bothy within that will act as an Airbnb is being proposed.

02 abandoned cock fighting pits to be retrofit into a new public space.

03: a drained moat to be retrofit into a natural swimming pond and leisure space.

04: existing Tennis courts to be adapted to also facilitate a form of energy generation.

Existing site plan (no scale)



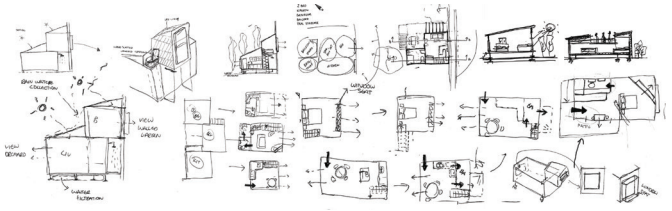
Proposed site plan (no scale)

As planned our team split off into 4 individual groups (with at least one MArch1 leader) with each group taking responsibility for one of the four projects. The undergraduates were allocated a group based upon which project interested them the most.

01 bothy

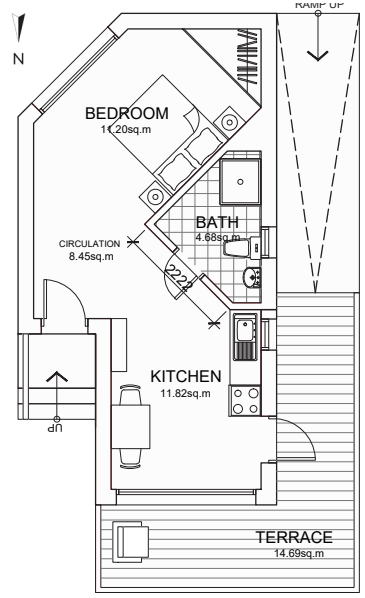
A Bothy is a self-sufficient single storey building. It requires at minimum a sleeping space, toilet/ shower room, kitchenette and small dining area. The Bothy will be used as a short-term holiday let. Therefore, the layout focused on emphasising the bedroom space where the occupants would spend most of their time. Through a team brainstorming day of sketching, tracing over scaled plans and researching precedents, a final layout was decided that incorporated a bedroom with tall ceilings, direct access from the entrance and a large picture window that looked over the walled garden.

Photo of sketching session

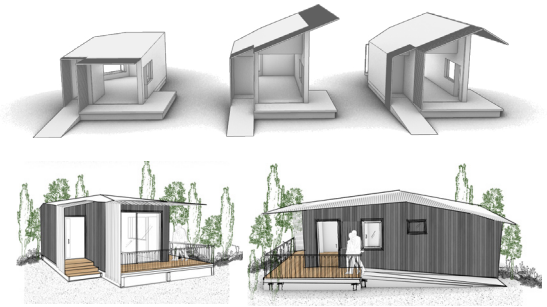


Concept work for bothy

The material palette for the Bothy was predominantly a uniform subtle black timber to be respectful of the sensitive context. In light of this a lot of the design emphasis was placed on massing interesting roof options for the Bothy in Rhino (3D modelling software). The final roof form was derived from the undulating topography of the site and features seamless canopies that extend from the roof.

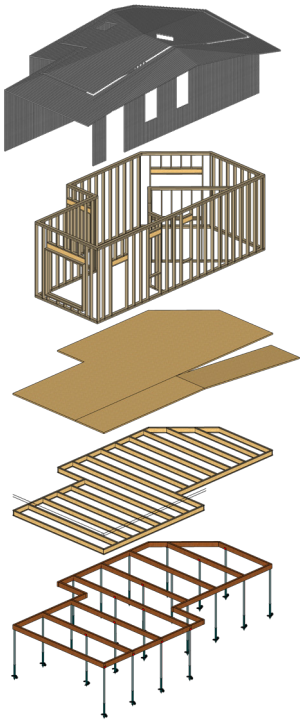


Proposed floor plan of bothy (no scale)



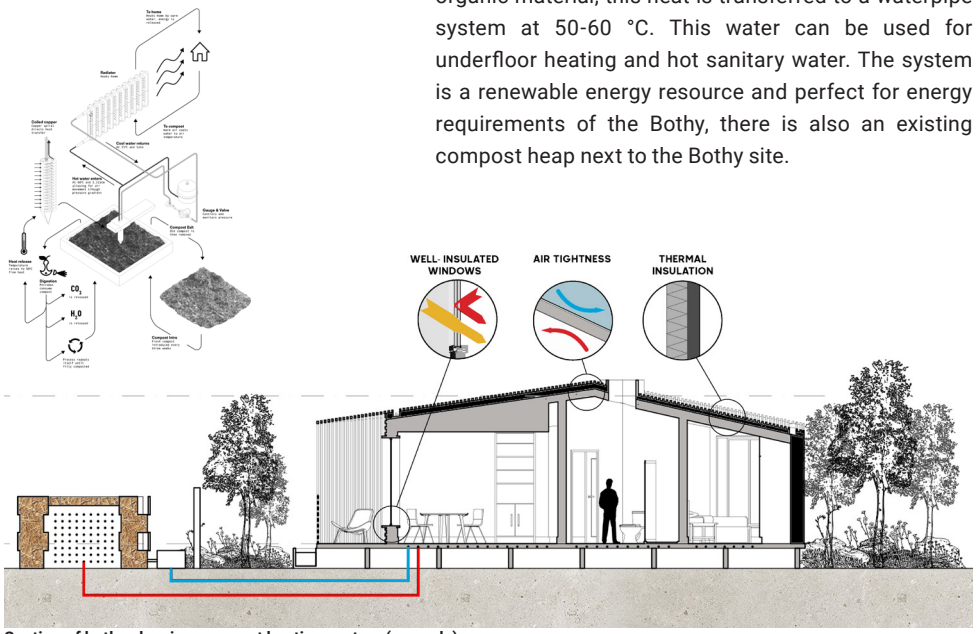
Development work of roof massing

Exploded construction axonometric



For the construction, timber was utilised where possible to reduce the embodied carbon of the building. Timber Steico I joists, rafters and studs were used as opposed to standard timber beams to reduce the mass of timber required. Wood fibre insulation was also used throughout, as well as a timber cladding system. The Bothy utilised a helical pile foundation system that supports a timber floor. The system negates the need for concrete which significantly reduces the embodied carbon of the structure, and it causes far less disturbance to the roots of the existing forest and orchard.

The sustainability strategy for the Bothy was to initially incorporate a series of photovoltaic slates into the southern façade of the building to generate electricity, as well as using a natural filtering greywater system. However, after discussing the ideas with our collaborator they felt there wouldn't be enough daylight in the wooded area for solar energy capture and that they would prefer to hook the Bothy up to mains electricity and sewage. Therefore, we looked at a space heating and hot water system through a compost heater. Compost heat is produced as a by-product of the microbial breakdown of organic material, this heat is transferred to a waterpipe system at 50-60 °C. This water can be used for underfloor heating and hot sanitary water. The system is a renewable energy resource and perfect for energy requirements of the Bothy, there is also an existing compost heap next to the Bothy site.



Section of bothy showing compost heating system (no scale)

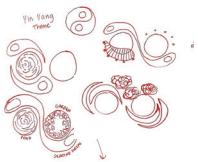
02 cock fighting pits

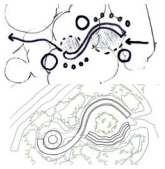
Lymm Hall is home to 2 of the few remaining cock fighting pits on private land in the UK. The brief for the area was to create a publicly accessible visitor experience that would bring life to the space. The resulting design combined the restoration of the existing pits with a lightweight sweeping walkway and canopy, that would lead visitors on a journey through the space, framing views and educating visitors about the site history.

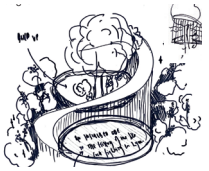
The sustainability strategy for this element was to create living structures, utilising willow and wattle fences to screen and divide the spaces. The team also researched and proposed wood welding within the construction, for securing structural timbers in an innovative and environmentally conscious way.

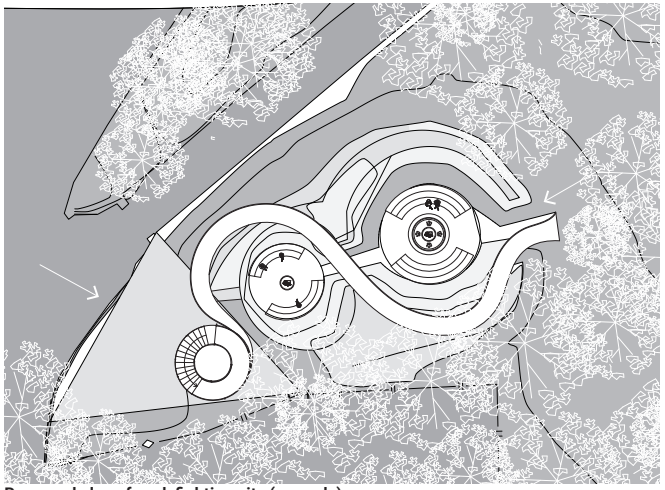
The design sprint on day 1 was especially useful to our team - Each person drew as many sketches on a given category as possible within the time frame of a minute, to create a brainstorm of ideas that included over 100 sketches. The initial brief for the cock fighting pits was extremely vague and this exercise allowed us to propose a plethora of ideas to the clients that inspired a new brief for the visitor space, prompting a new research exercise and a design re-haul during week 2 by our team.

Our research identified exactly how the spaces were used historically and the stone tables that they would have held. We have reflected this research in our design by sensitively re-providing centrepieces in these locations.

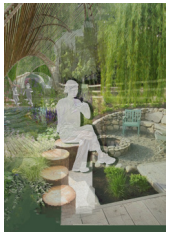


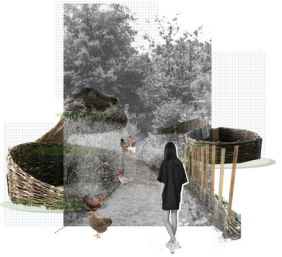


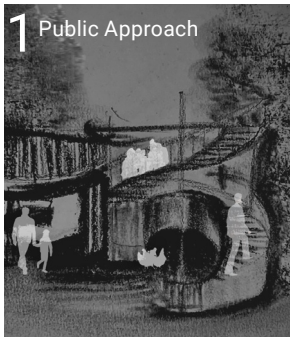


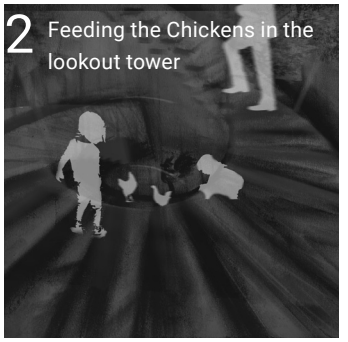


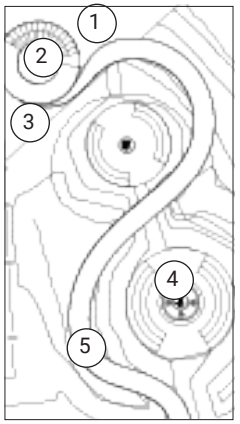
Proposed plan of cock fighting pits (no scale)

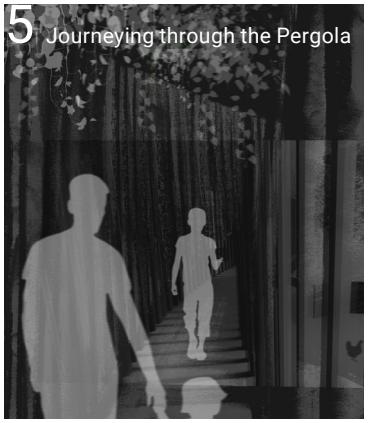












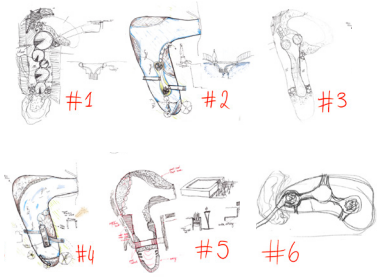
Sketch of proposed walkway and reflections spaces

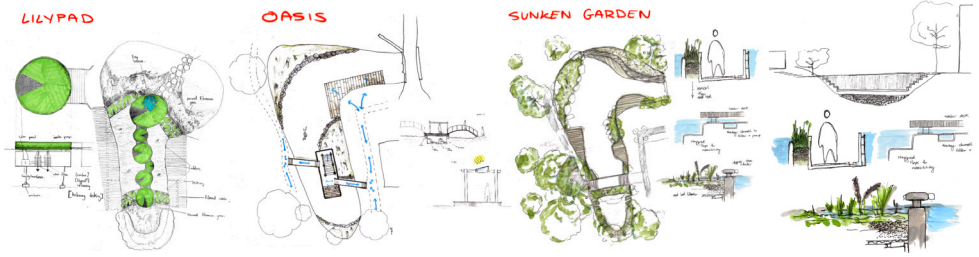
03 moat

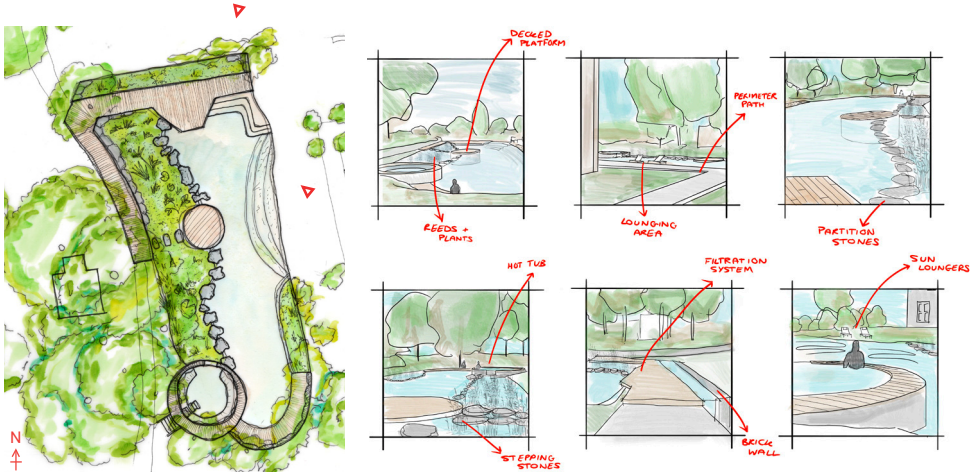
Re-floating the historical Lymm Hall moat formed a unique challenge that involved navigating heritage preservation, energy generation technologies, as well as filtration strategies to design a natural swimming pool.

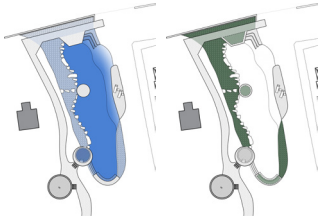
Working up to the client meeting, we sketched out several options to present and receive feedback. However, the meeting presented an unforeseen complication, with an altered site boundary, which cut the Northern arm of the moat from the design scope of the swimming pool.

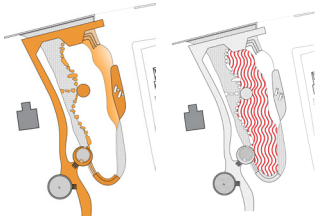
We quickly shifted priorities and took well-received elements from the presented options to combine into a central design.











Investigating precedents of water gardens, natural pools such as the Chichester House in Sussex, The Barbican in London, Moses Bridge in the Netherlands inspired our final design.

While minimising our impact on the existing grounds, we incorporated natural reed filtration beds and water-source heat pumps to create a enjoyable natural swimming pool, restoring the historical moat from 911 AD.

Image Top (Left):
Initial Sketches And Post-it Challenge To Generate Ideas

Image Middle (Left):
Design Development Options With Section Diagrams

Image Bottom-Left (Left):
Final Landscape Plan

Image Bottom-Right (Left):
Design Features Vignettes

Image Top (Right):
Clockwise -
1 - Swimming Area
2 - Filtration Strategy
3 - Water Source Heat Pump
4 - Circulation and Decking

Image Middle (Right):
View of Moat Bridge Decking

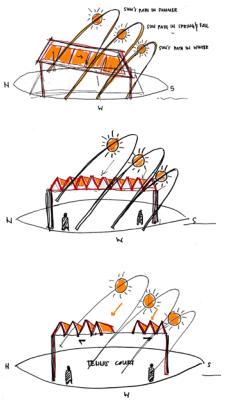
Image Bottom (Right):
View of Swimming Pool and Lymm Hall

04 tennis courts

This project retrofits a traditional tennis court into a multi-use space that incorporates renewable energy production, introducing the usage of natural, on-site resources within a canopy walkway, to create a more versatile and inviting space.

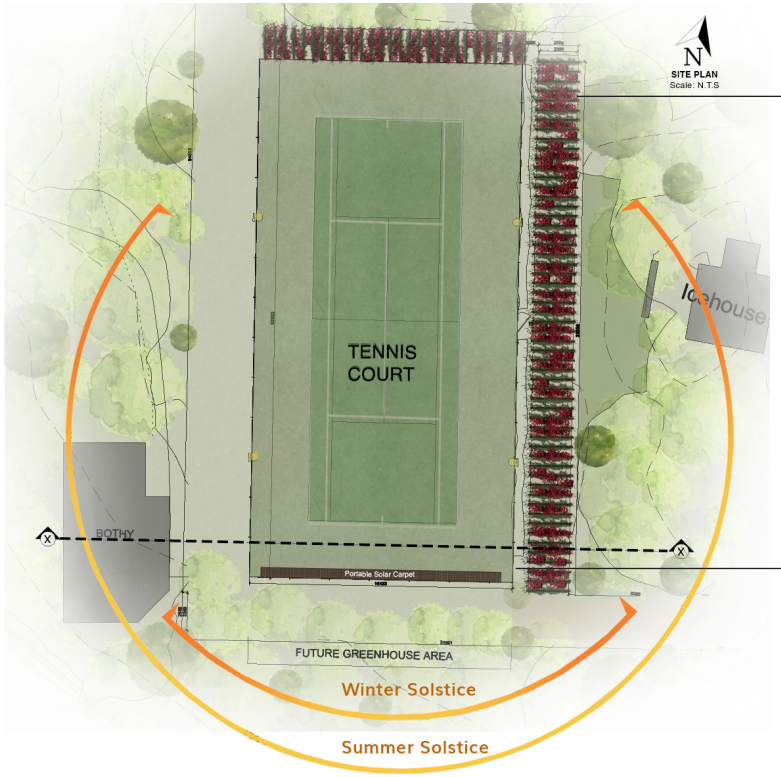
Portable solar panels that can be unrolled like a carpet were chosen as a sustainable technology, to store solar energy and generate electricity that powers lamp posts on the tennis court and along the canopy walkway, reducing energy consumption from the grid. It is located on the south side of the tennis court to maximize the absorption of solar energy.

The portable and retractable solar panels' system uses copper indium gallium selenide solar cells that are bonded with a tensile fabric. Its carpet-like solar system stores generated energy in batteries in the steel housing and the strength of the combined material can cope with being rolled in and out.



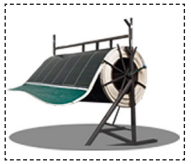
Solar Analysis

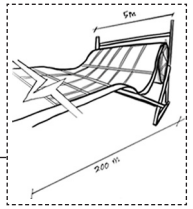
Collage of timber canopy walkway



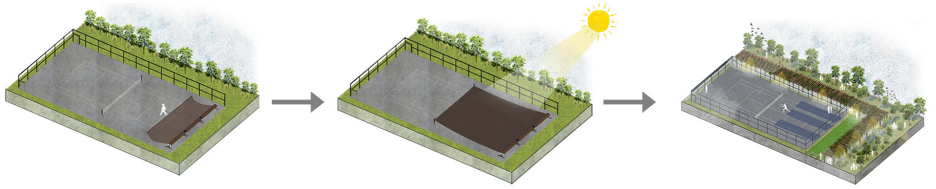
Timber structure canopy walkway

Portable unrolling solar carpet





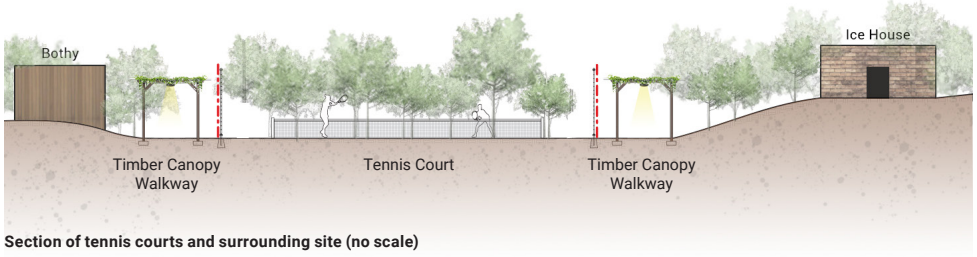
The size is 5 metres width and 200 metres length with a capacity of 150kW electricity.



Portable solar panels need to be unrolled when the tennis court is not used by anyone. It will absorb the solar energy from the sun.

The solar energy creates electrical charges that move in response to an internal field in the cell, causing electricity to flow.

The flow of electricity will light up the lamp along the timber structure canopy walkway which connects the tennis court to the other spaces.

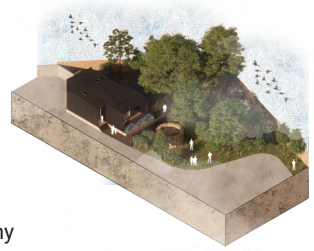


Section of tennis courts and surrounding site (no scale)

reflections and final images

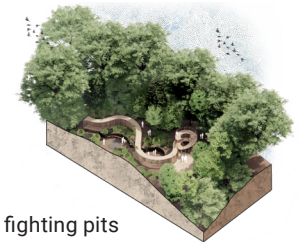
On the whole we were all really pleased with how the project progressed and how the team worked. Some slight adjustments were made throughout the two intensive weeks that deviated from the action plan. We spoke to the collaborators a day later than originally planned within the action weeks, as we felt that we needed more time to compile and finalise the ideas in order to get constructive feedback. Instead of distributing the presentations and tutorials evenly between us as planned, we assigned the two persons within the group with the most confidence to do the public speaking roles, whilst allocating other roles such as blog co-ordinator and file organiser to the other team members. We found it was more beneficial to play to our individual strengths, rather than distribute every task evenly. Furthermore, many of the BA1 and BA2 students had a greater knowledge of software than we had originally anticipated. In response to this we set up mini-tutorials throughout the two weeks. We split the team up into smaller groups based on ability. We then gave different levels of tutorials to each group which meant that the less able members of the team did not become overwhelmed and the more advanced members of the team didn't receive support on areas they already understood.

We found that the undergraduate students were particularly engaged with and appreciated the 3D and render workshops that we felt were very successful. We also found the discussion with the collaborators in the middle of the action weeks to be a success. It gave us lots of new ideas regarding sustainability strategies that we incorporated within our project. If we were to partake in the programme again, I think we would be less prescriptive within the action plan. We perhaps would have benefited from an extra day of concept design and sketching, but the pressures of the action plan and time constraints of the project resulted in us moving into final drawings and modelling early on in the process.

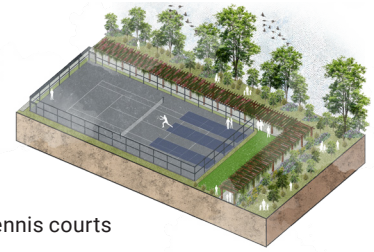


01 bothy

03 moat



02 cock fighting pits



04 tennis courts

01 View of Bothy from Orchard

01 View of Bothy bedroom

02 View of reflection space within cock fighting pits

02 View of entrance to raised walkway through cock fighting pits

03 View of natural swimming pool

03 View of sauna room and natural swimming pool

04 View of entrance to canopy walkway around tennis courts

04 View of canopy walkway around tennis courts

ABOUT

Each year the MSA LIVE programme unites Masters Architecture year 1 students with those in BA year 1 and year 2 and Masters Landscape Architecture 1 in mixed-year teams to undertake live projects with external partners to create social impact.

LIVE PROJECTS

All MSA LIVE projects are live. A live project is where an educational organisation and an external partner develop a brief, timescale, and outcome for their mutual benefit.

SOCIAL IMPACT

All MSA LIVE projects have social impact. Social impact is the effect an organization's actions have on the well-being of a community. Our agendas are set by our external collaborators.

EXTERNAL PARTNERS

MSA LIVE projects work with many organisations: charities, community groups, social enterprises, community interest companies, researchers, practitioners and educators.

STUDENT-LED

Our MSA masters students take the lead in the project conception, brief development, delivery and co-ordination of a small project. Other cohorts joined for an eventful 2 weeks of activities at the end of the academic year.

KNOWLEDGE TRANSFER

Working in teams within and across year groups and courses; MSA students participate in peer to peer learning. In addition, collaborators, participants and students engage in the transfer of tangible and intellectual property, expertise, learning and skills.

LARGE SCALE

This year approximately 650 students from 4 cohorts in MSA have worked on 42 projects with partners.

QUESTIONS

For questions about MSA LIVE please contact the MSA LIVE team:
msalive@mmu.ac.uk

BLOG

live.msa.ac.uk/2023

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