RSPB Lochwinnoch Visitor Centre

Andra Tai

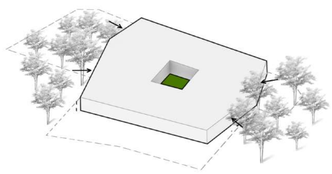
The Site:

Located in Lochwinnoch, Renfrewshire, Scotland, owned and managed by the RSPB, the reserve is situated on the banks of Castle Semple Loch and covers an area of approximately 1.25 square kilometres. ***Home to a variety of habitats including wetlands, woodlands, and meadows, it provides a haven for a wide range of bird species, insects, and other wildlife****; offering visitors the opportunity to explore its various habitats through a network of trails and hides allowing a range of activities such as birdwatching, wildlife spotting, guided walks, and educational programs.*

Approach to Design:

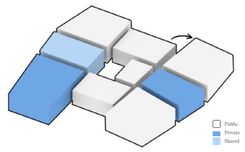
To minimize site disturbance, the building's shape is adjusted to avoid the existing trees. *Main access paths articulate the building into 3 main programmatic sections: the Café, Viewing Area & Learning Space. Circulation is actualized through fluid interconnected areas. The natural systems acting on the building contribute to the heating, ventilation, and lighting systems of the building. Locally resourced Scottish Larch, a readily accessible and renewable construction is the principal material. The walls and roofs are both framed and sheathed with wood with interior claddings and finishes kept to a minimum, leaving exposed much of the timber structure.*

Conceptual Diagrams



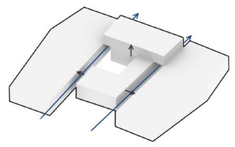
Response to Site

Building takes an angled form to keep existing trees protected. Creation of central courtyard brings in light into a deep floor plan.



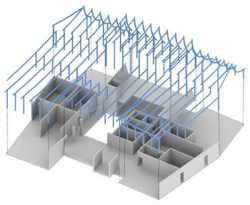
Volumetric Layout

A response to functional and spatial relations between the building's programmatic elements, creating coherent circulation within the site. Blocks to the right are angled slightly to create a new view perspective for us^{ers}



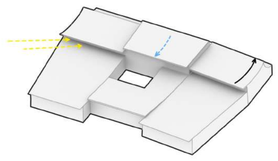
Creation of Paths

Main access paths are created articulate the building into 3 main sections. Circulation is actualized through fluid interconnected areas



Structure

The building's timber structural framework is exposed on both the interior & exterior. Curved beams support the roof's sloped shape

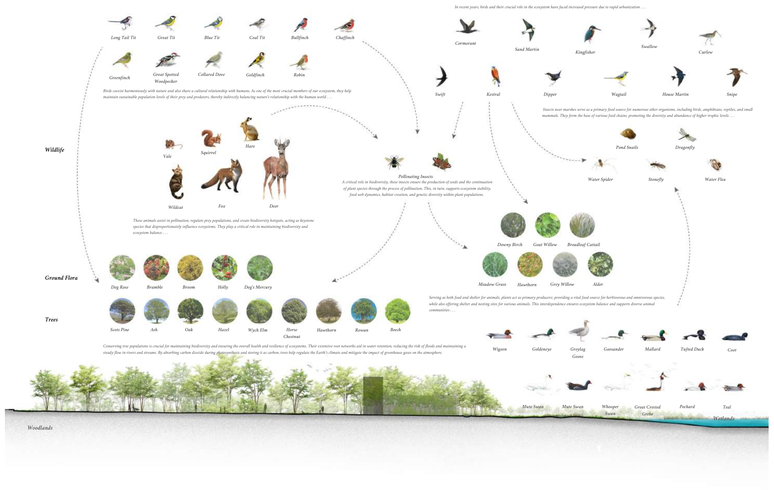


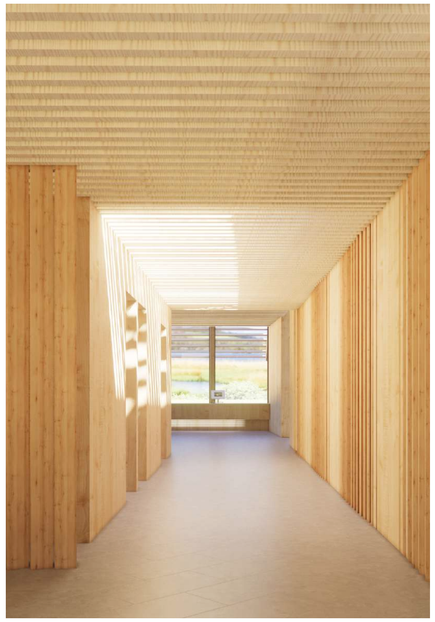
Sloped Roofs

Sloped roofs create an ideal surface for rain water collection. South facing windows allow low winter sun to enter the space.

Protecting Biodiversity

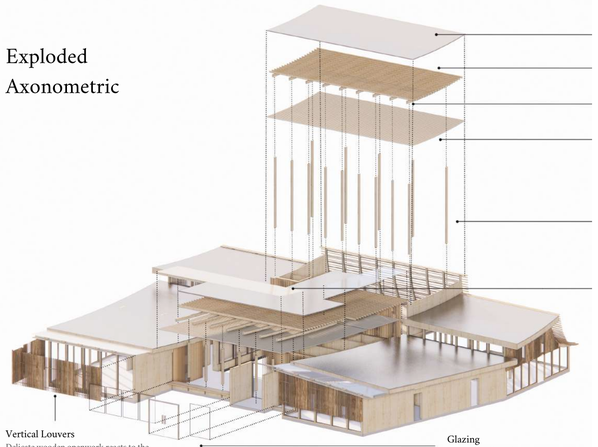
The visitor center takes on an angled form to protect existing trees and wildlife while preserving the region's landscape. This design approach allows for the creation of interactive spaces with minimal impact on the surrounding environment, educating people about the wildlife while ensuring its conservation.





Direct view of the loch from the main path upon entrance.

Exploded Axonometric



Curved Roof Plate
Aluminum roof surface directs precipitation into rain gutter

Secondary Beams

Primary Beams
Steam bent curved beams support sloped roof

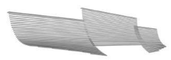
Interior Ceiling
Horizontal timber slats create continuity & lightness within the space whilst concealing installations

Timber Columns
Solid structural columns made from locally resourced Scottish Larch support the sloped roof

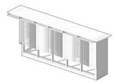
Skylights
South-facing skylights allow natural light to enter spaces

Vertical Louvers
Delicate wooden openwork reacts to the building's structure. The angled vertical louvers diffuse daylight into the building.

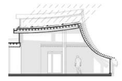
Glazing
With direct/face glazing the glass units are fixed onto the outside surface of the timber structure. Glass and fixings are secured to the structure with timber cover boards that preserve the look of the timber strucutre.



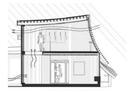
Louvered Façade
Louvers on the building's curved façade acts as a visual guide to deter birds from flying into the building.



Vertical Solar Protection
Glazed openings screened by angled vertical louvers to diffuse daylight into the building. The open wood work reacts to the building's structure, altering it gently.



Water Collection
Water flows down pitched roof and is collected in a groover through which water enter tanks



Sun Protection
High ceiling prevents heating of room and provides good ventilation of the room.

North East Elevation

South West Elevation

Long Site Section

Floor Plans

Plan Key

1. *Entrance*
2. *Reception*
3. *Reading Corner*
4. *Staff Office*
5. *Meeting Room*
6. *Staff Pantry*
7. *Staff Toilets & Showers*
8. *Drying Room*
9. *Indoor Learning Space*
10. *Viewing & Exhibition*
11. *Café*
12. *Toilets*
13. *Accessible Toilet*
14. *Kitchen*
15. *Kitchen Storage*
16. *Storage*
17. *Plant Room*
18. *Retail*
19. *Courtyard*
20. *Outdoor Learning Space*
21. *Outdoor Dining*
22. *Viewing Space*
23. *Bird Hide*
24. *Carpark*

First Floor

Ground Floor

Cut Away Axonometric

(Section BB)

1. *Green Areas contribute to purification & cooling of air, protecting façade from solar radiation*

2. *Heating by simple passive heat gain when sun angles are low during winter; lighting via the controlled placement of windows, clerestories, and skylights that distribute sunlight evenly*

3. *Shading from the heat and glare of the sun during summer regulates the temperature within the building, leading to a significant reduction in the building's peak cooling load and corresponding energy consumption.*

4. *Precipitation runs off sloped roof and is discharged into a linear watercourse, where it is carried to a shallow marsh and naturally cleansed by the water plants.*

5. *Window openings enable natural ventilation through the stack effect, facilitating passive cooling during the summer with lower maintenance and operating costs, as well as minimal to no energy expenses.*

6. *The use of vibro-compacted bricks from the demolished existing building on-site eliminates the need for concrete pile foundations. This sustainable approach not only reduces construction costs but also minimizes environmental impact.*

Repurposing Bricks as a Foundation Material

(Section A'A)

Bricks are recycled and repurposed as foundation material, thereby reducing the consumption of new resources and the overall carbon footprint of the project.

Key

- *Shading from Summer Sun*
- *Warming Winter Sun*
- *Precipitation*
- *Warm Air*
- *Cool Air*

Site Plan

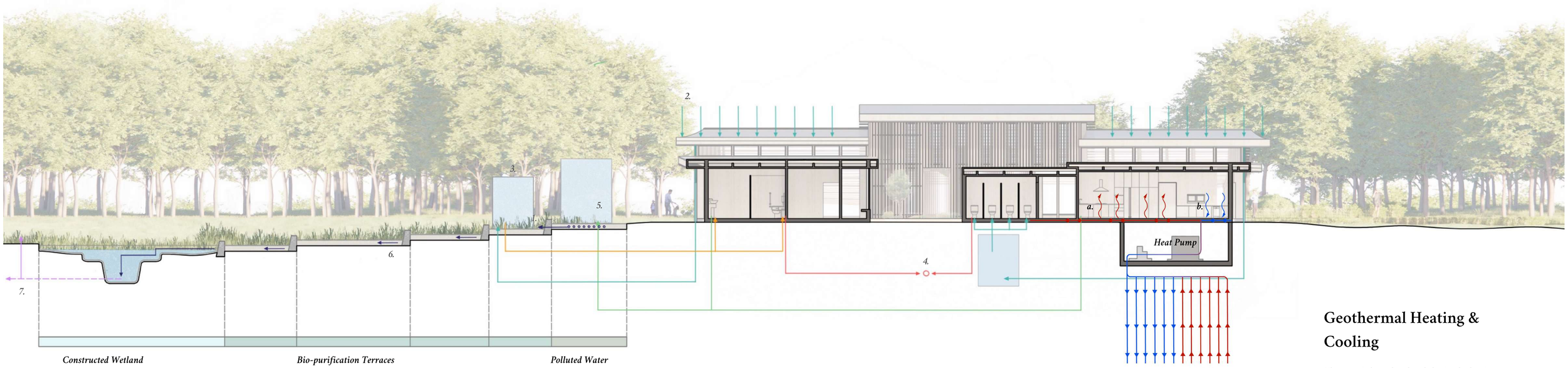
Plan Key

1. *Car Park*
2. *Outdoor Learning Space*
3. *Entrance*
4. *Outdoor Dining*
5. *Children's Play Area*
6. *Overflow Carpark Space*
7. *Channel Bird Hide*

Rainwater Collection & Reuse

(Section B'B)

Implementation of a terraced wetland landscape, carefully designed to allow for the effective purification of stormwater while also helping to mitigate the risk of floods.



Key

1. *Surface water collected from surrounding areas*
2. *Rainwater discharged into a linear watercourse and harvested for domestic reuse*
3. *Rainwater storage*
4. *Wastewater brought to main sewer*
5. *Greywater Storage*
6. *Water is purified through Bio-purification terraces*
7. *Purified water are utilised for irrigating surroundings and subsequently returned to natural water courses*

Marsh plants for grey water purification

Open Water

Pond Weeds
Wild Celery
Yellow Water Lilly
White Water Lilly

Deep Marsh

Hard-stem Bulrush
Soft-stem Bulrush
Pickerelweed

Shallow Marsh

Northern Arrowhead
Burreed
Pickerelweed
Soft Stem Bulrush
Three-square Bulrush

Wet Meadow

Woolgrass
Sweetflag
Northern Blue Flag
Cattails
Blue Vervain
Joe-pye Wood

Geothermal Heating & Cooling

The space is heated and cooled using hydronic radiant tubing, which coils a few inches beneath the concrete overlay of each floor. A mix of water and glycol runs quickly inside the tubes, effectively warming or cooling the concrete slab. This system efficiently radiates the temperature into the occupied spaces.

a. Winter Heating

During the winter, the heat pump operates in "backwards", extracting heat from the earth to warm the water. This heated water then circulates through the radiant floor, effectively warming the entire building.

b. Summer Cooling

In the summer, the building is cooled using a heat pump that circulates cool water through the radiant floor system. This process collects heat from the building and transfers it into the earth, thereby maintaining a comfortable indoor temperature.

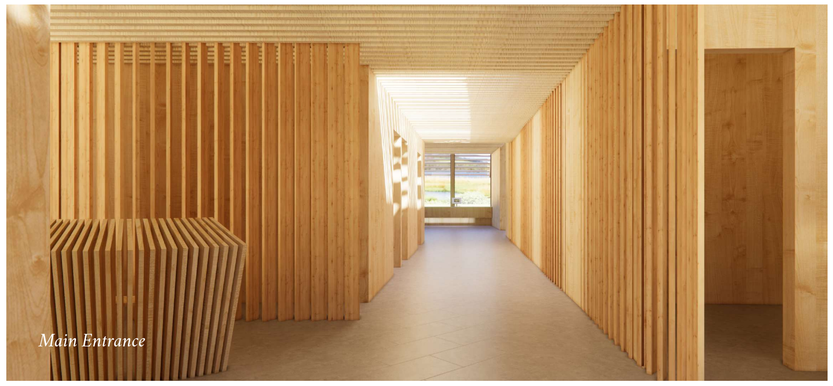

Top Deck Viewing


Viewing & Exhibition Area


Office


Reading Corner


Central Courtyard


Main Entrance

*As the North facing portion of the building does not receive direct sunlight, ensuring that **these spaces are well lit without artificial lighting** is vital. The delicate louvers on the building's curved façade acts as a visual guide to deter birds from flying into the building whilst still allowing an adequate amount of light into the space.*

1:50 Development models that explore potential spaces