Cameron Linden Green - Studio 2 - Housing Project in Chepstow

Contents

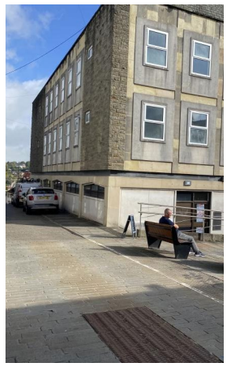
Map style created by Sarah Frisk on https://snazzymaps.com/style/72543/assassins-creed-iv accessed 2023-01-08

Settlement Overview & Site Choice

Chepstow is a town in **Monmouthshire** in **Wales**, situated on the border with England which, in Chepstow, is on the **River Wye**. It is the first port of call for **travellers into Wales** from England using the **Severn Bridge,** a major road connection slashing travel time to major cities like **Bristol.**

The town has a **population of 12,376** (according to a **2020** estimate)[1], a sharp increase from the **2001 census figure of 10,822.**

It has an extremely rich **historical urban fabric -** with the castle forming a key part of the town. The **town centre** and the **castle**, however, **could be better linked**, and the **wall better appreciated**. Furthermore, the town **does not appear to be bustling**, being **rather quiet** upon my visit.



The settlement's topography is very clear - it is home to very steep hills, and this is expressed in the arrangement of homes.

The portwall sometimes features in inconspicuous areas, where expensive cars line the streets - a sign of its' growing upper class population working in places like Bristol.

Chepstow was not left untouched by the post-war New Brutalist wave in town centres - the town square features this 1960s bank, which blends vernacular materials with concrete.

Site A - CHOSEN

OPPORTUNITIES

-Excellent castle views

-Links town centre to castle

-Opportunity for urban realm development

-Good vehicular access

CONSTRAINTS

-Difficult topography to work with

-Access is currently difficult - limited, not very visible, tight space.

Site B

OPPORTUNITIES

-Good access opportunities

-Close to train line, appealing to 16-34 working demographic. Good connections to major towns

-Flat topography

-Excellent river views

CONSTRAINTS

-Noise pollution is high due to train line

-Access to city is more limited, perhaps breeding sense of disconnection

Site C

OPPORTUNITIES

-Residential surroundings, opportunity to enhance sense of community

-Site proportions are good, blank canvas for design

-Good connections to town centre and quayside, urban development opportunity

CONSTRAINTS

-Bridge is a potential eyesore, also noise pollution from through road

-Flooding is a potential issue due to low lying ground

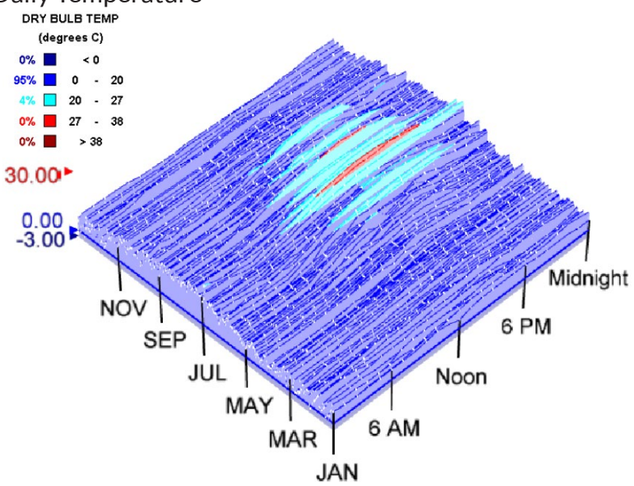
Town Centre

Quayside Residential Area

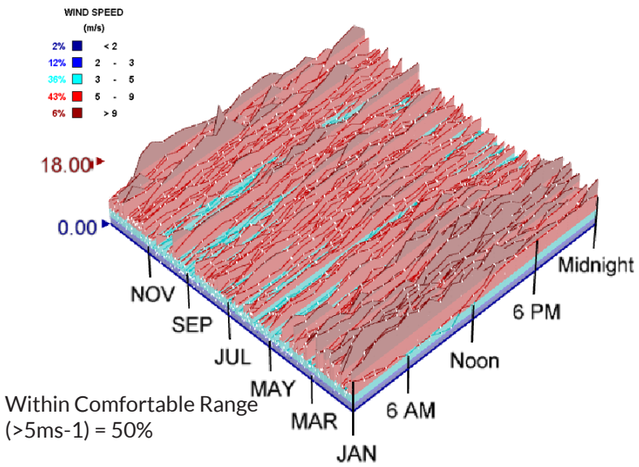
1- Data obtained from https://citypopulation.de/en/uk/wales/admin/monmouthshire/W04000778__chepstow/

Site Analysis - Climatic Site Analysis & Materiality/Typology Study

Daily Temperature

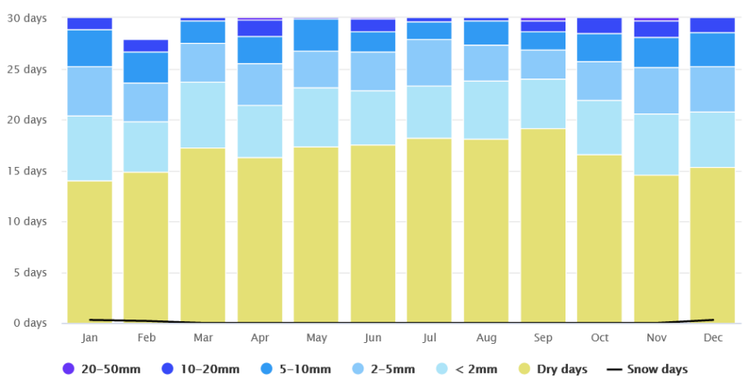


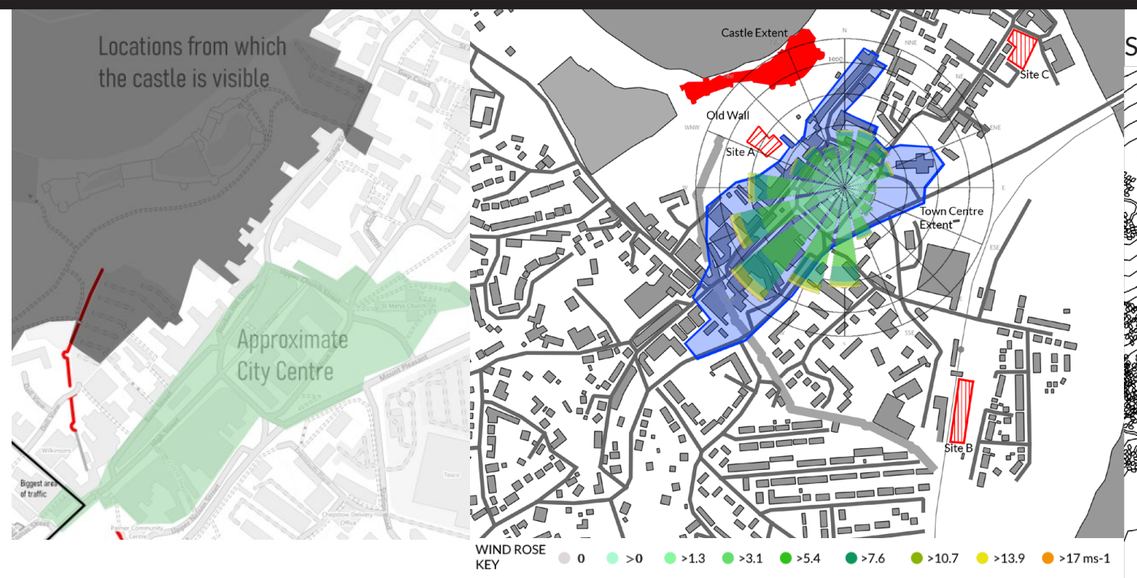
Daily Average Wind Speed



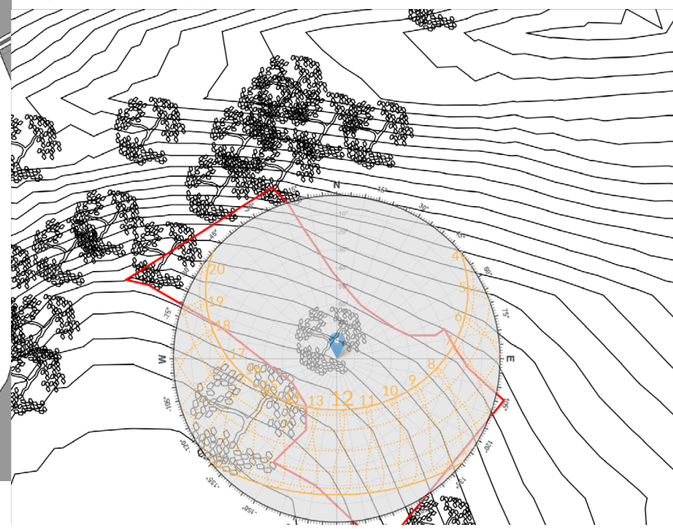
Within Comfortable Range
(>5ms-1) = 50%

Precipitation Model Graph

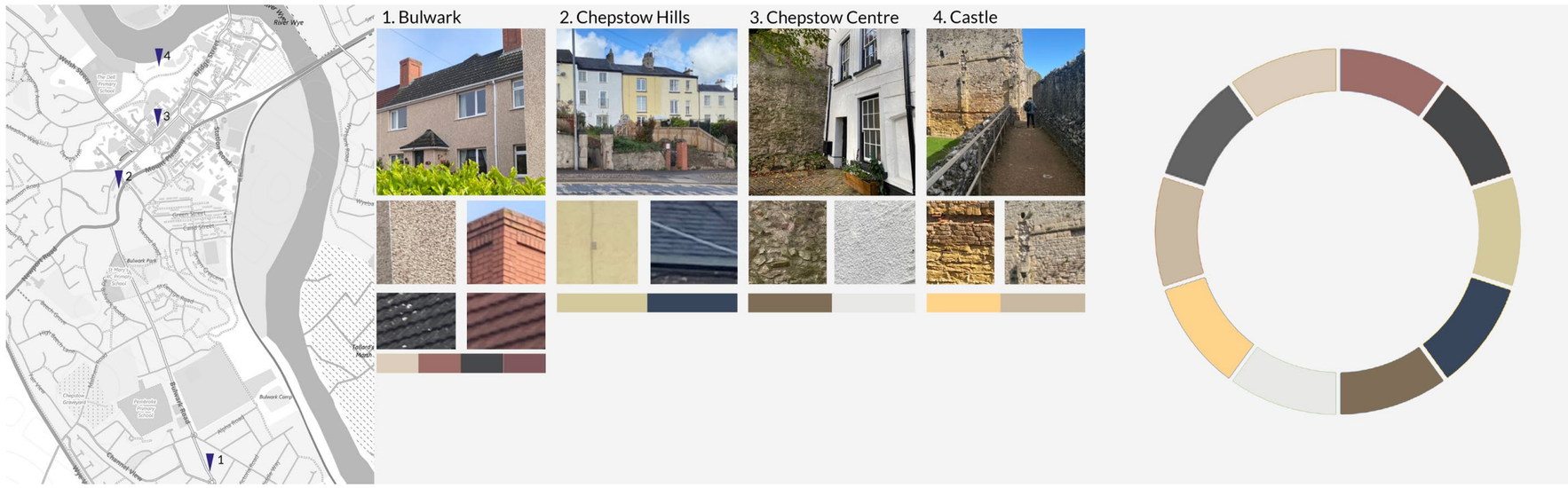




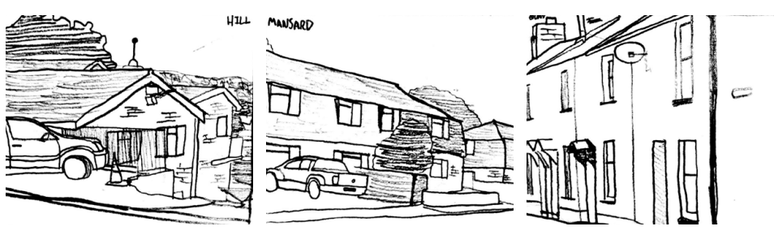
Site with Sun Path



Materiality Study



Local Housing Typology Examples



CONCLUSIONS

-There will not be much need for cooling at all, due to the low prevalence of high temperatures. Shading and shaded spaces should be considered for the future.

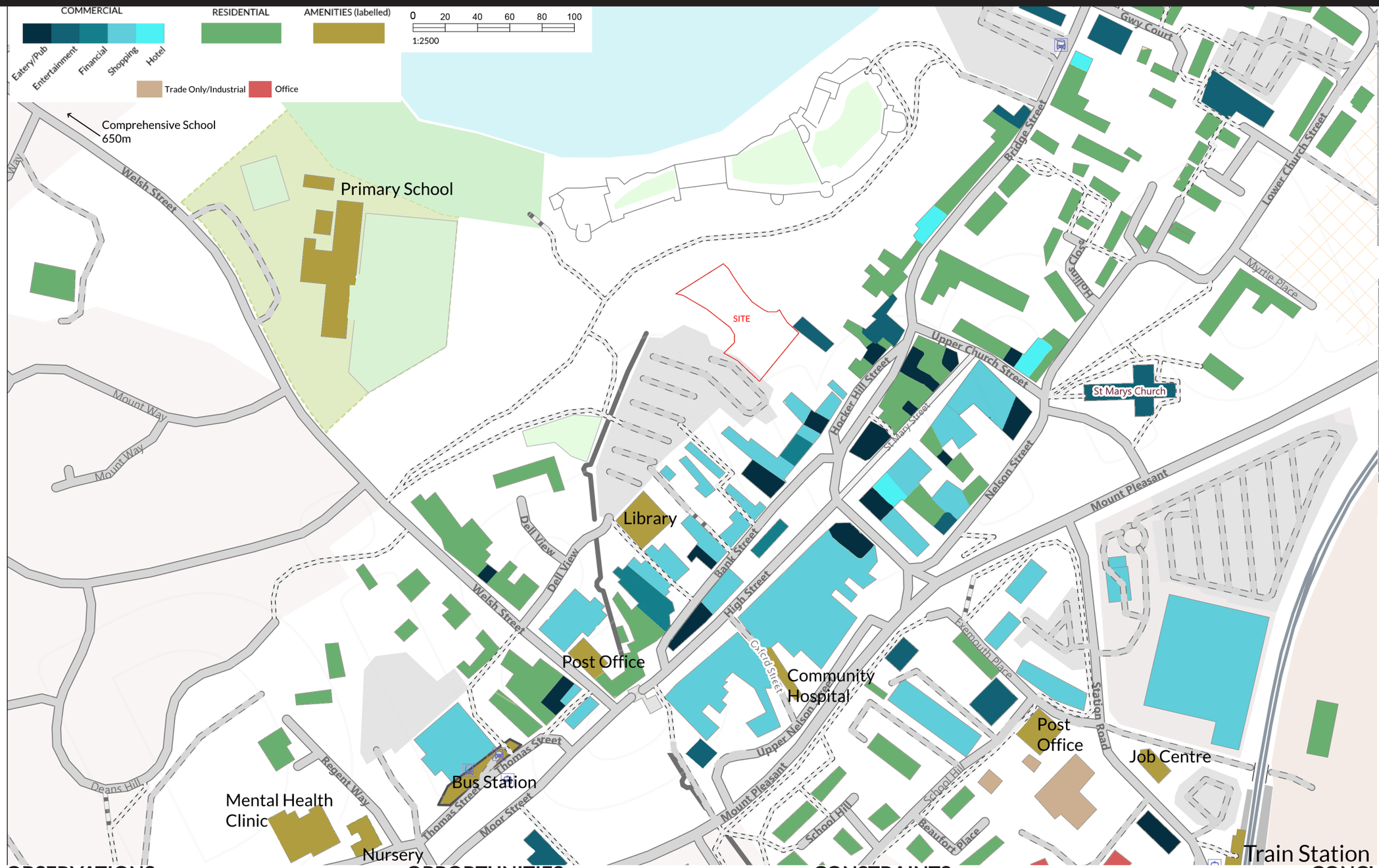
-The wind speed is often uncomfortably high, so this should be considered in my design.

-Drainage systems that work with topography are a very good potential strategy for dealing with precipitation.

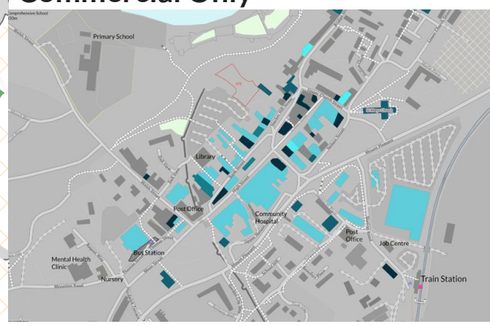
-I want to use materials similar to those that are local, to reflect local materiality - this will involve cream-coloured stucco and slate.

2- Data processed in Climate Consultant 6.0, using BRISTOL 2007-2021 file from https://climate.onebuilding.org/WMO_Region_6_Europe/GBR_United_Kingdom/index.html
3- Wind Rose from https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/chepstow_united-kingdom_2653256

Site Analysis - Zoning & Scaled Map

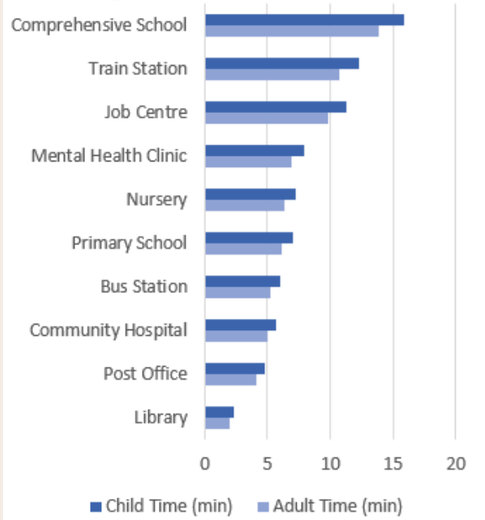


Commercial Only



Residential Only

Walking Distance from Amenities



OBSERVATIONS

-Portwall clearly defines town centre, most commercial zoning is inside

-Commerce seems concentrated further up the hill

-Town centre (densest comm. zoning) takes on a rectilinear form

OPPORTUNITIES

-Close to dense commercial zoning, encouraging local spending.

-Schools very close by, site is placed ideally for young families.

-Potential to unite fragmented residential areas.

CONSTRAINTS

-Site lies at the back of the town centre (opportunity for privacy)

-Distance to train station is comparatively high discouraging sustainable travel to cities. Similar issue with comprehensive school.

-Risk of the project community being more insular, as site is at the back of neighbouring residential zoning.

CONCLUSIONS

-Nearby primary school makes the site ideal for young families.

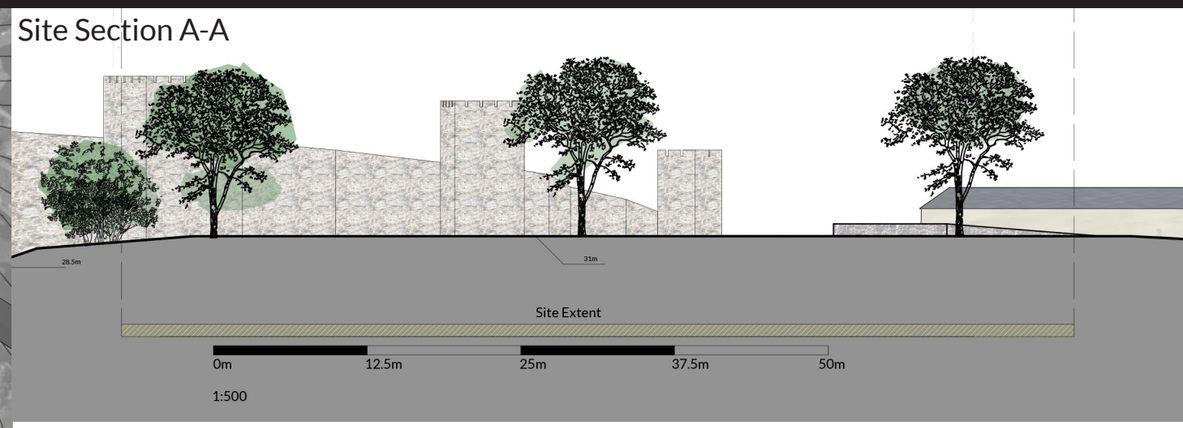
-Site is attractive to young buyers due to proximity to town centre - more vivacious and active lifestyle.

-Well connected to artery roads, desirable for young, university-educated workers in major cities.

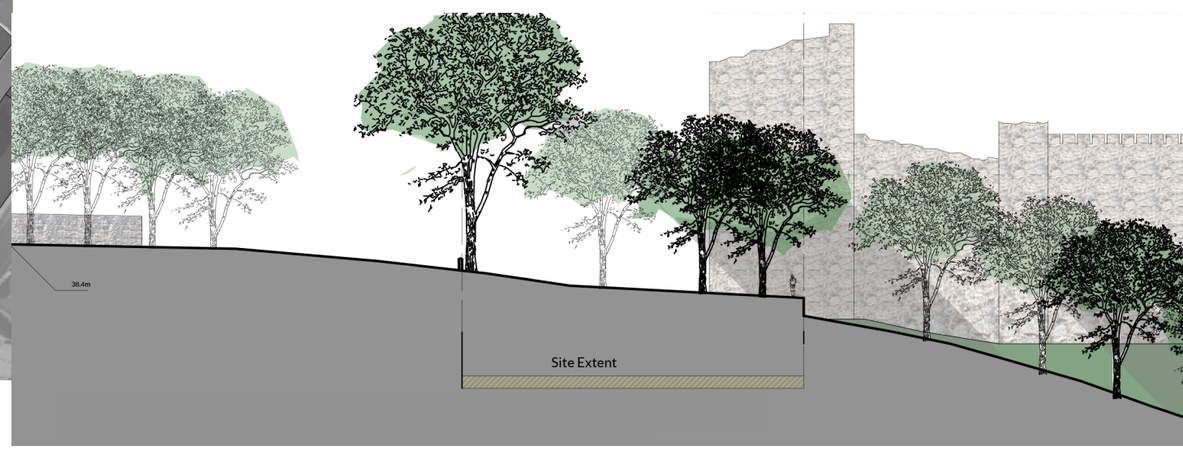
4- Maps obtained from DIGIMAP Edina OS Roam
5- Walking speeds from https://www.researchgate.net/figure/Average-walking-variables-for-each-age-group-at-initial-and-final-baseline-conditions_fig6_277413838

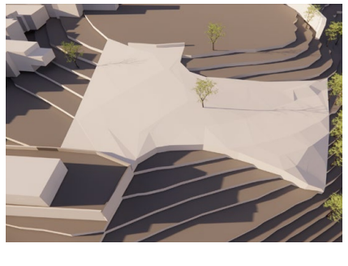
Site Analysis - Site Model, Topography, Dimensions, Sections

Site Section A-A

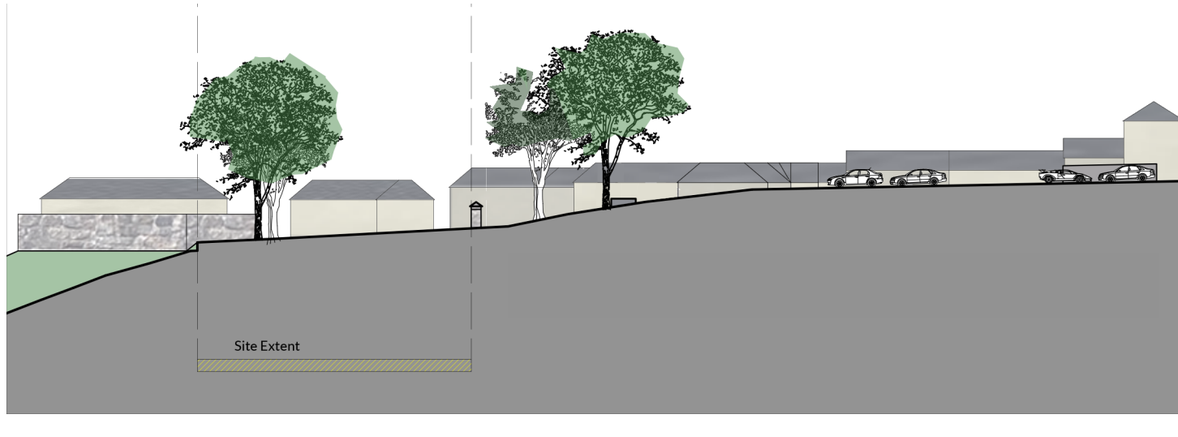


Site Section B-B



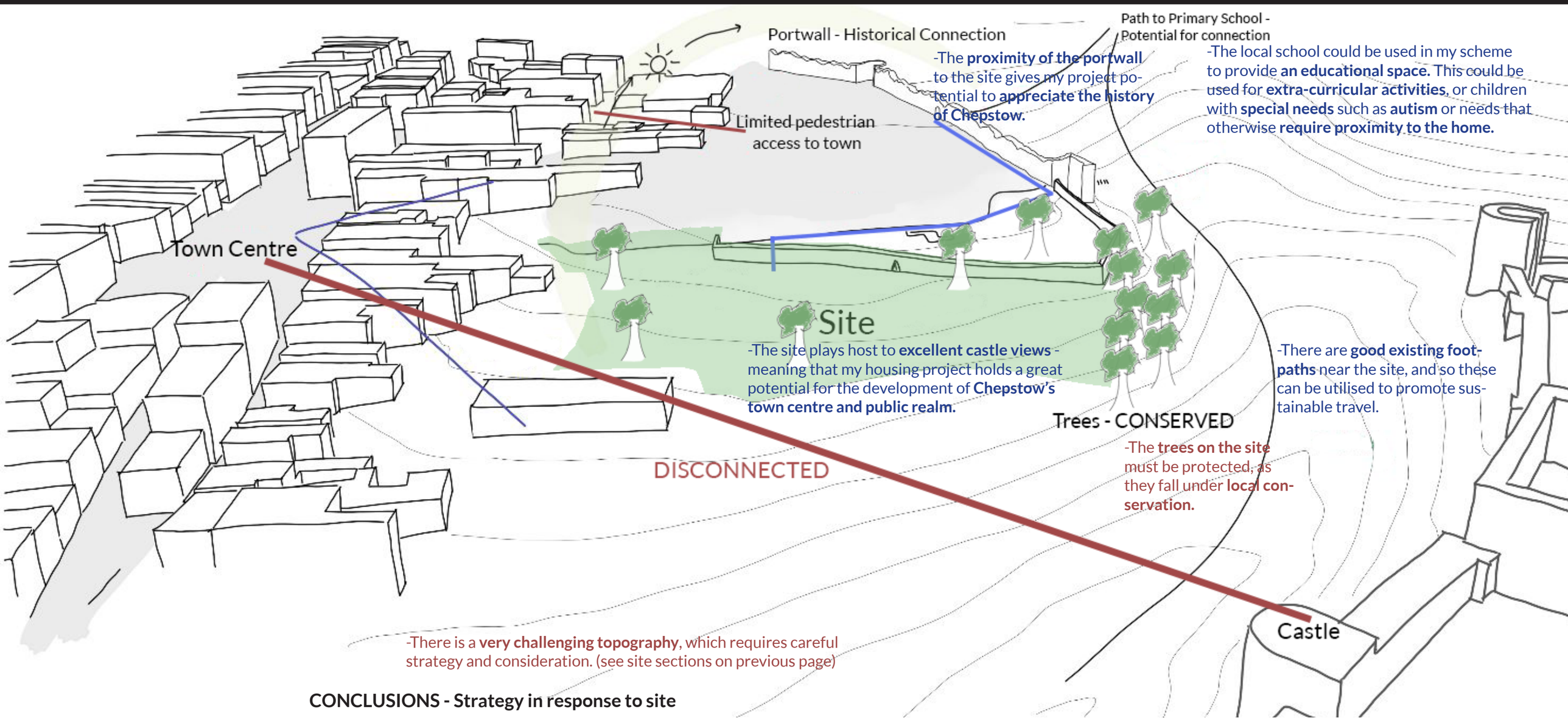


Site Section C-C



6- Satellite image obtained from Edina Digimap Data Download

Site Analysis - Key Opportunities, Constraints & Response Strategy



CONCLUSIONS - Strategy in response to site

-My site should **make use of some of the car park**, especially **sections that border the site and the portwall**, to create **safe footpaths for children** to walk on **without having to cross roads**.

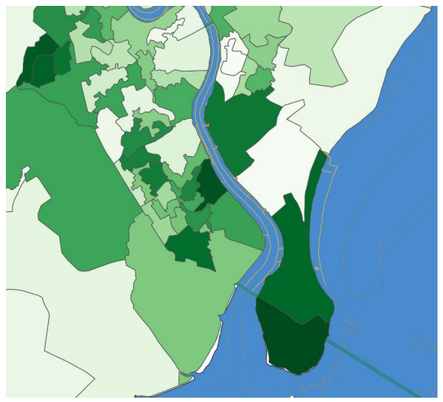
-I should **incorporate the public realm** into my project in a way that **makes use of castle views**, and **matches the form and morphology of local streets**, to allow for **better connection between the town centre and castle**.

-My scheme should **include a space that can be used by the local school,** in order to provide a **net positive impact to the surrounding area** as well as **taking advantage of its' proximity** to the site.

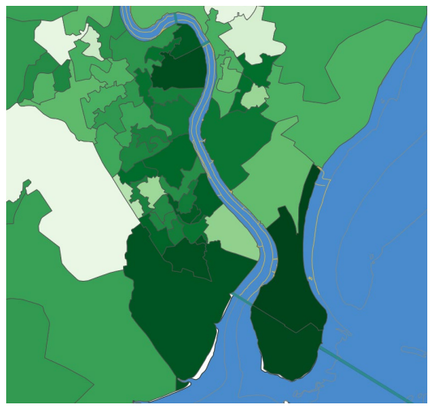
7- Illustration of site originally by Freya Kirby (Studio 2, BSc 2, WSA, 2022-23), edited by self with express permission

User Analysis - Profile & Demographic Study

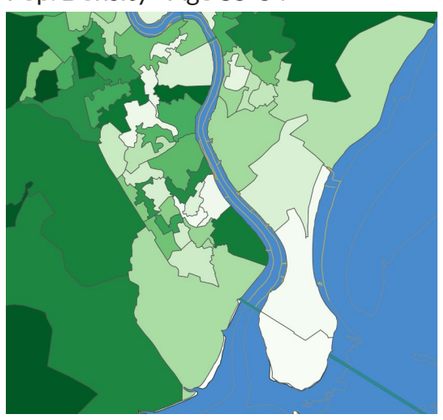
Pop. Density - Age 0-15
[Darker = Denser]



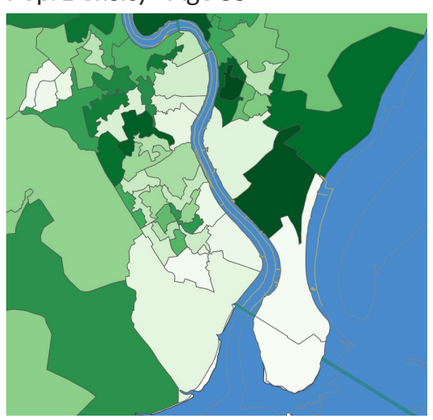
Pop. Density - Age 16-34



Pop. Density - Age 35-64



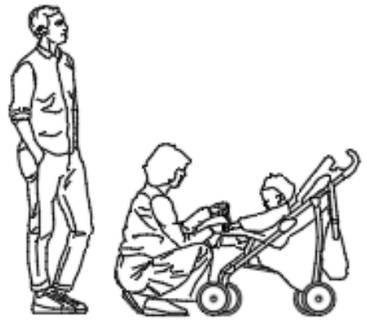
Pop. Density - Age 65+



USER PROFILE

My scheme will be designed to accommodate **young familes** with **one autistic child.**

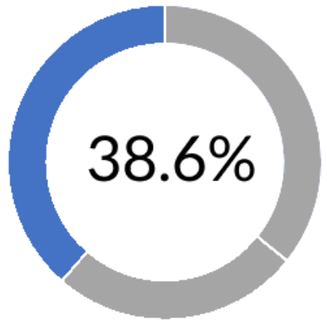
Based on data from Monmouth, out of 16-34 year olds(7),



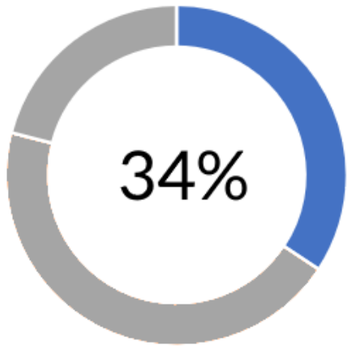
Based on generic Monmouth data on families with children aged 5-11(8) (It was not possible to isolate this to only 16-34),

And of the child population of the United Kingdom(9),

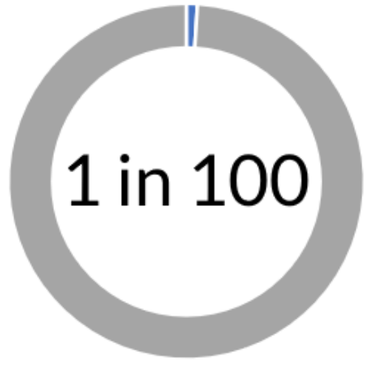
Figure X- Autism Awareness infinity symbol, introduced to replace controversial "puzzle piece" by Autism Speaks in 2018. Obtained from https://goodautismschool.com/autism-symbol/



are families



have one child



have an Autism Spectrum Disorder diagnosis.

CONCLUSIONS-

-The majority of families with young children are situated in the Bulwark area.

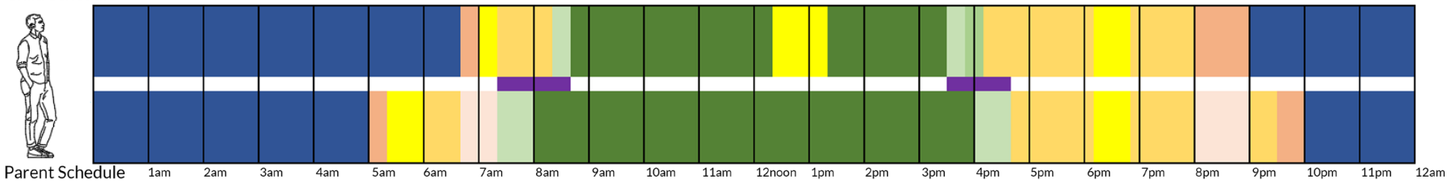
-Sedbury has the densest OAP population.

-The centre of Chepstow is predominantly 16-34, as is Thornwell.

-Those aged 35-64 tend away from the centre, opting for places like Pwllmeyric and Mathern.

-The area closest to my site is <u>dominated by 16-34 year olds</u>, so this is the <u>demographic I should design for.</u>

Child Schedule



Parent Schedule

1am 2am 3am 4am 5am 6am 7am 8am 9am 10am 11am 12noon 1pm 2pm 3pm 4pm 5pm 6pm 7pm 8pm 9pm 10pm 11pm 12am

Schedule Clashes
Sleep
Getting Ready
Eating
Relaxation
Childcare
Commute
Work/School

Potential Stressors:-

-Morning: Uncertainty/Routine Change

-In School: Social Anxiety, Sensory [Noise, Lighting, Textures]

-After School: Uncertainty/Routine Change, Stress Buildup

Schedule Comparison - Aims:

-See where and when a space for childcare may be necessary due to schedule clashes.

-Identify potential stressors for the autistic child through the day.

-

8- Data processed in QGIS v3, obtained from Digimap Society Data Download

9- Downloaded from https://www.nomisweb.co.uk/query/construct/submit.asp?forward=yes&menuopt=201&subcomp= accessed 2023-01-08

10- Family statistics obtained from https://www.nomisweb.co.uk/census/2011/QS118UK/view/1946157403?cols=measures accessed 2023-01-08

11- Statistic from https://www.hogrefe.com/uk/article/autism-in-the-uk-prevalence-assessment-and-the-impact-of-the-covid-19-pandemic accessed 2023-01-08

User Analysis - Requirements, Solutions and Approach

Routine - of paramount importance

Unexpected change could be a stressor

Stress from spaces that are too flexible?

Ensure that spaces make sense and are easy to use/access

Unfamiliar environments could worsen social anxiety

Aversion to Change

Social Skills

Motor Skills

General Challenges

Wayfinding & Navigation

Space Definition

To minimise distress, ensure easy pathfinding

Orthogonal forms are preferred to curvilinear

Buffer Spaces

Quiet Zones

Allows senses to readjust & for easy retreat from sensory overload

"some individuals with autism struggle understanding their body in relation to itself, the greater environment, and planning their movements through it."[11]

Natural wood is accepted as a good solution

Certain textures may cause sensory distress

Texture & Materiality

Intense smells from cooking

Waste odour

Smell

Colour

Neutral palette

Use acoustic material to reduce unwanted noise

Acoustic

Sensory Stressors

Soft, employ some natural lighting

Lighting

Avoid glare

Avoid fluorescent bulbs

Designing for Autism - Research

from Autism Friendly Design Guide

Colour coded doors assist with pathfinding

Precedent - New Struan Centre for Autism
Alloa, UK | 2005

Roof tapers inwards through the class-room

Lay-by spaces as thresholds

Aitken Turnbull Architects

"Progression of Scale"[13]

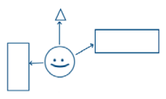
Existing Solutions

Fletcher Thompson

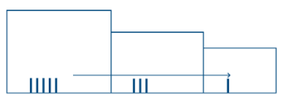
"ceiling heights must be kept low, spatial volumes small and learning spaces intimately proportioned."[11]

KEY PILLARS FOR AUTISM FRIENDLY DESIGN IN MY SCHEME

1- Control

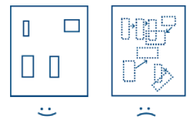


2- Gradual Thresholds

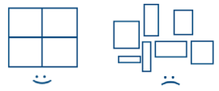


3- Safe Spaces

4- Certainty



5- Rationality



6- Conciseness

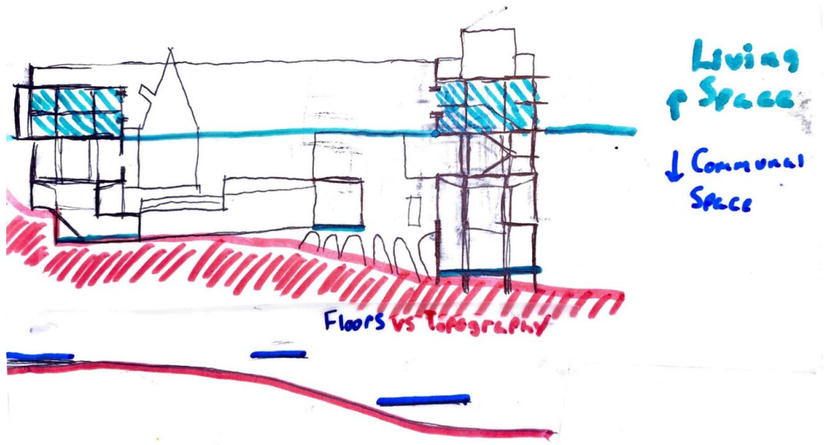
CONCLUSIONS - Strategy in response to user and site

-The space that w**orks with the school** could act as a **safe space for autistic** primary school **students.**
-The child should have **spaces that they alone control** - offering a **safe space**. This should, at least, include their **bedroom.**
-**Safe buffer spaces** should be **provided frequently** in the scheme, allowing for **easy, short but regular** retreat from **sensory overload.**
-The **number of different rooms** should be **limited**, in favour of **porous space**, to make the unit **rational and concise**.
-**Living and sleeping** spaces should **have a buffer zone** between them - providing an **opportunity for sensory adjustment** and offering a **clear, certain and understandable distinction.**

12- Mostafa, M, 2021 “The Autism Friendly University Design Guide”, Autism Friendly DCU, Dublin, Ireland, p23, 55, 58, 64, 69, 77, 92, 93
13- Henry, Christopher N. 2011. ‘Designing for Autism: Spatial Considerations’, ArchDaily <https://www.archdaily.com/179359/designing-for-autism-spatial-considerations>
13b- Image 2 of the exterior of New Struan Centre for Autism in Alloa, UK, by Aitken Turnbull Architects, https://www.aitken-turnbull.co.uk/project/centre-autism-new-struan/ accessed 2023-01-10

Precedents & Analysis

Precedent A- Couvent de la Tourette
Lyon, FR
Le Corbusier 1954

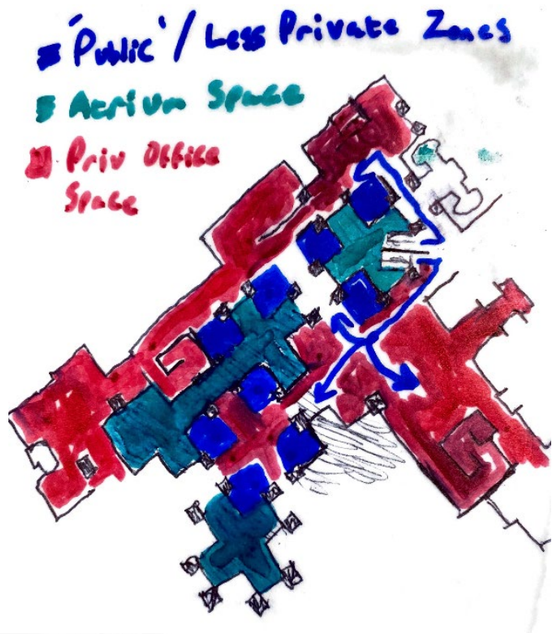


KEY THEMES
-Topography & Response
-Co-operative Living

-It lies on pilotis for most of the building, rejecting the hill, but follows the earth in the crypt - the earth is appreciated where necessary.

-A constant view of the earth is maintained even if not followed within the building envelope, an example of how negative space can influence a design so strongly.

Precedent B- Centraal Beheer
Apeldoorn, NL
Herman Hertzberger 1968



KEY THEMES
-Definition of Space & Spaciousness
-Communal Spaces
-Link to High Technology

-These communal areas make the corridors of this office more than just places to pass through.

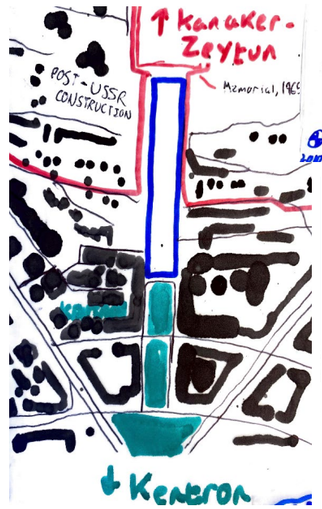
-I wish to use the stairways as an outside space and a shared balcony for the units it will serve.

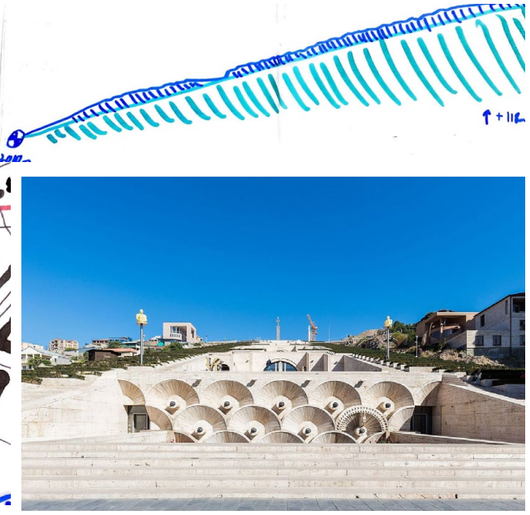
-These spaces define a clear and concise place, offering a sense of safety and comfort

-Opens up to a large atrium, providing a sense of spaciousness.

-A good example of high technology and how it can influence the experience of a place, a good reference point for the access points to my scheme.

Precedent C- Kaskad
Yerevan, AM
Jim Torosyan 1971





KEY THEMES
-Use of Vernacular Materials
-Topography & Response

-Unlike La Tourette, the Kaskad complex follows the topography nearly exactly - only offering small flat alcoves for gathering.

-It is a good reference point for a project in Chepstow, as the Cascade offers a key route from Kentron to Kanaker-Zeytun, linking inner and outer Yerevan.

-This precedent is useful to me in how I plan the routes through my housing project, so that it contributes to the public realm & connecting the castle to the town.

14- Cameron Linden Green, Couvent de la Tourette Exterior (2022), Taken by self on site
15- Willem Diepraam, Centraal Beheer Apeldoorn (1968-72), from Dezeen article [https://www.dezeen.com/2011/12/06/key-projects-by-herman-hertzberger/]
16- By Diego Delso, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=52486625
17- Section sketched over obtained from drawing by Samuel Ludwig, http://www.greatbuildings.com/cgi-bin/gbc-drawing.cgi/Convent_of_La_Tourette.html/La_Tourette_Section_A.jpg
18- Plan sketched over obtained from plans by Herman Hertzberger available on AAH, https://www.ahh.nl/index.php/en/projects2/12-utiliteitsbouw/85-centraal-beheer-offices-apeldoorn

AT2 - Mission Statement

-Overview

My design intent is to design a housing project for **young families with an autistic child**. The needs of those with autism **demand an architectural response to external stimuli**, such as **daylight, climate, heat, noise** and more.

-Sustainability

I intend to make my design sustainable through **meeting Passivhaus requirements for U-values**, utilising **south-facing windows** for **solar gains**, and therefore meeting the **RIBA 2030 Challenge** energy balance **target of 35 kWh/sqm/yr.**

I will use **framed construction** to **situate my scheme off the ground** where possible and reasonable, to **minimise disturbance to habitats**. In the same vein, I intend to **not cut down a single tree** and **utilise green bridges** where possible.

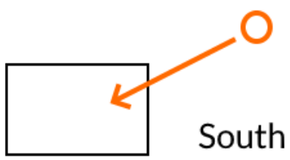
Furthermore, I will **utilise local materials** as much as possible - Chepstow provides an **excellent opportunity** for this with **timber**, as it is sourced on the outskirts along the River Wye.

-Environment

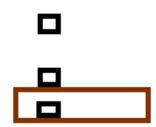
There are a **range of noise sources** around the site, and to create a **sensory "safe space"** these **should be mitigated** where possible. **Thermal comfort**, and **especially overheating**, should also be considered.

-Safety & General Liveability

My scheme should **meet all safety regulations** and **appropriate safety standards**, and meet as many of the standards possible set by the **London Housing Design Guide** and **EN 17037.**



South Light



Habitat Preservation

Local Materials

Meets Standards & Regulations

AT2 - Space Standards, Circulation and Conceptual Aims

-CONCEPTUAL AIMS

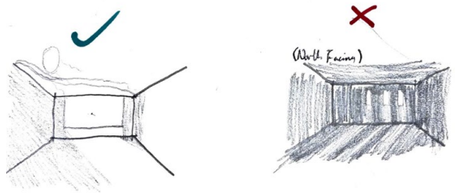
The intended user of my housing project is a young family with an autistic child. This will mean that the needs that may come with such a housing project will differ from normal.

KEY AIMS-

-<u>Good daylighting & sunlighting</u>

> Reasons-

Improves mood and morale
Greater quality of life in daylit spaces



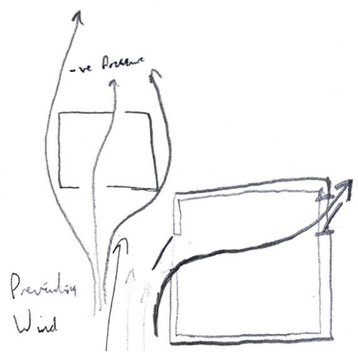
> Application-

-Over 50% DA300 in most used spaces.
-South facing windows where possible.

-<u>Good ventilation</u>

> Reasons-

Helps maintain comfort temperature
Constant flow of clean, fresh air.



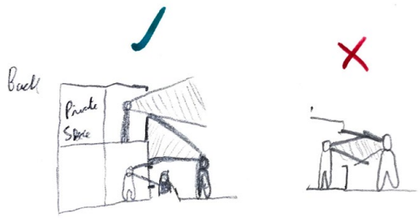
> Application-

-Design for cross ventilation - make use of prevailing wind
-Implement stack ventilation

-<u>Privacy</u>

> Reasons-

Provides a sense of safety



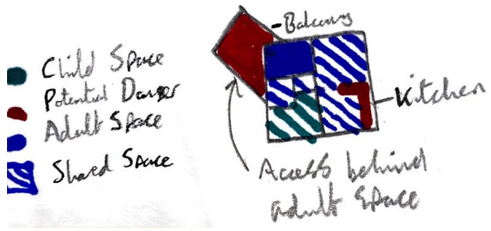
> Application-

-Ensure good community-household thresholds established
-Prevent bedrooms being overlooked

-<u>Safety</u>

> Reasons-

Physical safety is necessary
Safe spaces for the autistic child are also key



> Application-

-Consider thresholds between adult and child spaces

1-BS EN 17037:2018+A1:2021 Daylight in buildings, p16 (Table A.1)
2-Stair precedent Image from https://www.viewrail.com/gallery/brazilian-cherry-and-cable-railing-floating-stairs-fit-for-an-engineer/ accessed 2022-11-18

<u>REFERENCES TO USE-</u>

London Housing Design Guide

-This document is key for advice on spatial arrangement and room sizes, as many argue that space defines place and place defines architecture.

EN 17037

-This standard is concerned with daylighting levels, and stipulates the following:
>DA300 should be above 50%(1)
>DA100 should be above 95%(1)

Approved Document M

-Where there are no area minima specified by the LHDG, Approved Document M should be consulted for the general arrangement of rooms such as bathrooms and corridors.

<u>STAIR PRECEDENT-</u>

Image from https://www.viewrail.com/gallery/brazilian-cherry-and-cable-railing-floating-stairs-fit-for-an-engineer/ accessed 2022-11-18

-Dog-leg Stair, Open Tread

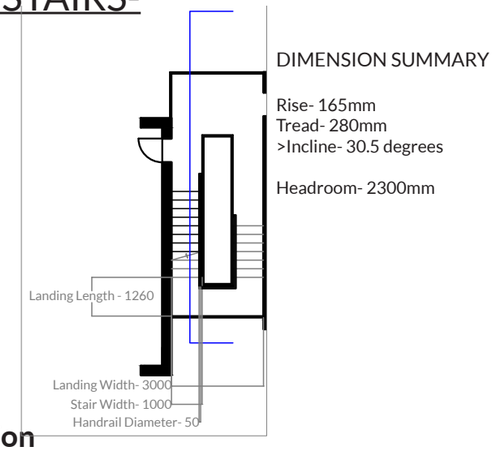
-Varying elevation changes between landings.

-The stringer is central and of subtle design.

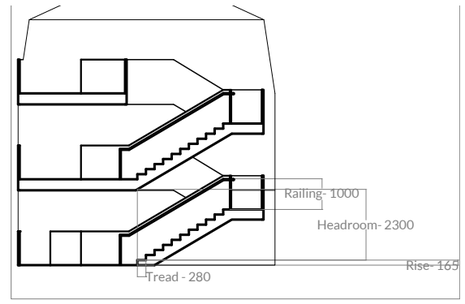
-Only elements that are to be interacted with are made to be visible, and almost appear to float (handrail and treads).

<u>MY STAIRS-</u>

Plan



Section



VARIATIONS FOR MY STAIRS-

-I am using closed tread stairs, as it will improve ease of interaction for an autistic user.

-I will therefore also use a closed stringer stair.

AT2 - Sustainability Strategies

-KEY SUSTAINABILITY AIMS

A- Daylighting

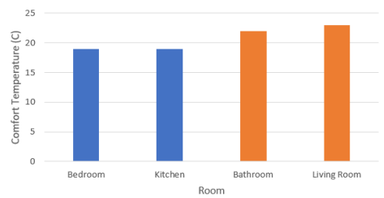
-Why?

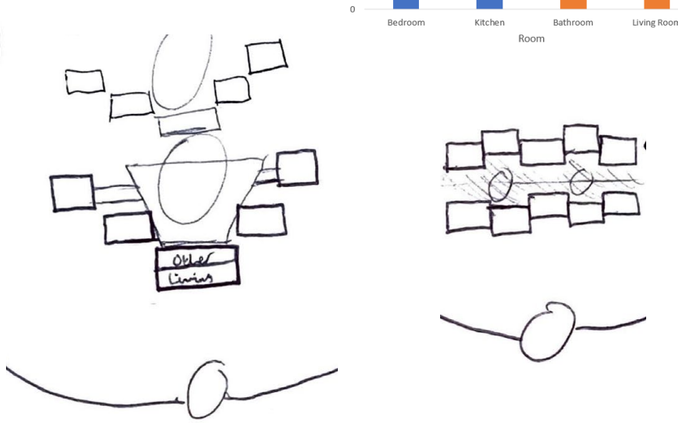
Daylighting, if done correctly, can offer an excellent path to a passive (and therefore more sustainable) building, primarily through solar gains.

-Strategies & Reasons

South facing Windows
-Southern elevation of a building will have the most exposure time to direct sunlight, and so will be the most irradiated. This passively heats the building as a result.

Arrangement of spaces in order of heating requirement
-The bathroom and living room have higher comfort temperatures[3] than the kitchen and bedroom, so these should have south facing windows.





-Conclusions

Use south facing windows on living space.

South, south-east or south-west elevation of building should be largest.

B- Local Materials

-Why?

The closer to our site we source materials from, the less pollution will be associated with the material - making our construction more sustainable.

-Intended Materials to Use

Steel [Frame] Tata Steel, Port Talbot | 77km
Insulation Celotex, Hadley | 253km
Lime Render Welsh Lime, Pontypridd | 46km
Brick Morgan Supplies, Gloucester | 39km
Slate [Facade] Welsh Slate, Cwt-y-Bugail | 172km
Timber [Floors] Wye Valley Timber, Tutshill | 1km

C- Habitat Preservation

-Why?

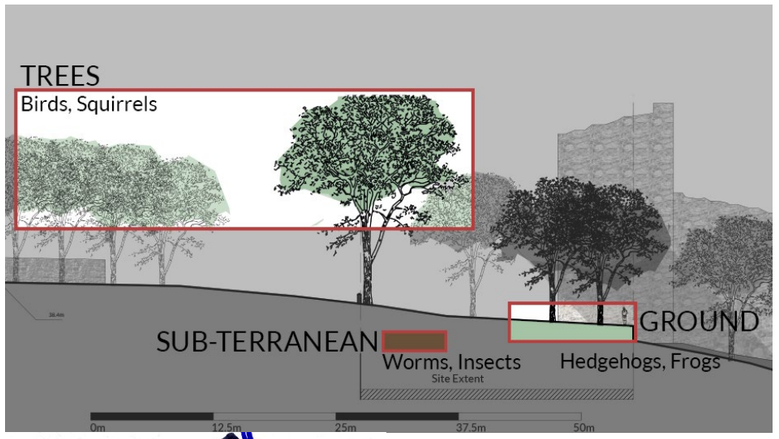
Habitats form an important part of any ecosystem - and so the preservation thereof on a site during and after construction is of paramount importance.

-Strategies & Reasons

Green Bridges
These allow the movement of small ground-based animals, meaning that the construction's disruption to the ecosystem and habitat is minimal.

Green Bridges can enhance **Habitat Connectivity** - a principle recommended by the **Chepstow Conservation Areas Appraisal**.

Tree Preservation
Trees are incredibly important to the habitats of avian creatures, and so the preservation thereof is of paramount importance.



Potential green bridge locations - connecting greenspaces in my strategy

-Conclusions

Green spaces should remain connected, to minimise habitat disruption.

I will aim to cut down no trees in my scheme.

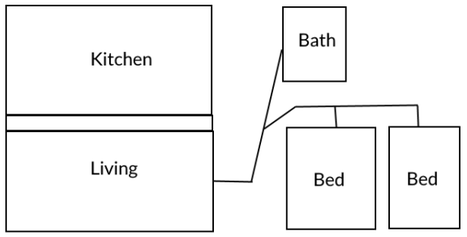
I will minimise disruption to sub-terranean habitats by limiting the amount of digging my scheme will need.

3- Chartered Institution Of Building Services Engineers. 2019. Environmental Design : CIBSE Guide A (London: Chartered Institution Of Building Services Engineers), pp. 1–10 - 1–13 (Table 1.5)

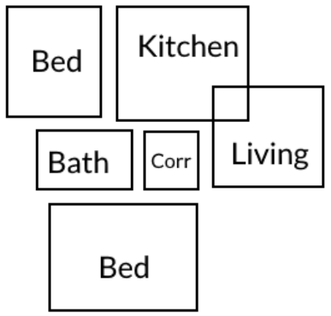
Design Concept Sketches

-Initial bubble diagrams

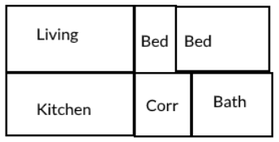
1.



2.



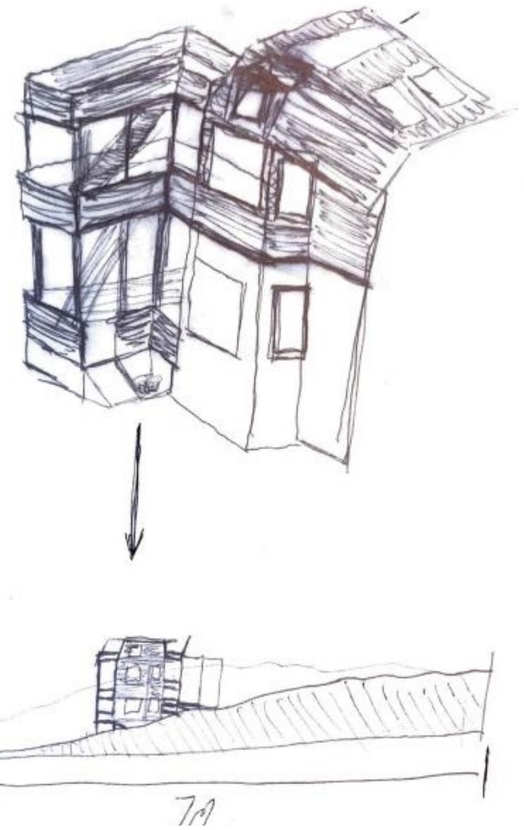
3.

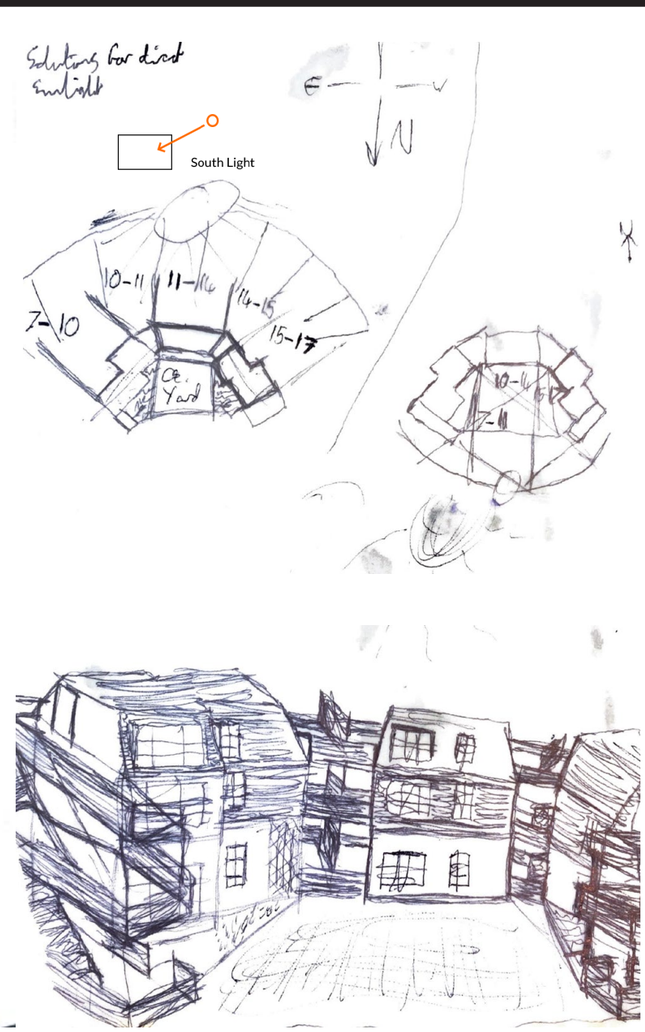


Personal Reflections-
-An adaptation of the 2nd bubble diagram appears to be the best to take forward.

-The first design could be improved by removing the roof where it is unnecessary and increasing the depth of the communal space.

-First design sketches





-Initial conclusions & ideas

-Focus around tree, links to Certainty due to centre around permanent object

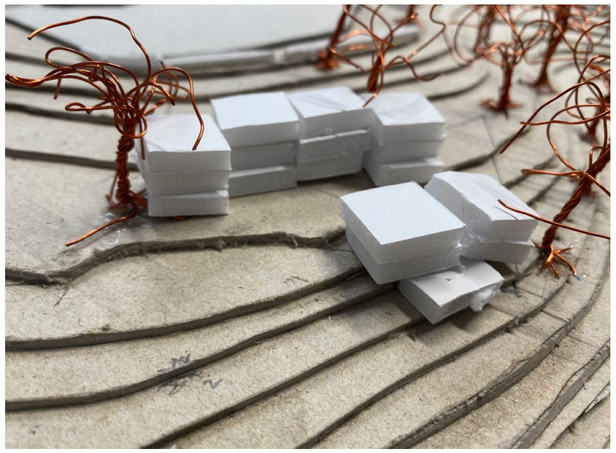
-Massings should be tested - could do street-like arrangement with opening to tree courtyard or crescent around tree

Initial Drawings & Testing

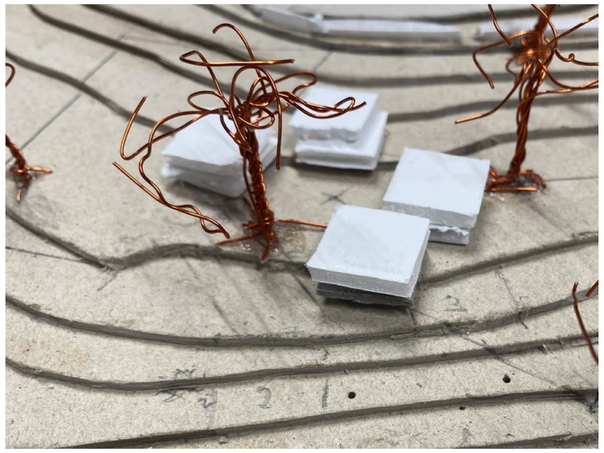
-Testing of Massings and Arrangements

1. “Chevron”

2. “Linear”



3. “Circular”



4. “U-shaped”

1.
+ Abundant **south light**
  Clear focal point for **community** centre

- Difficult to provide **gradual thresholds**

2.
+ All units have castle views
  Gradual thresholds possible

- Less south lighting

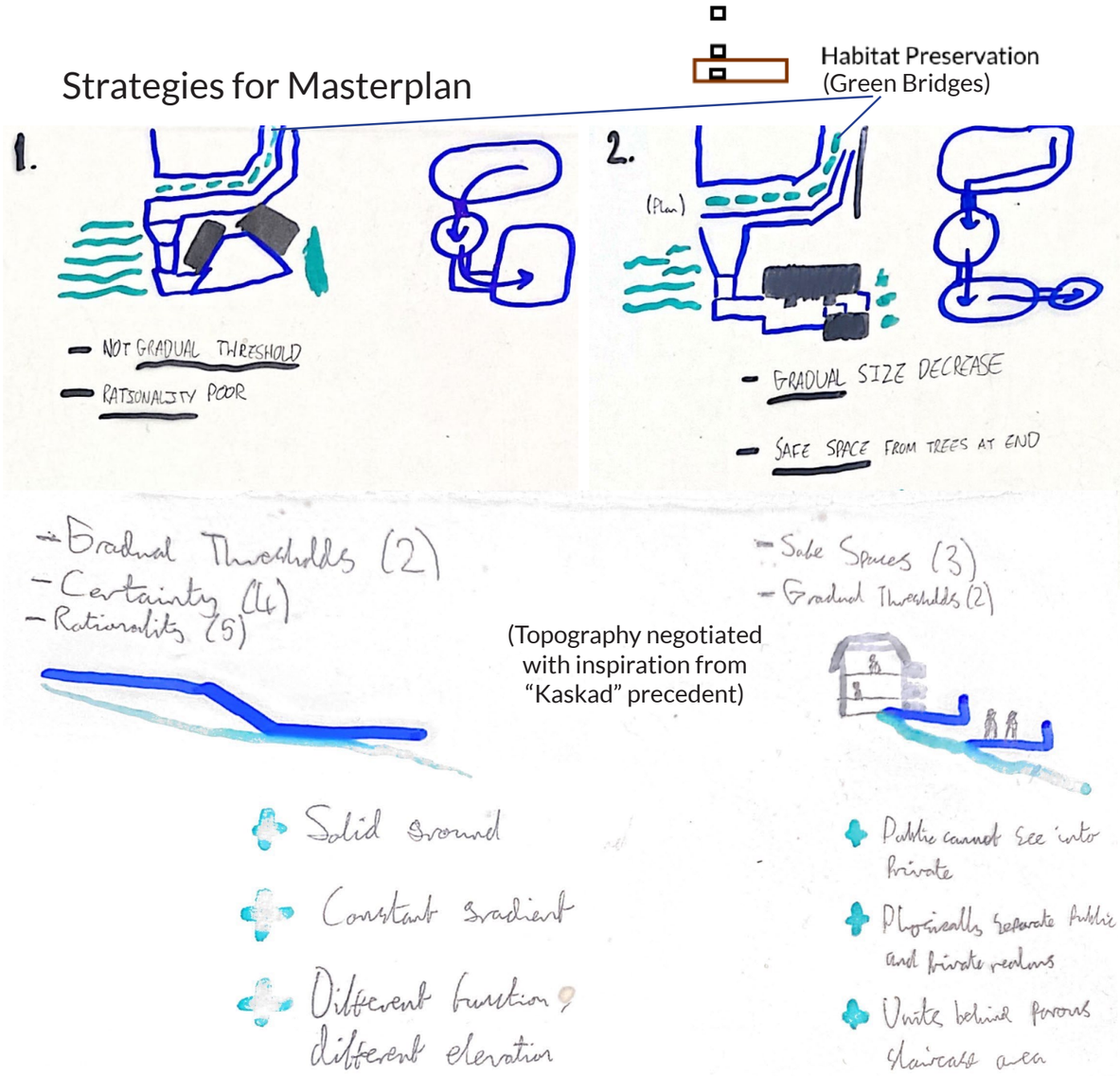
3.
+ Good arrangement for **privacy**
  Sense of **safe space from tree**

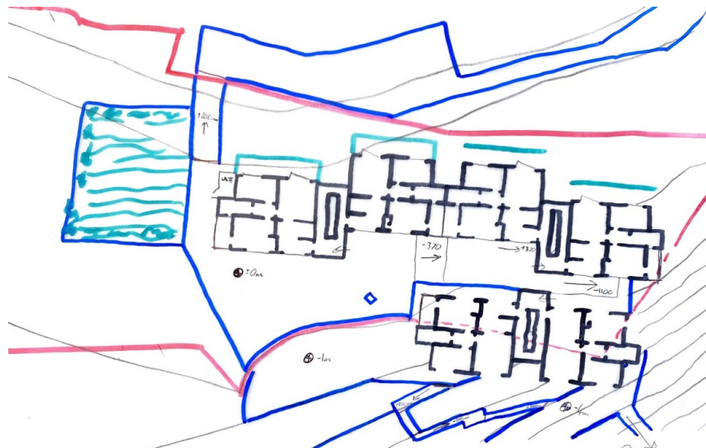
- **Castle views** not as available

4.
+ Sense of **safe space** like in 3
  Community centre offers castle view

- Not all units have **castle view**, **contradicts design intent**

Strategies for Masterplan

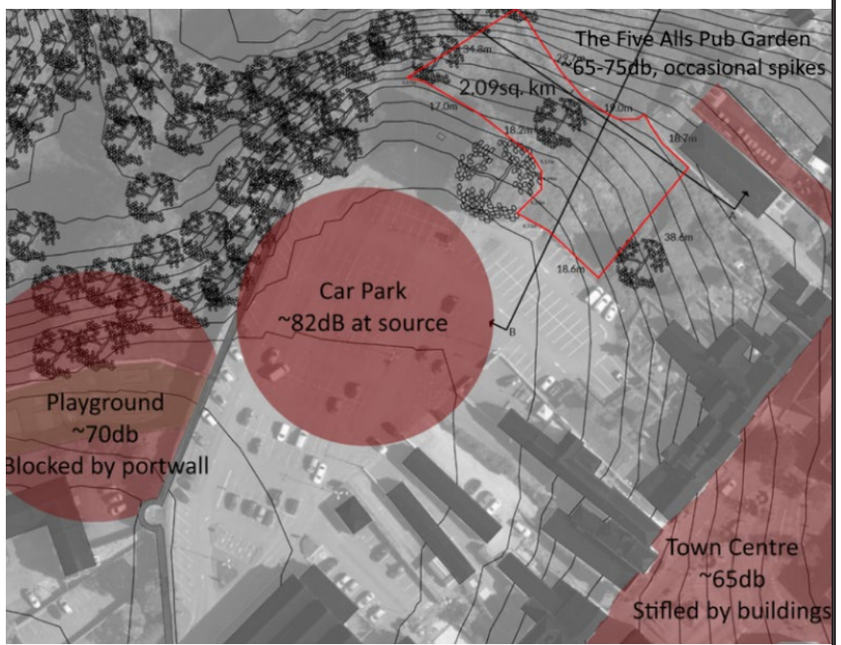




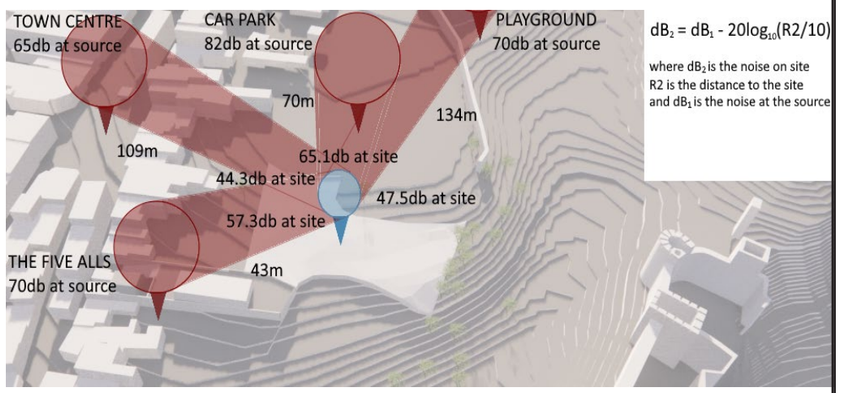
AT2 - Noise Analysis and Specific Material Research

-NOISE AROUND SITE

-Sources



-Noise Levels on Site



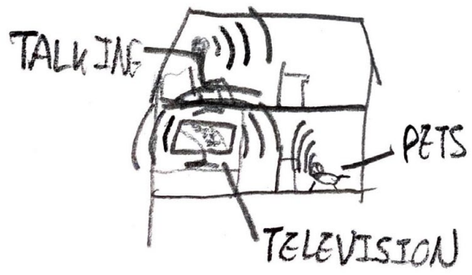
-Conclusions

External noise levels **range from 44.3db to 65.1db.** Considering my user group, this **should be stifled** as much as possible by **planting softwood trees** that will **quickly grow**.

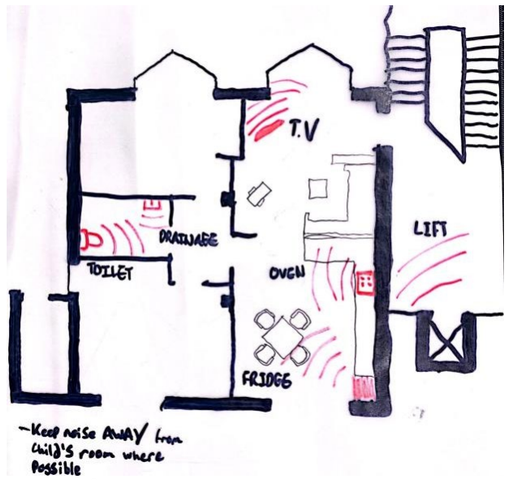
-NOISE IN BUILDING

-Impact Noise

-Airborne Noise



-General Noise in Plan



-Conclusion

Airborne noise is much more constant and inevitable than impact noise - so it should be predominantly considered.

Floors and walls must still be acoustically sound.

I should use carpets to absorb the constant impact from walking, as well as using acoustic materials in the walls.

-MATERIAL RESEARCH

-Slate Cladding

[CUPACLAD 201 VANGUARD]
Supplied by CUPACLAD
(link https://www.cupapizarras.com/uk/rainscreen-cladding/systems/cupaclad201-vanguard/)

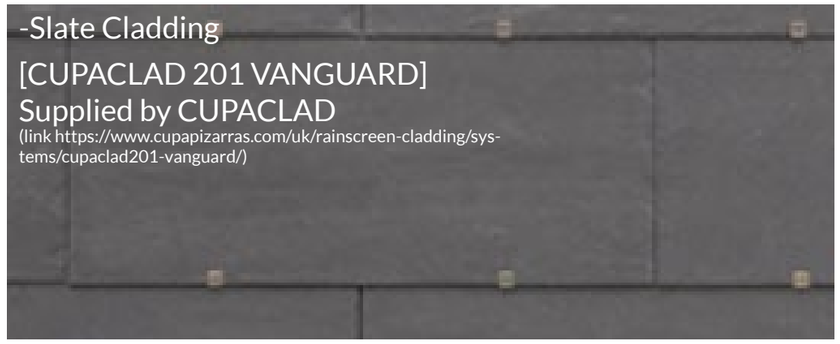


Image from https://www.cupapizarras.com/uk/rainscreen-cladding/systems/cupaclad201-vanguard/ accessed 2022-11-21

Fixing- Stainless steel clips, attached to steel battens

Size- 600x300x7.5mm

Sustainability- BRE Global Verified

Fire Safety - All tests according to ASTM E136 -16 passed

Thermal Resistivity - 0.671 (m*K)/W[6]
(Based on generic supplier studies, as no specific value was specified)

-Mitigation Strategies
- **Airborne, Impact and Site-based**

Arrangement - Place living spaces on top of each other to minimise noise transfer to bedrooms.

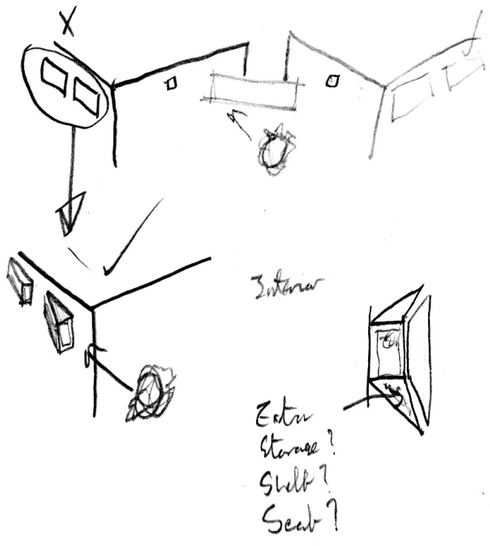
Construction - Ensure that Approved Document E is complied with by using the proper insulation & acoustic boards in the floor.

Vegetation - Trees and hedges stifle external noise, so should be utilised on site strategically.

4- Noise decay equation obtained and adapted from https://www.wkcgroup.com/tools-room/inverse-square-law-sound-calculator/ , accessed 2023-01-07
5- Car noise source https://pulsarinstruments.com/solutions/vehicle-noise/ | 6- Town Centre noise source https://www.noisequest.psu.edu/noisebasics-basics.html
7- Based on conductivity value of 1.49 from https://www.buildingdesignindex.co.uk/entry/151541/CUPA-PIZARRAS/Thermal-behavior-of-roofing-slates/

Design Development - Proposal Iterations

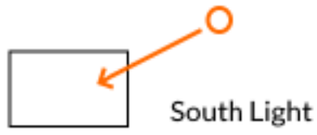
1. Protruded Window



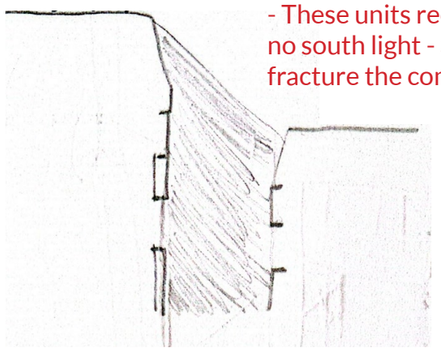
- The current flat window concept is uninspiring and does not contribute anything to the space.

+ By protruding the window, more south-facing aspect can be offered, increasing solar gain.

+ The extra space can act as a window seat, offering a subtle safe space for the child.



2. Iteration of Linear Massing to provide educational space



- These units receive no south light - and moving them would fracture the community too much.

2- Rotate units 90 degrees

+ Better solar gains & energy efficiency
-Community aspect lost
-Units back onto each other, disconnects neighbours
-Some units look onto blank walls

1- REMOVE COMPLETELY

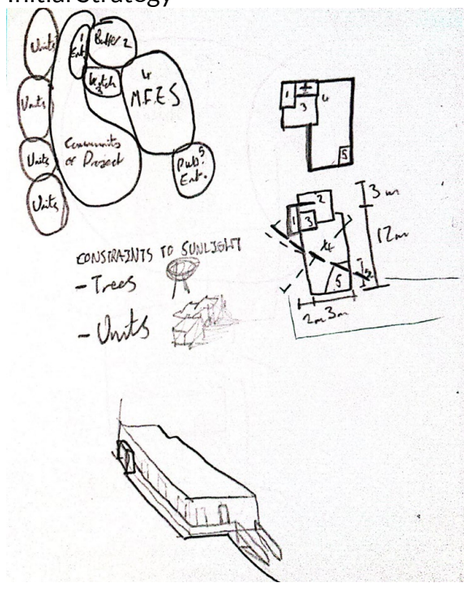
+ Improves views
- Units/ha reduced
-Space could be better used and pushed further
-Removes central focus

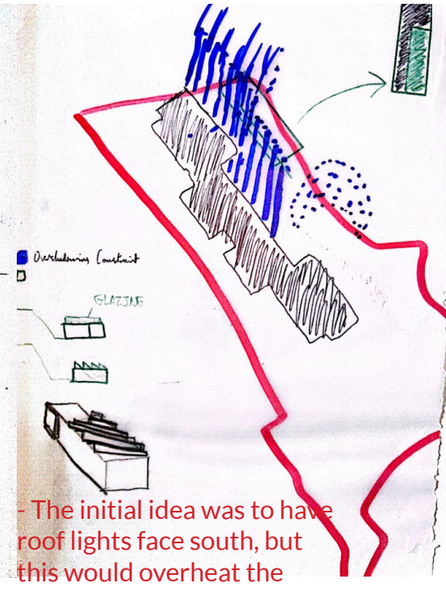
3- Repurpose the space

+ Provides more communal space
+ Only 1 storey needed, improves views
+ Can work with primary school, enhancing relationship with community

3. Educational (communal) Space

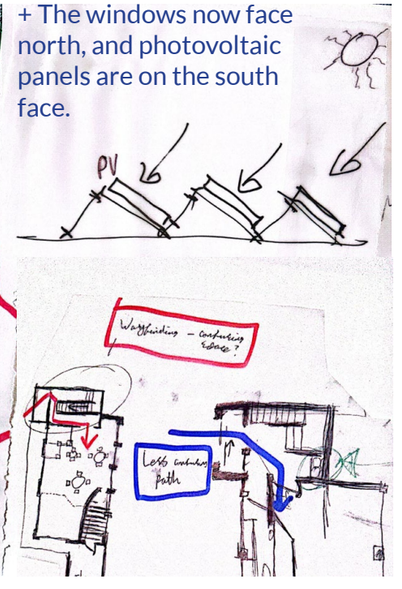
Initial Strategy



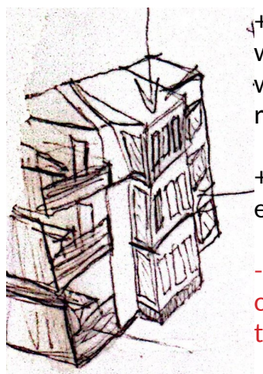


- The initial idea was to have roof lights face south, but this would overheat the space.

+ The windows now face north, and photovoltaic panels are on the south face.



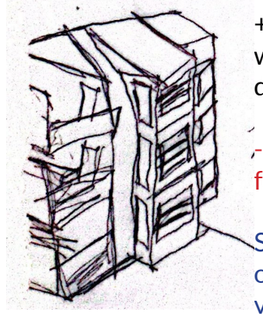
4. Bay window solutions & link to castle



+ Protrusions in the windows enhance window seat effect & relation to castle

+ Offers some south-east light

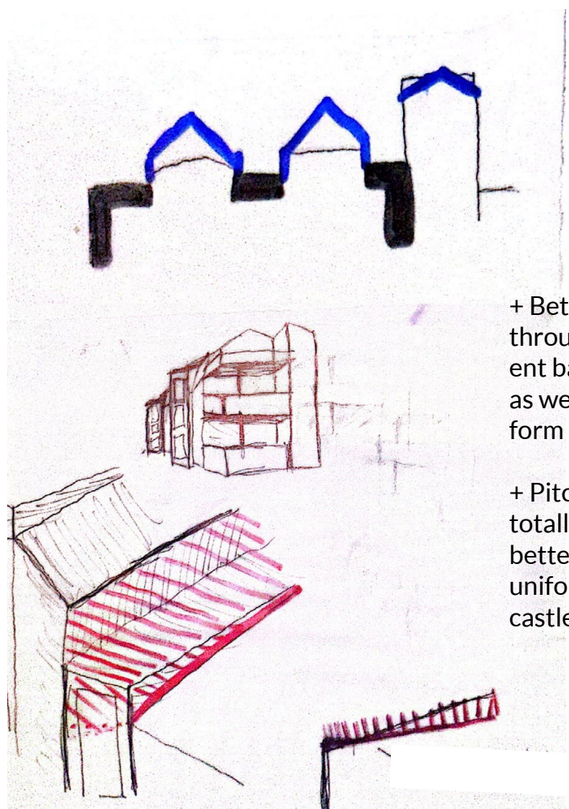
- Horizontal fits the character of slate better?



+ More fenestration with horizontal windows, better views

- Openings not as good for cross-ventilation

Solution - Vertical openings on side of prevailing wind, horizontal elsewhere

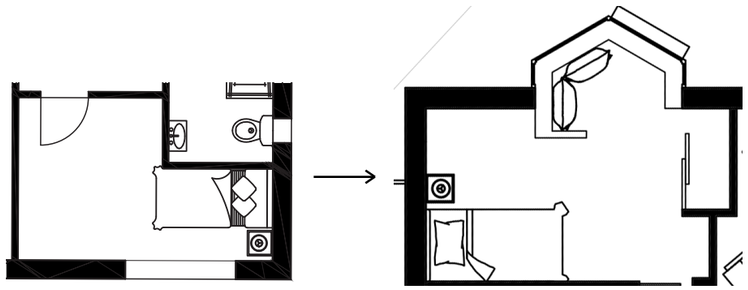


+ Better link to castle through a more coherent bay window form, as well as through the form itself.

+ Pitch of roof made totally uniform - works better with slate and uniformity resembles castle wall.

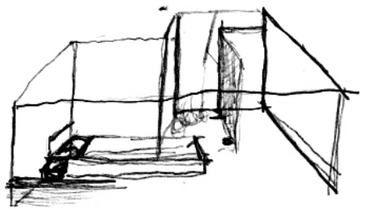
Design Development - Child's Bedroom

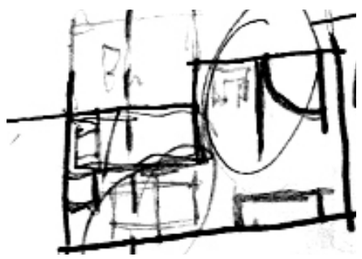
-Overall Evolution - Plan

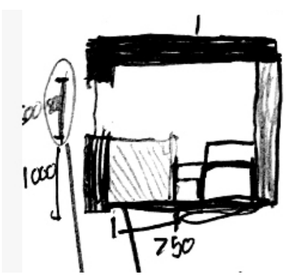


Not to Scale

-1: Initial Strategy for Bedroom







- The entrance being recessed offers a sense of safety on entry

- The entrance space can be adapted to the child's needs - potential for a sensory space?

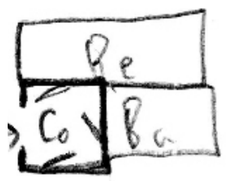
- Balcony access restricted, paramount for safety

- There is a safe space provided between the bed and the window, through an enclosed retreat.

-2: First Iteration

- The recessed entrance is unsighted from the bed. This creates the semantic of a lack of control.

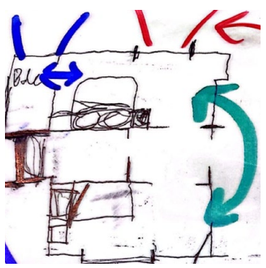
This could potentially cause distress.



+ By confining the bedroom to a more rectangular form initially, this issue is eliminated.

- The design perogative still remains of making the space special for an autistic child, how can this be achieved?

-3: Incorporating the Castle View



>Less overheating, meaning less sensory issues from being too hot.

>Less glare, creating a calmer visual environment.

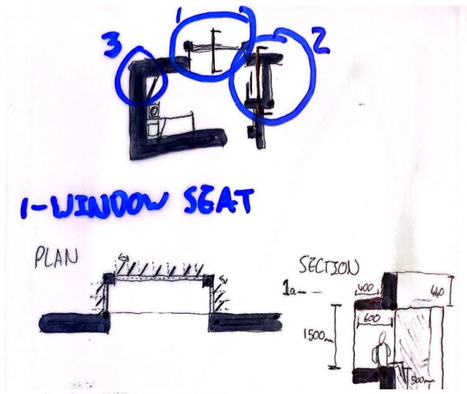
- The balcony should still ideally have castle views and be open mostly to the private realm, but it must be accessed through the parents' bedroom.

+ The child's bedroom is far better placed on the north face.

>More shielded from car park and town centre noise on north

>The north face provides excellent castle views, for a magical experience.

-4: New Strategies as a Result



4.1-

+ A tall window seat provides a good castle view, as well as plenty of headroom.

- The height of 1500mm could encourage a small child to stand up, which is a safety risk.

-It is also perhaps too tall to provide an effective safe space given its' dimensions.

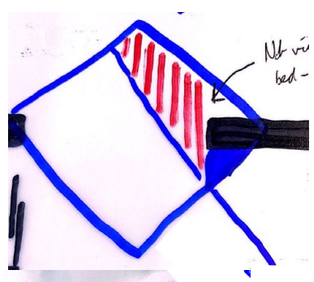
-I also tested a height of 1000mm, but this could be too low to a risky extent.

-I found that 1250mm balanced physical safety and the safe space concept best.

-By swapping the parents' and kids' bedrooms and making changes to match the strategy, the cupboard can also be used as a freely accessible enclosed safe space.

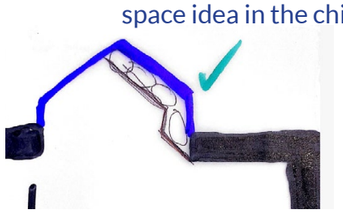
-The cupboard can act as a space for whatever the child needs, from an activity space for their special interest, to a small sensory room.

-5: Third Iteration | Window Seat & "Turret" Influence



- Every part of the room should be visible from the bed, the turret being this way could cause distress.

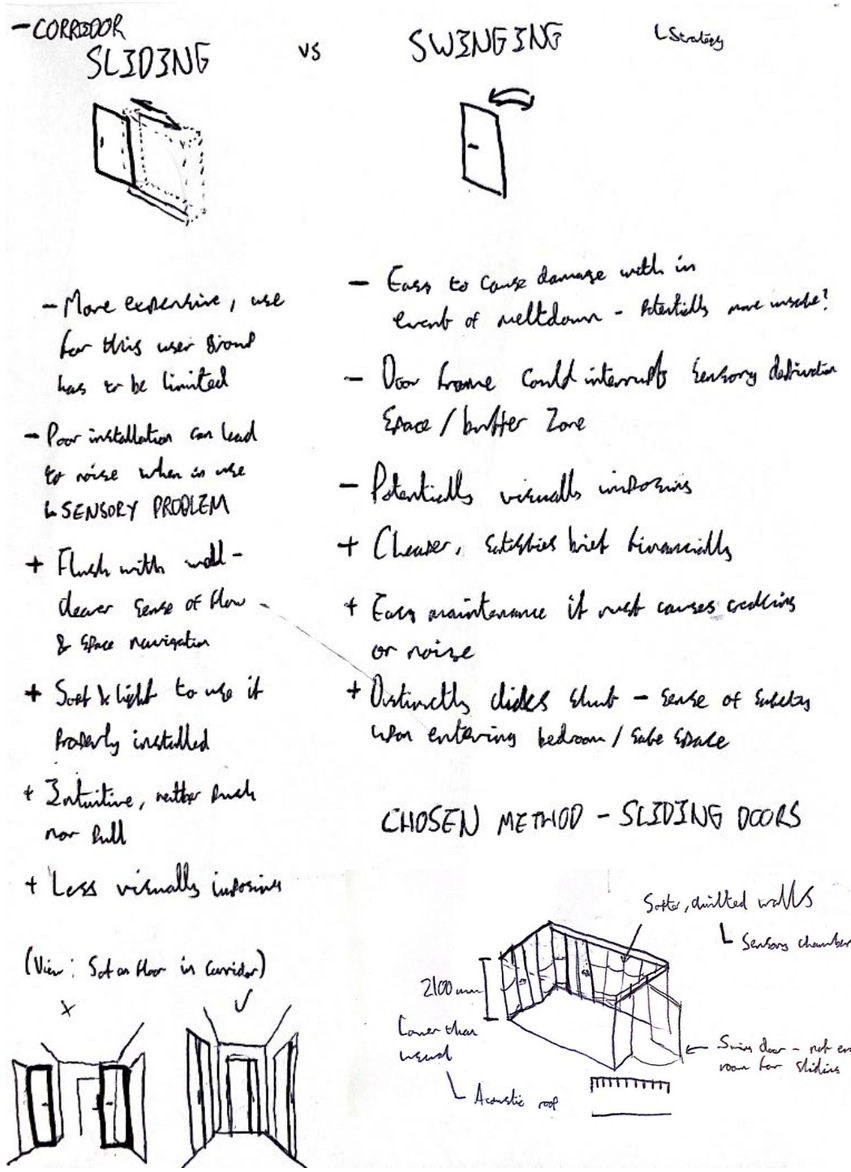
+ A turret provides a better link to the castle, and provides a similar semantic. This reinforces the safe space idea in the child's bedroom.



- The turret does not protrude enough to provide much of a safe space.

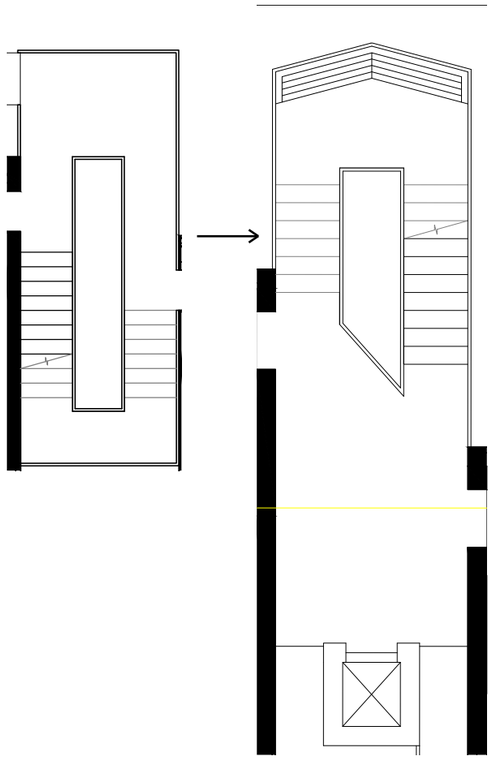
Design Development - Corridor & Atrium

-Corridor

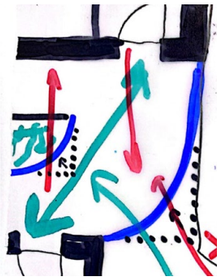


-Atrium

-Overall Evolution

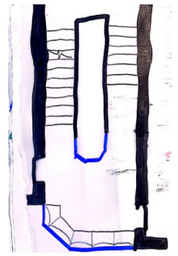


-1: Potential iteration & eventual first solution



+ A taper theoretically offers better neighbourly connection

- Curvilinear forms lead to looser space definitions, which contradict my design pillars.



+ An octagonal form provides a good compromise.

-2: Improving neighbourly thresholds

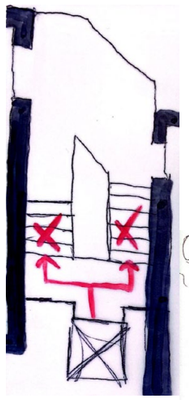
+ The staggered doors behind the central void provide good subtle privacy thresholds.

- The situation of the doors could discourage neighbourly interaction.

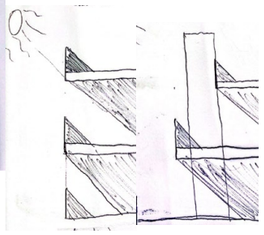
+ By decreasing the size of the void slightly, a better neighbourly interaction zone is provided.

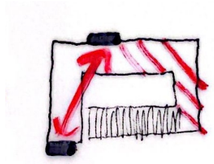
-3: Incorporating the Lift

- A lift is necessary for ease of use and accessibility, but how can it be best incorporated?



- The lift space can be used to admit light, while also blocking the less attractive south aspect to focus on the north aspect (castle).

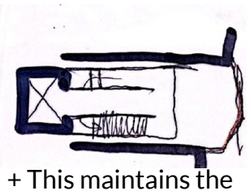




+ A linear stair would solve the aforementioned issue.

- It would serve to disconnect the neighbours.

-Longer corridors discourage interaction and provide an unhomely semantic.



+ This maintains the zone for neighbourly interaction.

- There is no central void, which serves to admit light and function as a centre for the micro-community.

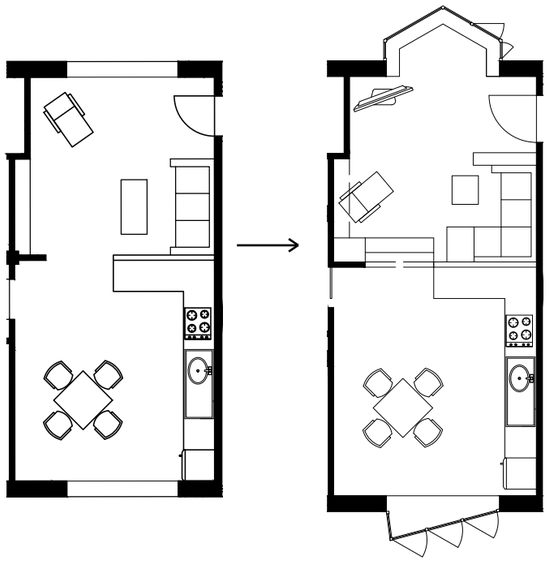
+ Good lift access

+ Neighbourly micro-community maintained

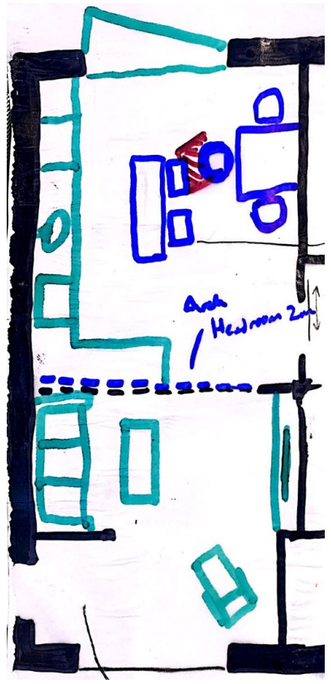
+ Further two-floor micro-community provided with intermediate landing seats

+ The boundary of the floor by the lift recesses each floor to admit more light.

Design Development - Living & Kitchen Space



-1: Potential strategies and considerations



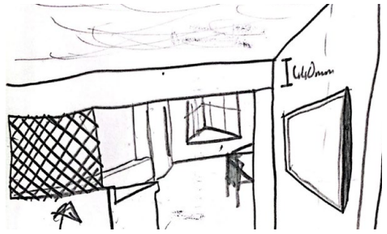
TV SPACE
+ Certainty

KITCHEN ISLAND
+ Certainty
- Doesn't co-exist with table well

WINDOW SEAT
+ Safe Space, offers withdrawal space

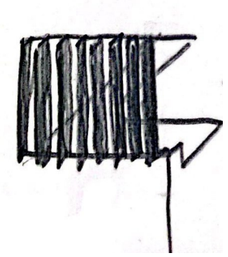
'ARCH'
+ Gradual Thresholds

-2: Living/Kitchen Threshold & Porosity Considerations



+ A porous, retractable screen between the living room and kitchen could provide a good sense of threshold, and be opened or closed according to the needs of the users.

- Offers a binary solution, open or closed, which is not very adaptible.

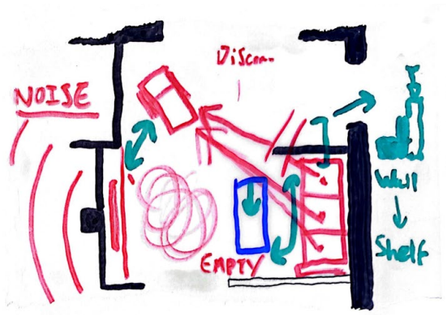


+ Louvres offer a similar kind of porosity.

+ They have a more high-tech and contemporary semantic, which lends itself better to my design intent.

+ The range of opening or closing is far greater, providing an in-finite range of solutions to the requirement of control.

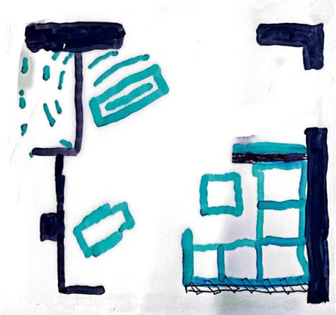
-3: Noise and Neighbouring Spaces



TV SPACE
-Neighboured stud wall with kids' bedroom

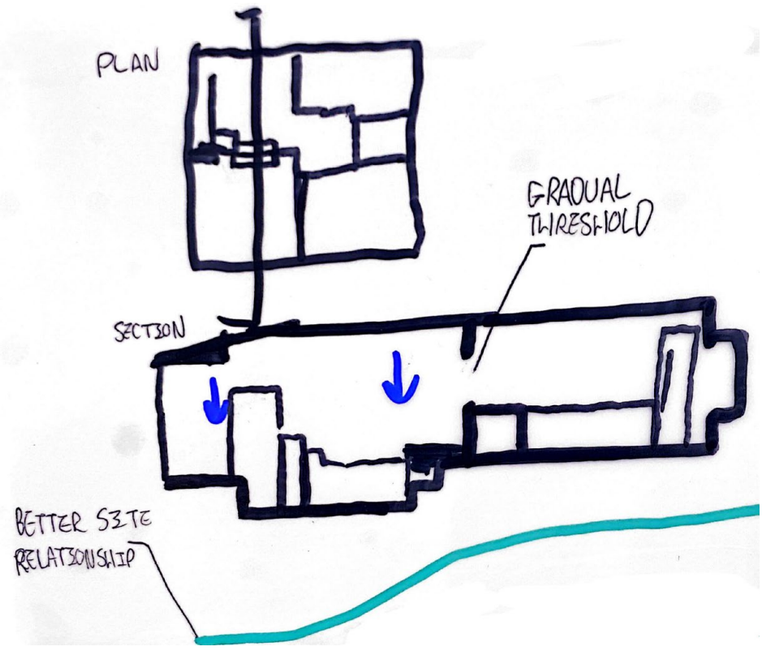
-Moved to more solid wall, sound is stifled

COUCH AND ARMCHAIR
-Broken line of sight, dis-connection



-Partition wall at entrance changed to shelf, lounger moved to nook-like area

-4: Site Relations and Potential for Greater Gradual Thresholds



AT2 - Structures | Spans, Dimensions and Diagrams

-KEY DIMENSIONS AND SPANS

-Columns
Floor to Ceiling: 2500mm
Floor Thickness: 360mm (approximate)

Assuming that h=2500mm, and based on a span-depth range of 7-14 (the compression from the heavy slate cladding means that a maximum h/d ratio of 14 is preferable)

d_{min} = 2.5/14 = 179mm

d_{max} = 2.5/7 = 357mm

Chosen column - UKC 203x203x86

I chose a slightly higher depth (222mm), as the **slate cladding is heavy** - so as a consequence, **more bending strength** is required to **prevent buckling**.

FINAL h/d = 11.26

-Beams

As defined by the columns, to maintain hegemony in my design it is preferable to use 222mm depth UKC.

Typical L/d range = 18-28, d=222

L_{min} = 3.99m
L_{max} = 6.22m

Desired span (0 intermediate columns in dwelling): 8.1m
L/d = 36.5

Interrupted beam (1 intermediate column halfway through): 3.9m
L/d = 17.7

While slightly atypical in terms of L/d, for my scheme it would be best to have spans of 3.9m, as I know for sure that my structure would work as a result.

8- Structural guidance for TIMBER obtained from Buxton, Pamela (EDITOR). 2021. METRIC HANDBOOK : Planning and Design Data. (S.L.: Routledge), p.6-8 - 6-10
9- Structural guidance for STEEL obtained from Littlefield, David (EDITOR). 2008. Metric Handbook : Planning and Design Data (London: Architectural) p. 36-38

Table XLII Steel – vertical support elements

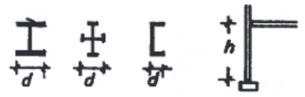
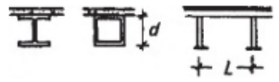
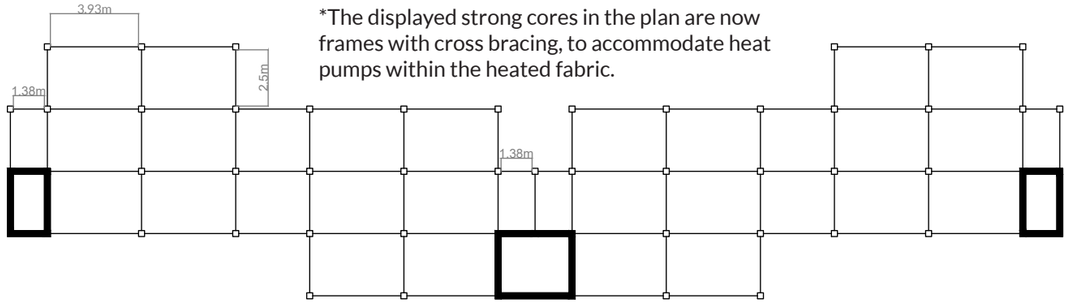
Element	Horizontal and vertical section	Typical heights (h) (m)	h/d between lateral supports	Critical factors for sizing	Remarks
Rolled steel of open section – single storey – multi-storey		2–8 2–4	20–25 7–18	Buckling (h/d > 14) Buckling and compression (h/d < 14)	Standard rolled sections usual but special shapes may be made by welding Connections easier with open rather than closed sections

Table XLIII Steel – floors

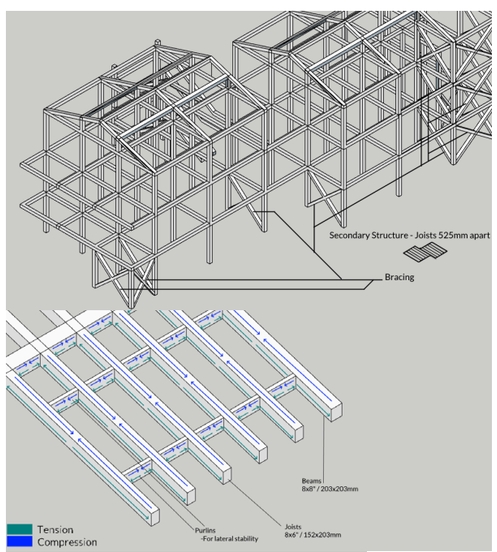
Element	Section and elevation	Typical depths (d) (mm)	Typical spans (L) (m)	Typical L/d	Critical factors for sizing/remarks
Wide flange rolled steel section		100–500	4–12	18–28	Deflection

-STRUCTURE DIAGRAMS WITH KEY ELEMENTS

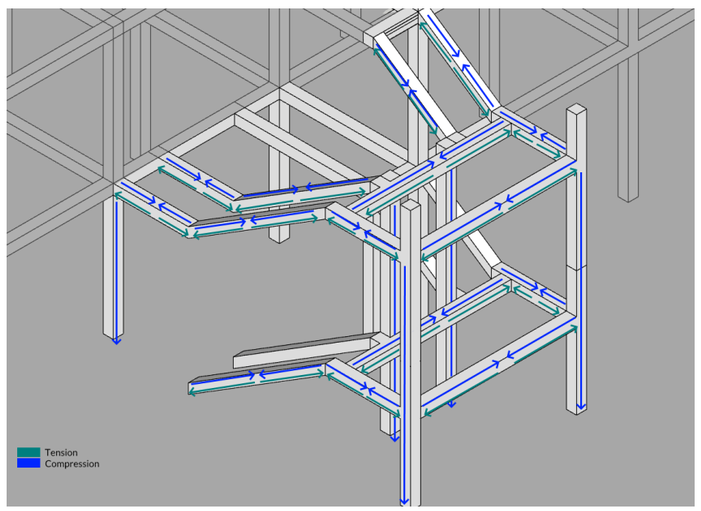


*The displayed strong cores in the plan are now frames with cross bracing, to accommodate heat pumps within the heated fabric.

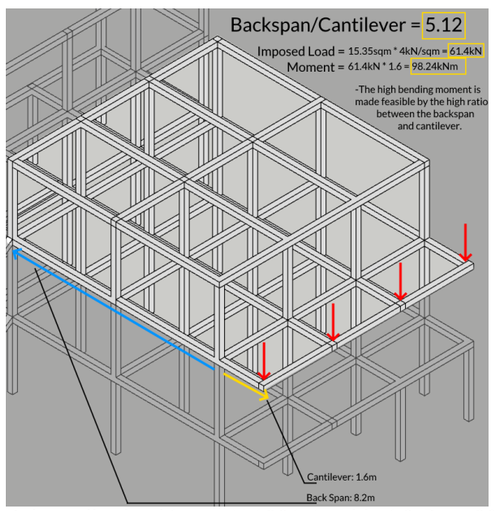
-General Diagram



-Load Paths - Stairways



-Cantilever: Balcony



Balcony live load from EN 1991-1, Table 6.2, Page 22

NOTE- Local Materials Habitat Preservation

I have since changed the construction type to a timber framed construction.

WHY TIMBER OVER STEEL-

-Less concrete is required in the footing (as it is more lightweight)

-Less embodied carbon despite lower recycling rate

-More locally sourcable

-Spans still achievable with similar dimensions

Joist Dimensions = 203x152mm (8"x6" Pine)
Joist L/d = 15.5 [Typ. Range 12-20]

Primary Column Dimensions = 203x203mm
Column H/d = 12.3 [Range 15-30, <15 for multi-storey]

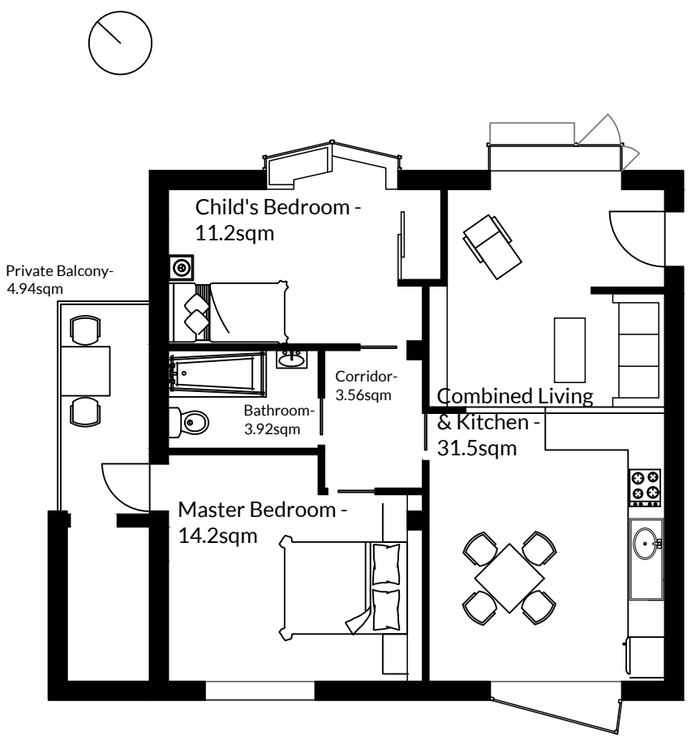
Secondary Column Dimensions = 154x102mm
Column H/d = 24.5 [Range 20-35]

AT2 - Space Standards and their application in my design

Aim-

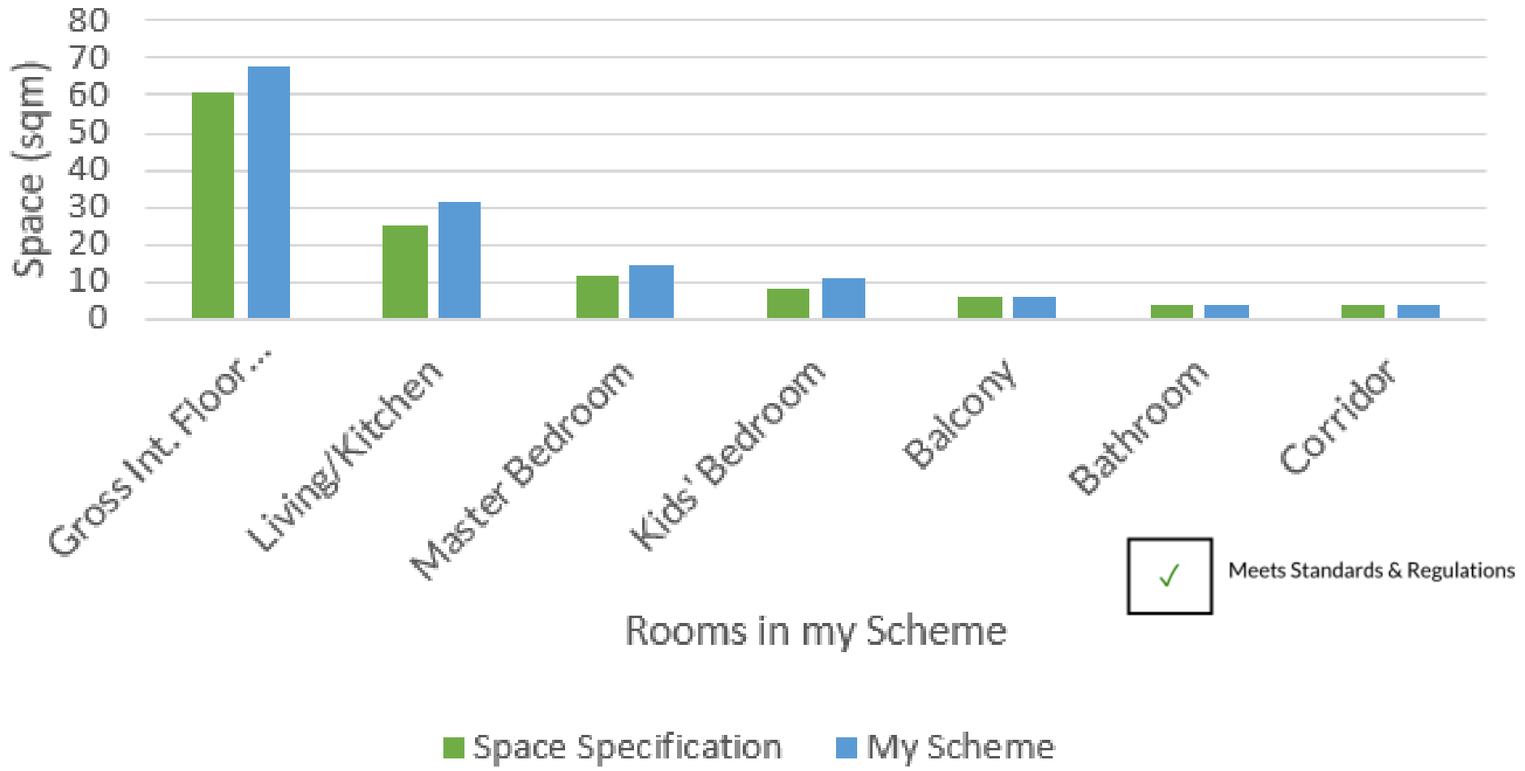
To create a dwelling that complies, within reason, to the London Housing Design Guide in terms of space requirements.

DWELLING PLAN 1:100-



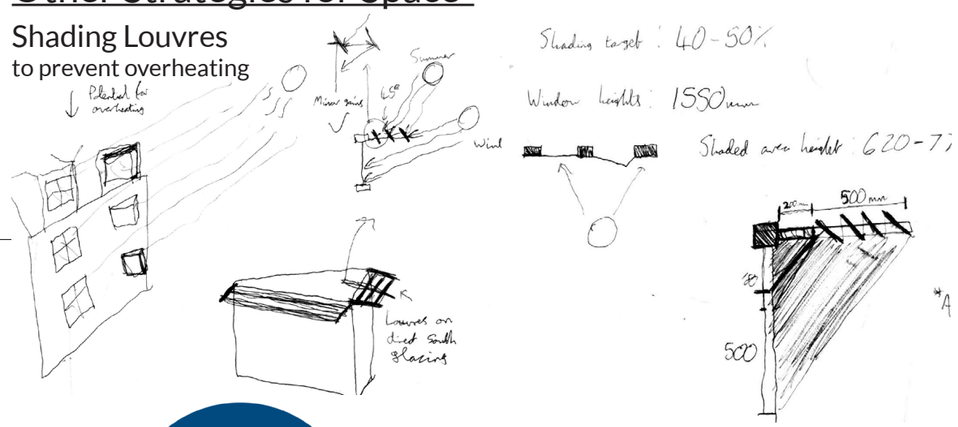
Gross Internal Floor Area- 67.8sqm

My Scheme vs Space Standards-



Other Strategies for Space-

Shading Louvres
to prevent overheating



London Housing Design Guide Requirements*-

GIA 61sqm

Living/Kitchen 25sqm

Main Bedroom 12sqm

Bedroom 2 8sqm

Balcony 6sqm

Bathroom 3.63sqm

Corridor 3.5sqm

*Bathroom and Corridor requirements derived from Approved Document M 2015, M4(2) p.17, M4(3) p41-45

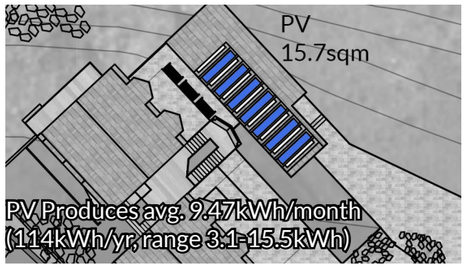
AT2 - Building Services, U-Values and Sustainability Appraisal

-SUSTAINABILITY APPRAISAL

	Upper Floor Wall		Lower Floor Wall		Floor	Roof
Assemblage	UK produced natural slate tiles on timber battens, breather membrane, cement-bonded particle board sheathing, insulation, light steel frame, vapour control layer, plasterboard on battens, paint	Clay tiles on timber battens, breather membrane, cement-bonded particle board sheathing, insulation, light steel frame, vapour control layer, plasterboard on battens, paint	Polymeric render system, breather membrane, cement-bonded particle board sheathing, insulation, light steel frame, vapour control layer, plasterboard on battens, paint	Brickwork, cement mortar, cement-bonded particle board sheathing, insulation, light steel frame, vapour control layer, plasterboard on battens, paint	Approved Document E – Floor Type 3.1A (with added insulation between joists to satisfy Passivhaus)	Timber trussed rafters and joists with insulation, roofing underlay, counterbattens, battens, UK-produced slate
Number	1206490018	1206490010	1206490007	1206470004	829910235	812410026
Summary	A	A	A+	A+	A+	A
Climate Change	A	A	A	A	A+	A+
Water Extraction	A+	A	A+	A+	A	A+
Mineral Resource Extraction	A	A+	A+	A+	A+	C
Ozone Depletion	A	B	A+	A	B	A
Human Toxicity	A+	A+	A+	A+	D	A+
Ecotoxicity to Land	A+	A	A+	A+	A	A+
Fossil Fuel Depletion	A+	B	A+	A+	C	A+
Waste Disposal	A+	A	A+	A+	B	A+
Kg CO2 eq [60yrs]	77.0	120.0	72.0	94.0	12.0	49.0

-BUILDING SERVICES

-Site

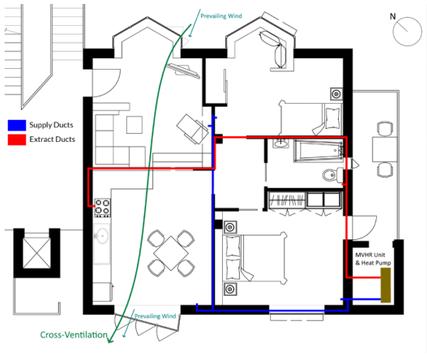


-Dwelling | Plan

Bathroom-
Underfloor Heat,
Minor Solar Gain

Living/Kitchen-
Radiator, Solar Gain,
Int. Gain

Corridor-
Underfloor Heat

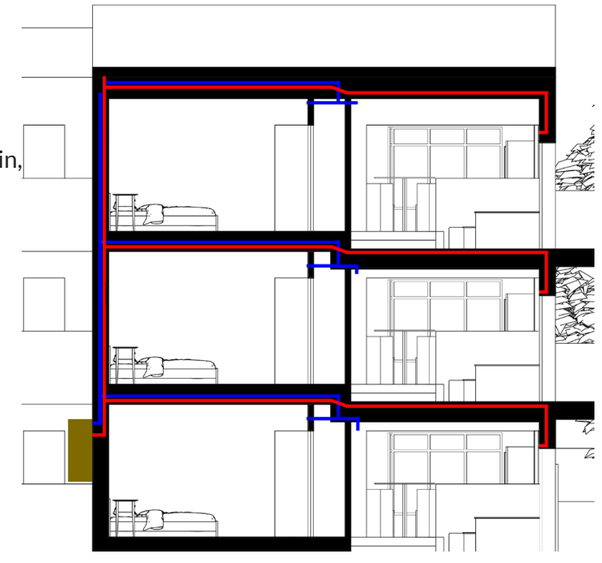


Bathroom-
1 Extract

Living/Kitchen-
1 Extract
2 Supply

Bedrooms-
1 Supply

-Section



1 MVHR Unit & Ground Source Heat Pump/3 Dwellings

-U-VALUES

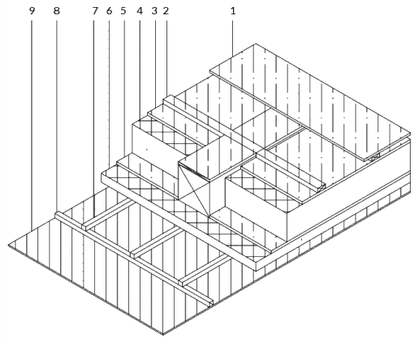
-WALL

Part L max. U-value = 0.18 W $m^{-2} K^{-1}$

Passivhaus Guidance = 0.10 - 0.15 W $m^{-2} K^{-1}$

U-value = 0.10 W $m^{-2} K^{-1}$

Material (Inside > Out)	Thickness	Conductivity	R-value
Inside Air Film	0	-	0.12
1- Plasterboard https://www.wickes.co.uk/Knauf-Plasterboard-Square-Edge---12-5mm-x-1-2m-x-2-4m/p/104123	12.5	0.19	0.007
2- Timber Battens	25	7.69	0.192
Vapour Control Layer	0	-	0
3- Cement-bonded Particle Board Sheathing between timber studs https://www.insulationshop.co/10mm_rcm_cemboard.html	15	0.26	0.058
4- 160mm Recticel Eurothane GP Rigid Insulation Board (600x2440), between timber studs	160	0.022	7.27
5- Cement-bonded Particle Board Sheathing	15	0.26	0.058
6- 50mm Recticel Eurothane GP Rigid Insulation Board (600x2440)	50	0.022	2.25
7, 8- Aluminium Clip Channel Battens and Counter-Battens	50	26.3	0.002
9- CUPACLAD Vanguard 201 Slate Tiles	7.5	2.01	0.003
Outside Air Film	0	-	0.12
Total	335		10.1



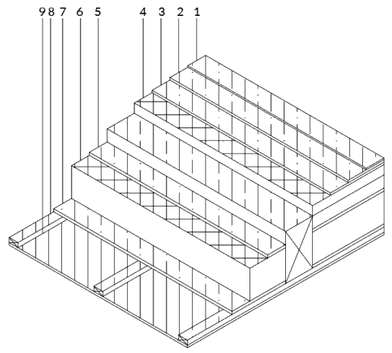
-FLOOR

Part L max. U-value = 0.13 W $m^{-2} K^{-1}$

Passivhaus Guidance = 0.10-0.15 W $m^{-2} K^{-1}$

U-value = 0.096 W $m^{-2} K^{-1}$

Material (Inside > Out)	Thickness	Conductivity	R-value
Inside Air Film	0	-	0.12
8mm EGGER Laminate Flooring	8	8.75	0.07
JCW Impactalay Acoustic Floor Insulation	12	5.83	0.07
Chipboard Floor Deck	12	9.44	0.113
50mm Recticel Eurothane GP Rigid Insulation Board (600x2440), between timber bearers	50	0.022	2.25
Air gap with timber joist	64	7.69	0.008
Cement-bonded Particle Board Sheathing https://www.insulationshop.co/10mm_rcm_cemboard.html	15	0.26	0.058
160mm Recticel Eurothane GP Rigid Insulation Board (600x2440), between timber joists	160	0.022	7.27
Cement-bonded Particle Board Sheathing	15	0.26	0.058
25mm Timber Battens	25	7.69	0.192
12mm Plasterboard	12.5	0.19	0.007
Outside Air Film	0	-	0.12
Total	374.5		10.4



-WINDOWS

Passivhaus Guidance = 0.8 W $m^{-2} K^{-1}$

Chosen Window = Olympic Glass **Triple Glazing**

U-value = 0.8 W $m^{-2} K^{-1}$ | SHGC = 0.609

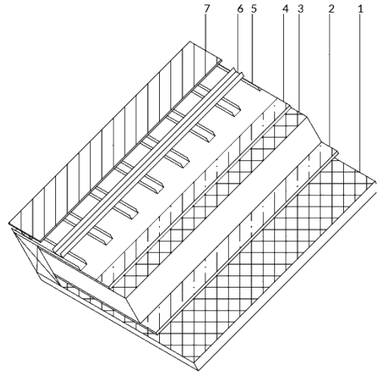
-ROOF

Part L max. U-value = 0.13 W $m^{-2} K^{-1}$

Passivhaus Guidance = 0.10-0.15 W $m^{-2} K^{-1}$

U-value = 0.101 W $m^{-2} K^{-1}$

Material (Inside > Out)	Thickness	Conductivity	R-value
Inside Air Film	0	-	0.12
1- 50mm Recticel Eurothane GP Rigid Insulation Board (600x2440)	50	0.022	2.25
2- Cement-bonded Particle Board Sheathing	15	0.26	0.058
3- 160mm Recticel Eurothane GP Rigid Insulation Board (600x2440), between timber studs	160	0.022	7.27
4- Cement-bonded Particle Board Sheathing	15	0.26	0.058
5, 6- Aluminium Clip Channel Battens and Counter-Battens	50	26.3	0.002
7- CUPACLAD Vanguard 201 Slate Tiles	7.5	2.01	0.003
Outside Air Film	0	-	0.12
Total	297.5		9.88



-Justification of choice

-Lower light transmittance provides better sensory environment

-Excellent thermal performance outweighs cost

10- Sustainability guidance from BRE Green Guide

11- Photovoltaic output data calculated on https://re.jrc.ec.europa.eu/pvg_tools/en/tools.html#PVP on 2023-01-06

AT2 - Internal Comfort and Ventilation, Balance Calculation

AIMS: To have a building that requires as little mechanical heating/cooling as possible whilst being internally comfortable
To stay within the RIBA 2030 Challenge target of under 35 kWh/sqm/y energy used, in the energy balance.

✓ Meets Standards & Regulations

Room	Volume (m3)	Maximum occupancy	WINTER- Average dry bulb temp. (C)	WINTER- Indoor comfort temperature (C)*	SUMMER- Average dry bulb temp. (C)	SUMMER- Indoor comfort temperature (C)*	Direct Heating – Winter (hours)	Direct Cooling – Winter (hours)	Direct Heating – Summer (hours)	Direct Cooling – Summer (hours)
Living / Kitchen	78.8	3	7.7	20-21	13.2	22-25	3069	0	1196	0
Corridor / Sensory Space	8.9	1	7.7	19-24	13.2	21-25	2974	0	1162	0
Master Bedroom	35.5	2	7.7	17-19	13.2	23-25	2791	0	1239	0
Kids' Bedroom	28	1	7.7	17-19	13.2	23-25	2791	0	1239	0
Bathroom	9.8	1	7.7	20-22	13.2	23-25	2974	0	1239	0
Storage and Service	8.5	1	7.7	19-21	13.2	21-25	2974	0	1162	0

Room	Volume (m3)	Maximum occupancy	Suggested air supply rate (L s-1)	Conversion to air changes per hour (ach)	Avg Winter inside/outside temperature difference (C)	Avg Summer inside/outside temperature difference (C)	Winter Qv (kW)	Summer Qv (kW)
Living / Kitchen [IEQ II]	78.8	3	60 (based on kitchen)	2.74	12.8	10.3	0.921	0.741
Corridor / Sensory Space [IEQ III]	8.9	1	1.5 (Derived from Table B.11 EN 16798-1)	0.607	13.8	9.8	0.025	0.018
Master Bedroom [IEQ II]	35.5	2	ACH specified in CIBSE Guide A Table 1.5	1	10.3	10.8	0.122	0.128
Kids' Bedroom [IEQ II]	28	1	ACH specified in CIBSE Guide A Table 1.5	1	10.3	10.8	0.096	0.101
Bathroom [IEQ III]	9.8	1	ACH specified in CIBSE Guide A Table 1.5	5	13.3	10.8	0.217	0.176
Storage and Service [IEQ III]	8.5	1	1.5 (Derived from Table B.11 EN 16798-1)	0.635	12.3	9.8	0.022	0.018

12- Comfort temperatures: Chartered Institution Of Building Services Engineers. 2019. Environmental Design : CIBSE Guide A (London: Chartered Institution Of Building Services Engineers), pp. 1–101–13 (Table 1.5)
13- Ventilation requirements obtained from:
Chartered Institution Of Building Services Engineers. 2019. Environmental Design : CIBSE Guide A (London: Chartered Institution Of Building Services Engineers), pp. 1–101–13 (Table 1.5)
British Standards Institution. 2019. EN 16798-1:2019 (London: BSI Standards Limited), p. 54 (Table B.11)
14- RIBA Challenge 2030 target obtained from https://www.architecture.com/about/policy/climate-action/2030-climate-challenge accessed 2023-01-06

BALANCE EQUATION: Qf + Qv - Qs - Qint = Qmec

Avg U-value = $0.7(39.36/413.72)+0.1(374.36/413.72) = 0.157\ W\ m^{-2}\ K^{-1}$

Qf = Total U-value * Fabric Area * (Inside Temp. - Outside Temp.)
Qf Winter = 0.157*413.72*(19.8-7.7)
= 0.785kWh = 3580kWh/yr
Qf Summer = 0.157*413.72*(23.6-13.2)
= 0.676kWh = 2960kWh/yr

Qv = (Air Changes per Hour * Volume * (Inside Temp. - Outside Temp.)) / 3
Qv Winter Total = 1.40kWh = 6,130kWh/yr
Qv Summer Total = 1.18kWh = 5,170kWh/yr

Qs = Area of windows * Solar radiation flux density * Solar heat gain coefficient
Qs Total = (0.71 * (20.94/39.36) + 0.0277 * (0.72/39.36) + 1.64 * (17.7/39.36)) * 0.609
= 0.682kWh = 5,974kW/yr

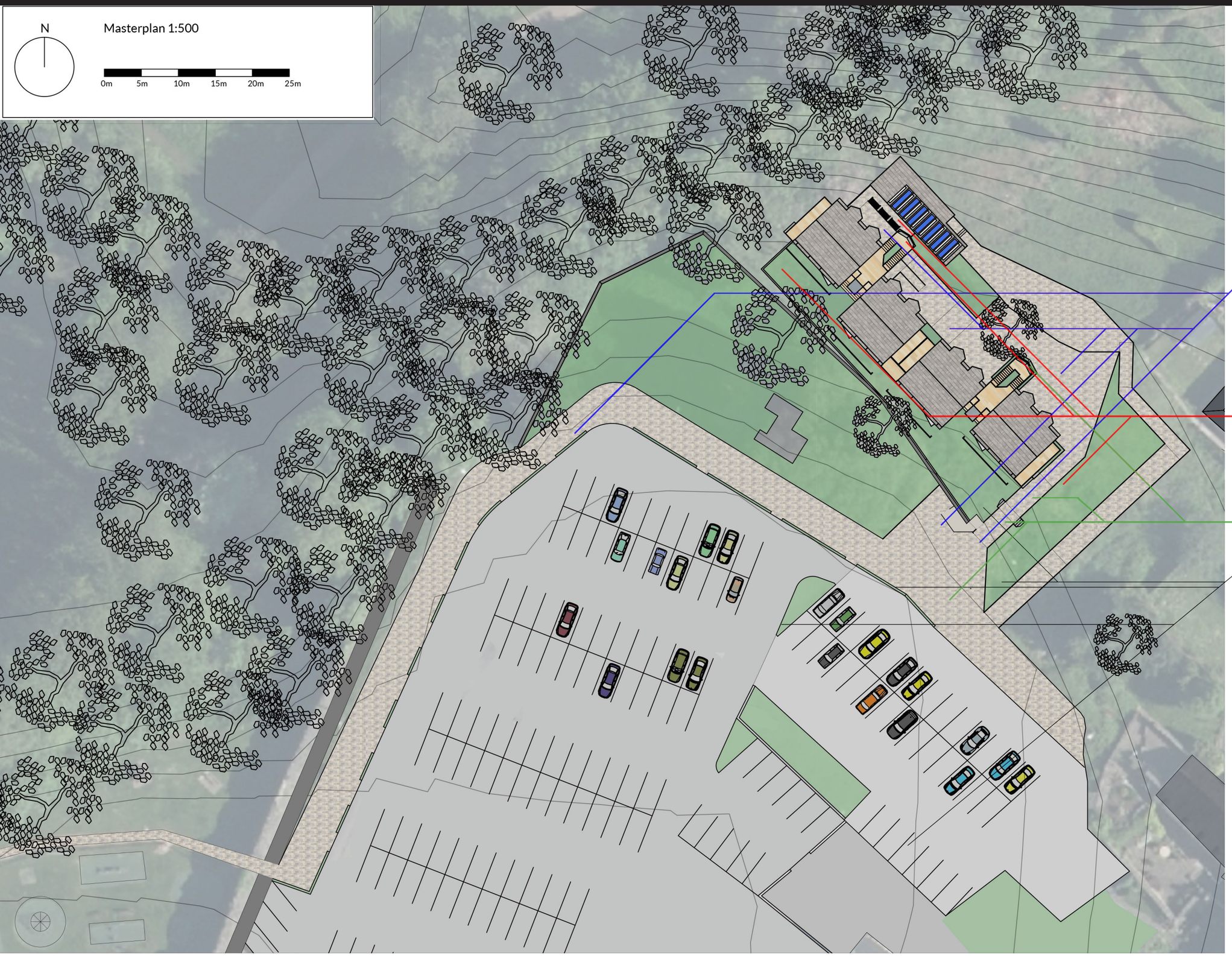
Qint =
Qint Winter Total =
1 met = 17.5W
Activity levels =
31.5W (bedrooms) | 47.3W (living spaces)
(31.5+47.3)= 78.8W = 0.079kWh
= 346kWh/yr

Qint Summer Total =
1 met = 17.5W
Activity levels=
31.5W (bedrooms) | 45.5W (living spaces)
(31.5+45.5)= 77W = 0.077kW
= 337kWh/yr

TOTAL DEMAND = 11,183kWh/yr | TOTAL GIA = 813.6sqm | Qpv = 114kWh/yr

Qmec demand (excl. solar panel gains) = 13.6kWh/sqm/yr

Final Drawings - Master Plan



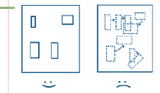
2- Gradual Thresholds

When entering the private area, the open spaces get smaller and smaller, gradually introducing the autistic child to the next environment. The hedges that line the path begin the transition, at 1.2m tall, and gradually get longer and less porous.

3- Safe Spaces

The scheme offers a plethora of retreat spaces, ranging from green areas to solid ground, and from open yet isolated spaces to closed lay-bys.

4- Certainty

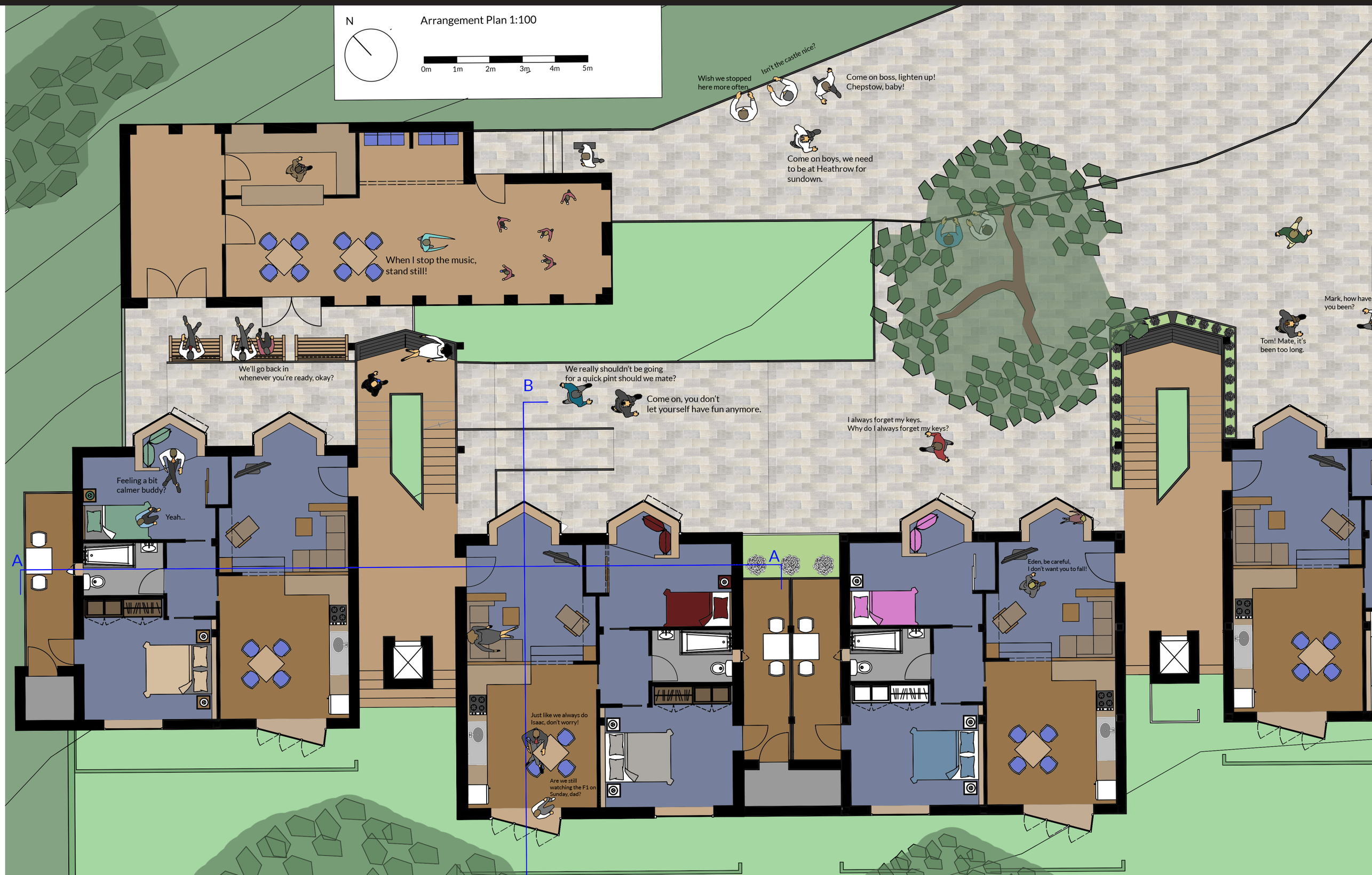


The ramps into the private area are made of local solid stone slabs, and have a constant gradient. The texture and feel of the ground is always similar to expectation.

Habitat Preservation

A range of green spaces and green bridges have been provided, to minimise disturbance to local ecosystems.

Arrangement Plan



Section Drawings

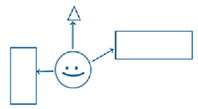
Sec. A-A

Sec. B-B

Sections 1:100

0m 1m 2m 3m 4m 5m

1- Control



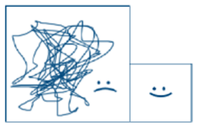
Louvres can be opened or closed to further separate or join the living and kitchen areas, according to the needs of the child or the family as a whole.

2- Gradual Thresholds

The ceiling height from the personal bedroom, through the corridor (which behaves as a safe buffer space), to the living room gradually increases, reinforcing the gradual thresholds.

The step down to the living room offers a gradual introduction to going from the private to the semi-private/community.

3- Safe Spaces



The windows offer safe spaces through distinct sensory environments - one with castle views, one with a seat that floats above nature. Furthermore, the corridor offers a quieter sensory environment, as an easy retreat. The storage space in the child's bedroom offers a similar provision.

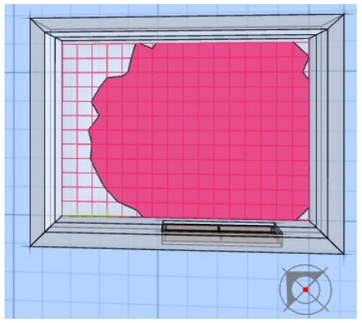
La Tourette - Private-Public Transition

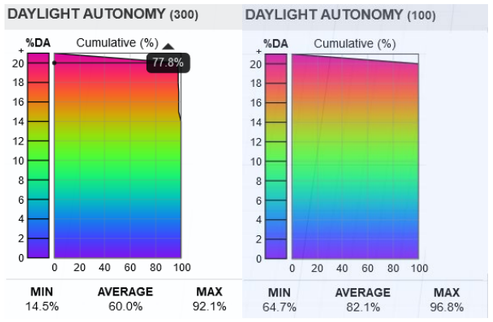
Deeper Red = More Public

AT2 - Daylighting Analysis

-TARGET | At least 50% average DA300

-Parents' Bedroom

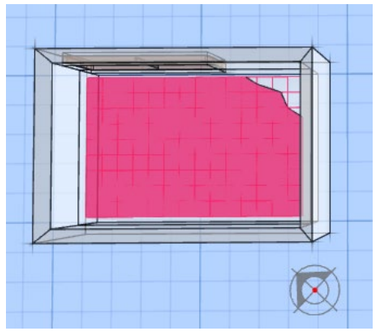


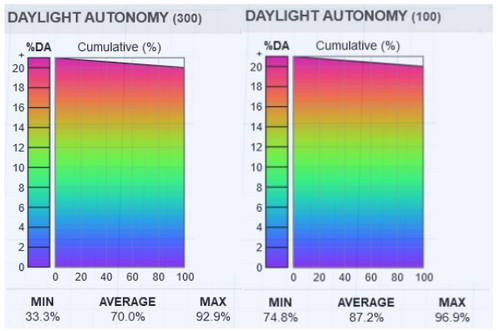


Avg. DA300 = 60.0%*
Avg. DA100 = 82.1%

*Some of these rooms are likely to be affected by overshadowing from a tree on the site - however, this should have only a small impact on DA300.

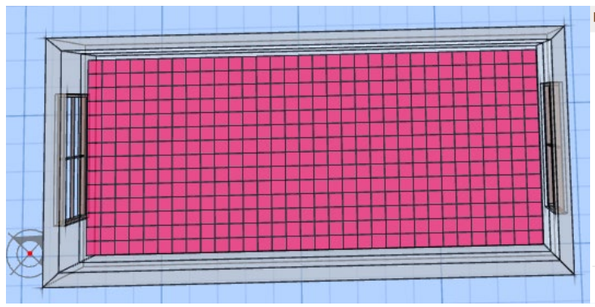
-Kids' Bedroom

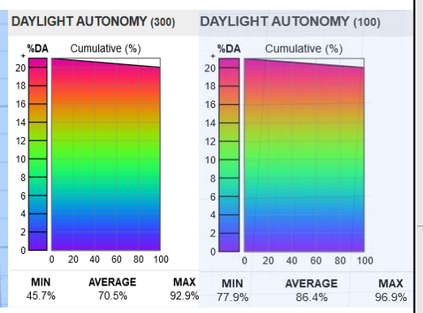




Avg. DA300 = 70.0%
Avg. DA100 = 87.2%

-Living & Kitchen Space

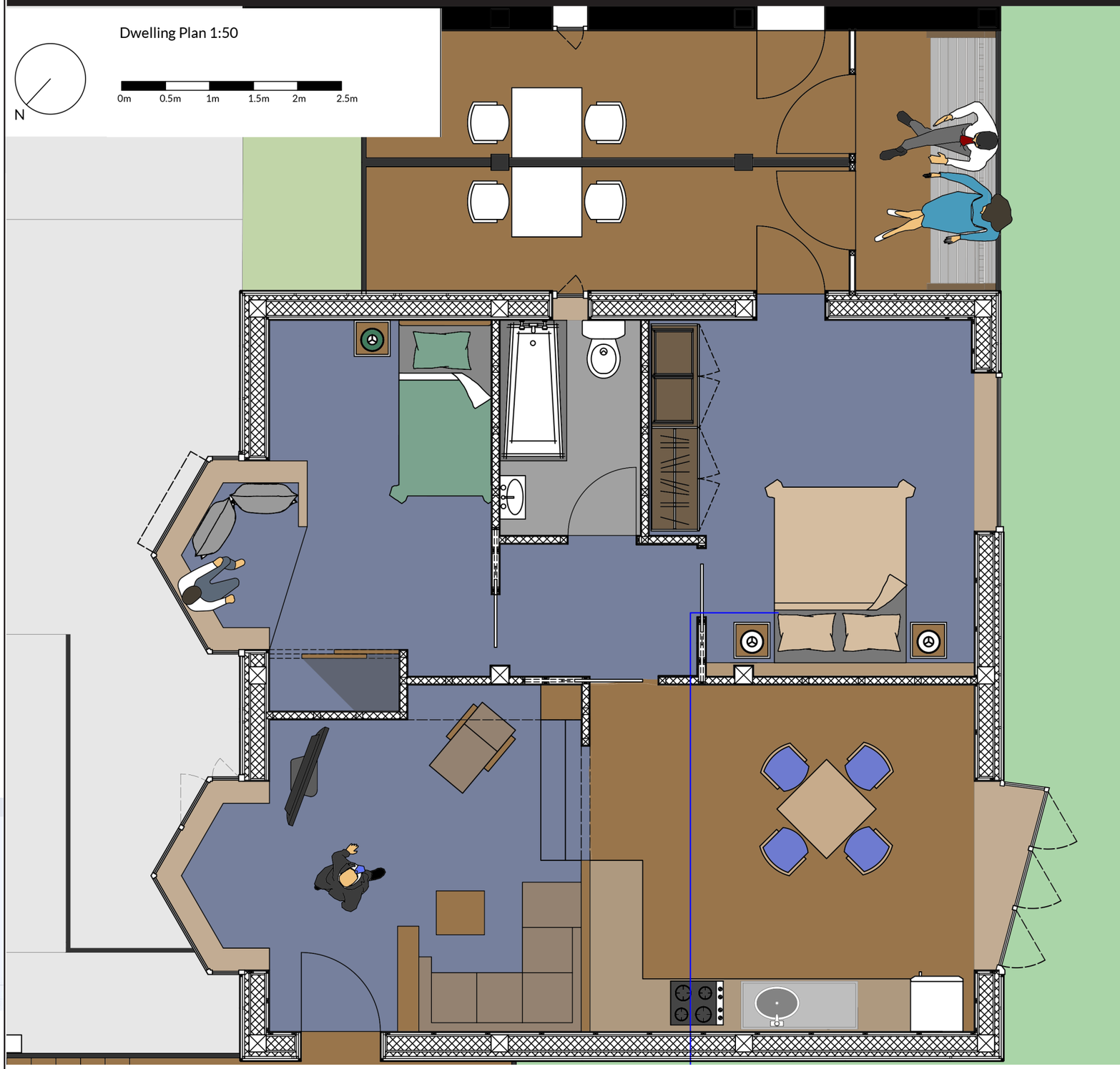




Avg. DA300 = 70.5%
Avg. DA100 = 86.4%

-CONCLUSION | While EN 17037 suggests 50% DA300 and 95% DA100, which is only half-satisfied by my scheme, I believe that the DA300 metric is more important to satisfy - which all inhabitable spaces do.

Dwelling Plan



15- Daylight analysis performed on https://drajmarsh.bitbucket.io/daylight-room.html

Final 3D Model & Renders

-GENERAL SCHEME

-CASTLE VIEWPOINT

-NEIGHBOURLY INTERACTION PLACE

-ENTRANCE - PRIVATE COMMUNITY

-COMMUNITY ZONE - OPEN

-GREEN SPACE - ENCLOSED

-ENTRANCE - PUBLIC CASTLE VIEWPOINT

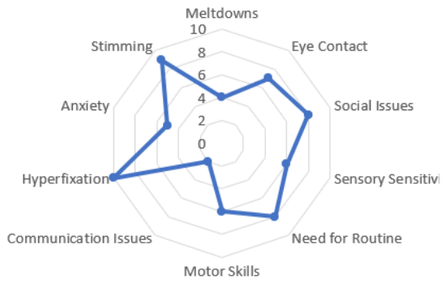
-GREEN SPACE - OPEN

-EDUCATIONAL SPACE COURTYARD ENTRANCE

The Space “in vivo” - Different Autistic children & how this space helps them

POTENTIAL USERS

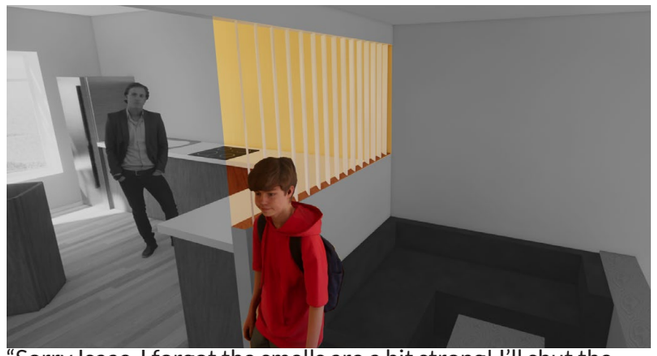
-Isaac
10 years old
Prefers quiet spaces
Verbal, hyperfixated on special interests



-Spaces with opportunities for retreat are preferable.

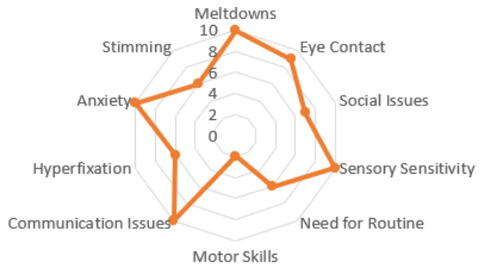
“I want to be a part of the fun but it’s too loud... I know! I’ll go outside for 5 minutes. I can still see in but I won’t be overwhelmed.”

-Control is key, in the same vein as the need for routine.



“Sorry Isaac, I forgot the smells are a bit strong! I’ll shut the louvres now.”

-Eden
4 years old
Highly anxious, requires constant care
Non-Verbal



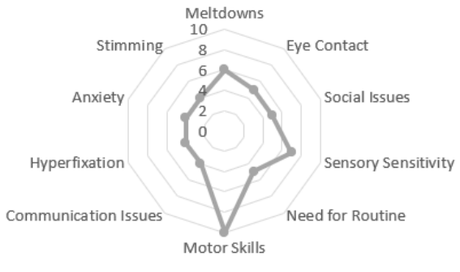
-More enclosed safe spaces are absolutely necessary.

“I know it’s really noisy in there - we’ll go back in when dinner’s ready. You’re okay in here. It’s quieter, see?”

-Gradual Thresholds are required to alleviate anxiety.

“We’ll go one step at a time, if you start to feel anxious we can stop, okay?”

-Thomas
6 years old
Delayed motor skills
High sensory sensitivity



-Larger open spaces, within reason, are not an issue.

“It is a bit noisy down there isn’t it? That’s much better - and we can still wave to mum! It’s just like being in the castle here, isn’t it?”

-Easy spaces to retreat to are necessary.

19- Metrics for identifying symptoms of Autism from https://www.psychologytoday.com/gb/blog/women-autism-spectrum-disorder/202208/autistic-linear-spectrum-pie-chart-spectrum

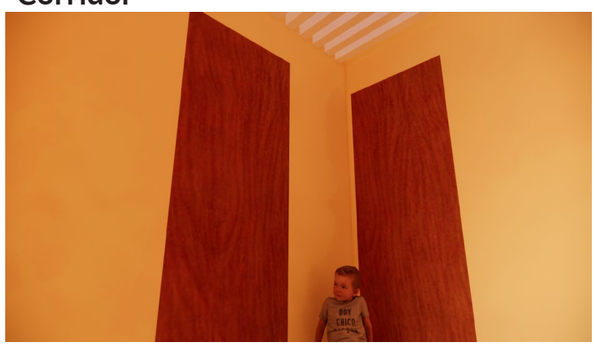
Interior Renders

-Renders

-Living Space

-Kitchen

-Corridor

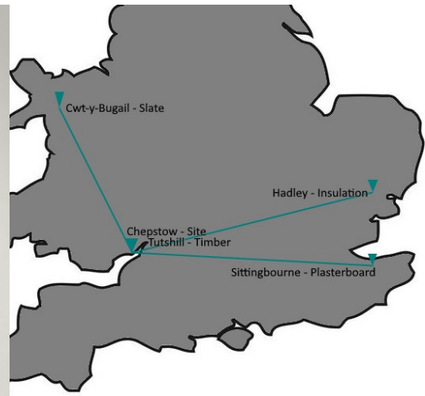


-Kids' Bedroom

20- Slate sustainability information obtained from https://www.buildingcentre.co.uk/news/articles/what-makes-slate-a-great-sustainable-building-material accessed 2023-01-07
21- Timber lifespan information researched from https://eurodita.com/how-long-do-timber-frame-houses-last-in-the-uk/ accessed 2023-01-07
22- Plasterboard/Gypsum sustainability research from https://gpda.com/sustainability/ accessed 2023-01-07
23- PIR Insulation research from https://en.wikipedia.org/wiki/Polyisocyanurate accessed 2023-01-07

Materials

-Tectonic Model 1:10



SLATE
Source & Distance -
>Welsh Slate, Cwt-y-Bugail, 172km

Sustainability -
>Extraction- Does not require chemical treatment
>Use- Requires little maintenance, no chemical treatment.
>Lifespan- 100+ years

>End of Life- Can be recycled

PLASTER BOARD
Source & Distance -
>Knauf Plasterboard UK, Essex, 239km

Sustainability -
>Extraction- Made of Calcium Sulphate mined or recycled in the UK.
>Use- Low indoor air quality impact through VOCs, reduces Qf.
>Lifespan- 50+ years

>End of Life- Broken down and recovered Calcium Sulphate remade into plasterboard.

TIMBER
Source & Distance -
>Wye Valley Timber, Tutshill, 1km

Sustainability -
>Extraction- From FSC certified forests, tree is replanted.
>Use- Carbon sink, low embodied CO2.
>Lifespan- Usually 25-30yrs before maintenance.

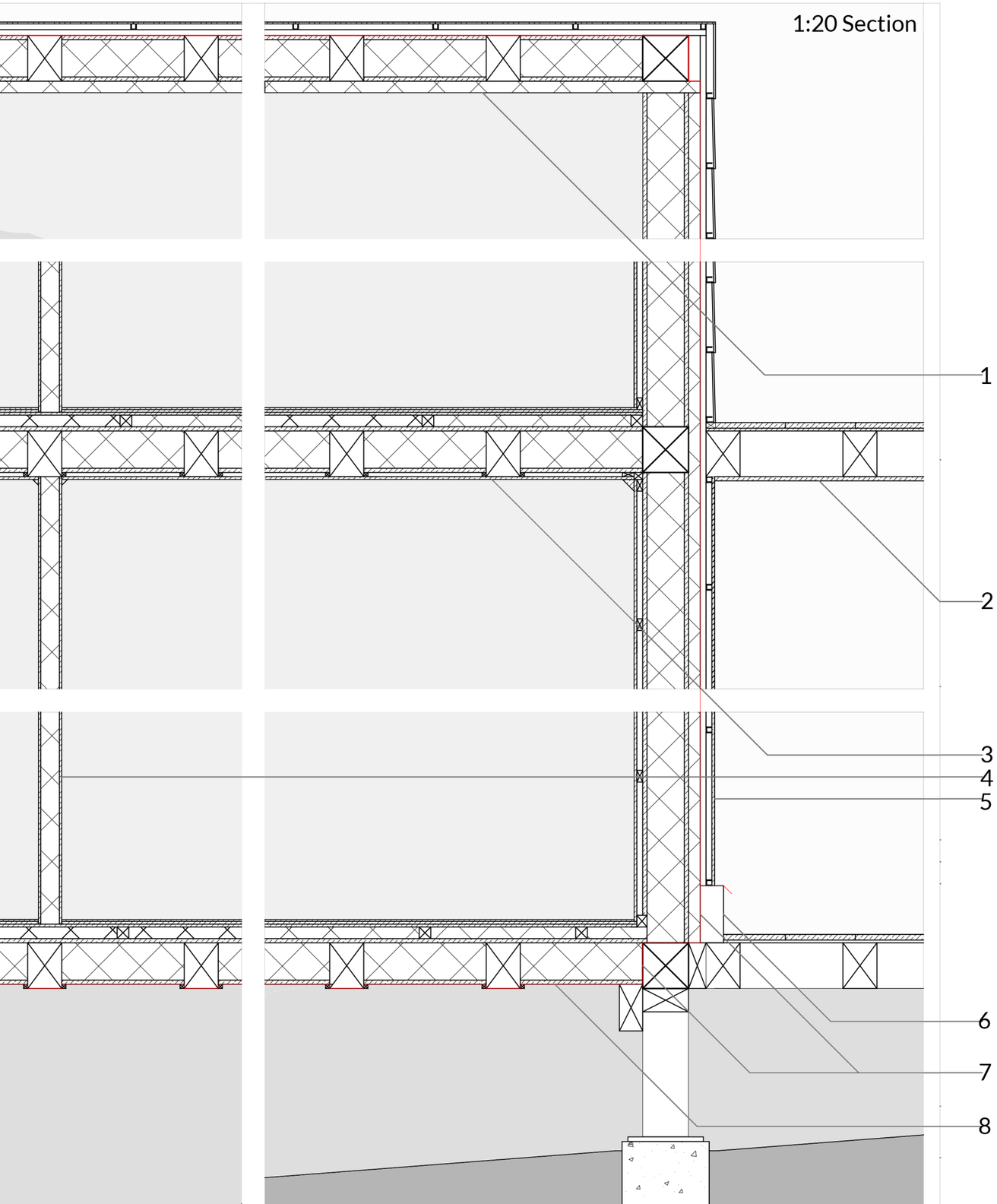
>End of Life- Recycled into various manufactured boards

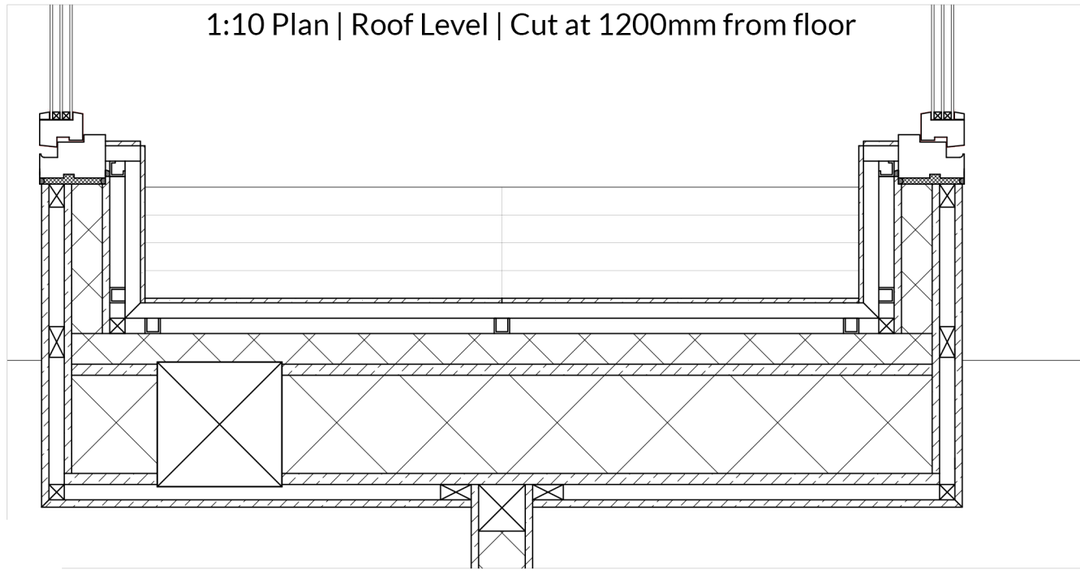
PIR INSULATION
Source & Distance -
>Celotex, Hadley, 253km

Sustainability -
>Extraction- High temperature reaction with catalyst.
>Use- Extremely high thermal performance, lower power demand from National Grid
>Lifespan- 25+ years before checks for defects

>End of Life- Can be professionally recycled and reused.

AT2 - Details





1- Roof: 7.5mm CUPACLAD Vanguard 201 Slate Tiles, Aluminium Clip Channel Battens and Counter-Battens, Novia Black Roof Breather Membrane, 18mm Cement-bonded Particle Board Sheathing, 160mm Recticel Eurothane GP Rigid Insulation Board between 8x6" timber joists spaced 525mm apart, 18mm Cement-bonded Particle Board Sheathing, 50mmRecticel Eurothane GP Rigid Insulation Board

2- External Floor: 300x300x24mm Wickes Acacia Garden Deck Tile, 12mm Marine Plywood floor deck, 8x6" timber joists spaced 440mm apart, 18mm Marine Plywood

3- Internal Floor: 8mm EGGER Laminate Flooring, 12mm JCW Impactalay Acoustic Floor Insulation, 12mm Chipboard floor deck, 50mm Recticel Eurothane GP Rigid Insulation Board between timber bearers, 18mm Cement-bonded Particle Board Sheathing, 160mm Recticel Eurothane GP Rigid Insulation Board, 18mm Cement-bonded Particle Board Sheathing (sheathed insulation system between 8x6" timber joists spaced 525mm apart),25mm timber battens, 12mm plasterboard.

4- Internal Wall: 12mm plasterboard, 75mm Recticel Eurothane GP Rigid Insulation Board, 12mm plasterboard.

5- External Wall: Ground Floor - 12mm Render Board,, Upper Floors 7.5mm CUPACLAD Vanguard 201 Slate Tiles
50mm total Aluminium Clip Channel battens and counter-battens, Waterproof Membrane, 50mm Recticel Eurothane GP Rigid Insulation Board, 18mm Cement-bonded Particle Board Sheathing, 160mm Recticel Eurothane GP Rigid Insulation Board, 18mm Cement-bonded Particle Board Sheathing, 25mm Battens, 12mm Plasterboard

6- 100x215x440mm Thermalite Shield Aircrete Block 3.6N

7- Damp Proof Course over thermal concrete block & frame

8- 8mm EGGER Laminate Flooring, 12mm JCW Impactalay Acoustic Floor Insulation, 12mm Chipboard floor deck, 50mm Recticel Eurothane GP Rigid Insulation Board between timber bearers, 18mm Cement-bonded Particle Board Sheathing, 160mm Recticel Eurothane GP Rigid Insulation Board, 18mm Cement-bonded Particle Board Sheathing (sheathed insulation system between 8x6" timber joists spaced 525mm apart), Damp Proof Membrane.

Bibliography

AD2 & AT2 (Blue header)

1- Data obtained from https://citypopulation.de/en/uk/wales/admin/monmouthshire/W04000778__chepstow/
2- Data processed in Climate Consultant 6.0, using BRISTOL 2007-2021 file from https://climate.onebuilding.org/WMO_Region_6_Europe/GBR_United_Kingdom/index.html
3- Wind Rose from https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/chepstow_united-kingdom_2653256
4- Maps obtained from DIGIMAP Edina OS Roam
5- Walking speeds from https://www.researchgate.net/figure/Average-walking-variables-for-each-age-group-at-initial-and-final-baseline-conditions_fig6_277413838
6- Satellite image obtained from Edina Digimap Data Download
7- Illustration of site originally by Freya Kirby (Studio 2, BSc 2, WSA, 2022-23), edited by self with express permission
8- Data processed in QGIS v3, obtained from Digimap Society Data Download
9- Downloaded from https://www.nomisweb.co.uk/query/construct/submit.asp?forward=yes&menuopt=201&subcomp= accessed 2023-01-08
10- Family statistics obtained from https://www.nomisweb.co.uk/census/2011/QS118UK/view/1946157403?cols=measures accessed 2023-01-08
11- Statistic from https://www.hogrefe.com/uk/article/autism-in-the-uk-prevalence-assessment-and-the-impact-of-the-covid-19-pandemic accessed 2023-01-08
12- Mostafa, M, 2021 "The Autism Friendly University Design Guide", Autism Friendly DCU, Dublin, Ireland, p23, 55, 58, 64, 69, 77, 92, 93
13- Henry, Christopher N. 2011. 'Designing for Autism: Spatial Considerations', ArchDaily <https://www.archdaily.com/179359/designing-for-autism-spatial-considerations>
14- Cameron Linden Green, Couvent de la Tourette Exterior (2022), Taken by self on site
15- Willem Diepraam, Centraal Beheer Apeldoorn (1968-72), from Dezeen article [https://www.dezeen.com/2011/12/06/key-projects-by-herman-hertzberger/]
16- By Diego Delso, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=52486625
17- Section sketched over obtained from drawing by Samuel Ludwig, http://www.greatbuildings.com/cgi-bin/gbc-drawing.cgi/Convent_of_La_Tourette.html/La_Tourette_Section_A.jpg
18- Plan sketched over obtained from plans by Herman Hertzberger available on AAH, https://www.ahh.nl/index.php/en/projects2/12-utiliteitsbouw/85-centraal-beheer-offices-apeldoorn
19- Metrics for identifying symptoms of Autism from https://www.psychologytoday.com/gb/blog/women-autism-spectrum-disorder/202208/autistic-linear-spectrum-pie-chart-spectrum
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1-BS EN 17037:2018+A1:2021 Daylight in buildings, p16 (Table A.1)
2-Stair precedent Image from https://www.viewrail.com/gallery/brazilian-cherry-and-cable-railing-floating-stairs-fit-for-an-engineer/ accessed 2022-11-18
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4- Noise decay equation obtained and adapted from https://www.wkcgroup.com/tools-room/inverse-square-law-sound-calculator/ , accessed 2023-01-07
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8- Structural guidance for TIMBER obtained from Buxton, Pamela (EDITOR). 2021. METRIC HANDBOOK : Planning and Design Data. (S.L.: Routledge), p.6-8 - 6-10
9- Structural guidance for STEEL obtained from Littlefield, David (EDITOR). 2008. Metric Handbook : Planning and Design Data (London: Architectural) p. 36-38
10 Balcony live load from EN 1991-1, Table 6.2, Page 22
11- Sustainability guidance from BRE Green Guide
12- Photovoltaic output data calculated on https://re.jrc.ec.europa.eu/pvg_tools/en/tools.html#PVP on 2023-01-06
13- Comfort temperatures: Chartered Institution Of Building Services Engineers. 2019. Environmental Design : CIBSE Guide A (London: Chartered Institution Of Building Services Engineers), pp. 1–101–13 (Table 1.5)
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British Standards Institution. 2019. EN 16798-1:2019 (London: BSI Standards Limited), p. 54 (Table B.11)
15- RIBA Challenge 2030 target obtained from https://www.architecture.com/about/policy/climate-action/2030-climate-challenge accessed 2023-01-06
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3.1, 8.1 - https://www.wood2u.co.uk/laminate/by-range/egger-basic-8mm-ac4.html accessed 2023-01-08
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3.9, 4.1, 4.3, 5.9 - https://www.travisperkins.co.uk/standard-plasterboard/british-gypsum-gyproc-wallboard-square-edge-2400mm-x-1200mm-x-12-5mm/p/760054 accessed 2023-01-08

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Software used - AutoCAD, SketchUp, Climate Consultant 6.0, Opaque 3.0

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