

EMBODIED CARBON - STRUCTURAL STRATEGY TESTING

5 structural options were analysed for the proposal, using the following parameters to establish the most suitable option:

Building usage is a lab type space. For labs a vibration response factor equal to or less than 1 is generally required.

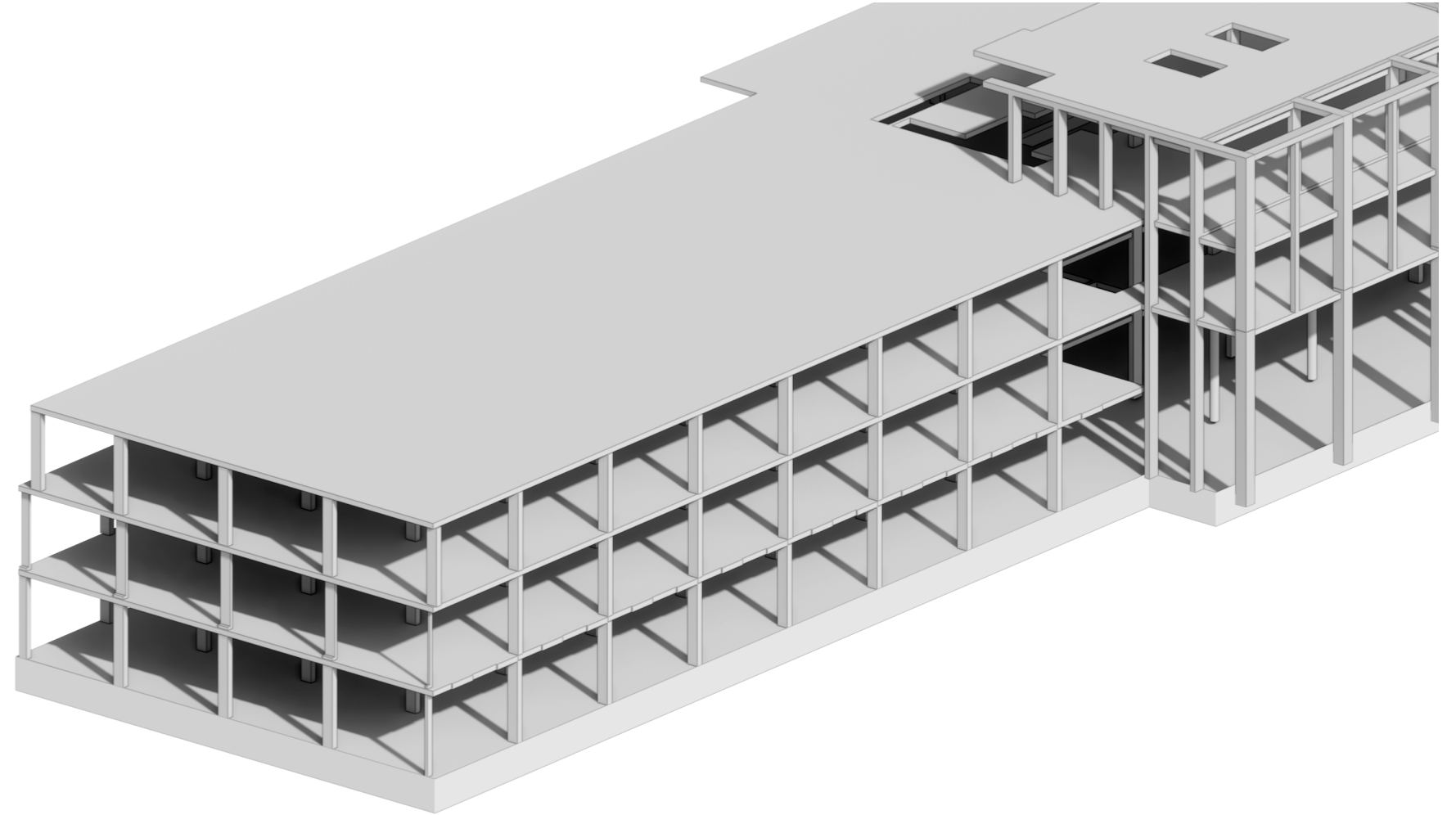
- Element emission breakdown
- Released Carbon
- SCORS rating
- SCORS, RIBA & LETI targets
- 2030 Emissions targets
- Embodied Carbon by lifecycle stages

The results showed a concrete frame performed best in all of the following categories, and therefore has been proposed for the building:

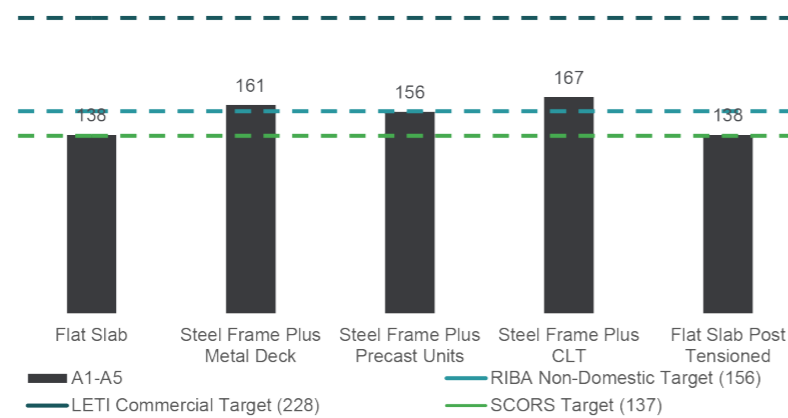
- Embodied Carbon
- Vibration Response
- Cost

CONCRETE INSITU FRAME BENEFITS

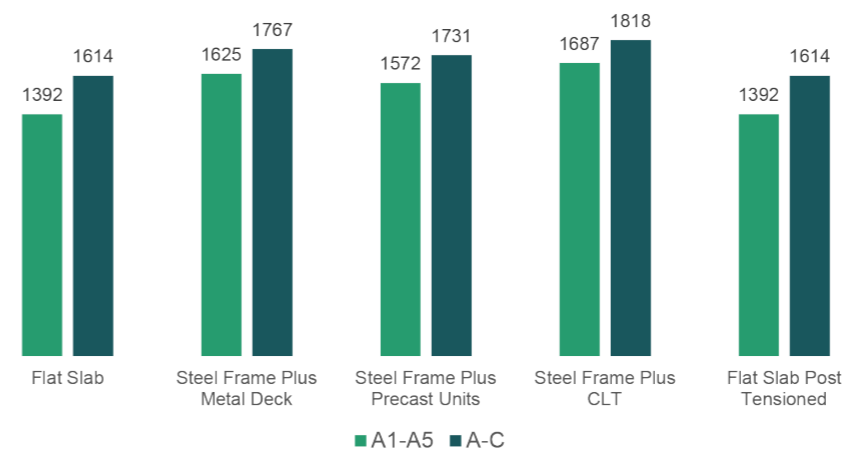
- Flat underside of floor soffit – this can be beneficial for routing of services, etc. Downstand beams don't have to be negotiated.
- Slimmer form of construction – with downstand beams the floor build-up can be quite high. The concrete flat slab option reduces the overall floor level build-up.



Comparison to 2030 targets (kgCO₂e/m²)



Estimated embodied carbon (tCO₂e) Modules A1 - A5 and A - C



The scheme with the lowest emissions is Flat Slab. Compared with the highest emission scheme, Steel Frame Plus CLT, this scheme saves the equivalent of:

- ✈️ 347 one-way flights from London to New York
- 🍔 173 people's consumption of meat, dairy and beer for 1 year
- 🚗 95 average family cars running for 1 year

OPERATIONAL CARBON - BE LEAN, BE CLEAN, BE GREEN

ENERGY STATEMENT

The design team have improved the building by implementing passive design techniques and specialist knowledge by a sustainability champion specialist. This development follows the principles to make the fullest contribution to minimising carbon dioxide emissions in accordance with the energy hierarchy as follows:

1. Be Lean, Use Less Energy.
 - Passive design measures to last the life of the building.
2. Be Clean, Supply Energy Efficiency
 - All building services systems utilise electric and will not use fossil fuels for regulated energy.
3. Be Green, Use Renewable Energy
 - The building services exclude the use of combustion equipment for providing space heating and hot water.

The Part L thermal dynamic simulations shows that the proposed building and building services can achieve a 40% improvement on Part L 2021.

There will be a **reduction of 20.4 Metric tonnes of carbon dioxide** emissions per year.



Figure 37. PV Panels over biodiverse roof

PV PANELS

- New photovoltaic system on the third-floor roof and above the fourth-floor roof area plant space.
- Space for approximately 1215m² of panel area facing east west at an inclination of 10°, which will provide approximately 263.5kWp, with an **annual output of 201.7 MWh of electricity.**
- PV Panels provide the best solution for energy savings and the technology suits the flexibility for the shell and core proposal.
- Payback period are likely to be around 5 to 6 years.

EV CAR PARKING

25% of parking spaces will be provided with EVCP via a load management system.

LIGHT FITTINGS & CONTROLS

- Part L compliant lighting throughout building.
- Daylight dimming, and absence control in laboratories, Offices, Gym, Café, and reception areas.
- Presence detection in Circulation, Cores,



Figure 38. Electric Vehicle Charging

WC, and changing areas.

THERMAL COMFORT

- Building can achieve the comfort criteria of CIBSE guide A for current and future weather files.

SOLAR CONTROL

- Vertical and horizontal brise soleil to control solar gain across the façades.

HEATING & HOT WATER

- **No combustion equipment** will be used for providing space heating and hot water along with heating and cooling.
- The proposed fixed building services will **not include any energy generation from gas or other fossil or solid fuel.**, LETI compliant.
- **All building services systems utilise electric** taking advantage of the de-carbonisation of grid electricity
- The proposal **meets the 'nearly zero carbon emissions' standard** within Part L 2021.
- Building is predicted to achieve a **45.4% carbon emission reduction against Part L 2021** in excess of the 40% required by policy RE1 of the Oxford Local Plan.



Figure 39. Solar Shading

OPERATIONAL ENERGY

All are **in line with the LETI recommendations.**

1. Fabric U-Values
 - Walls - 0.15 W/m².K
 - Ground Floor 0.12 W/m².K
 - Roof 0.12 W/m².K
 - Glazing 1.3 W/m².K
2. Fabric Efficient Measures
 - Air tightness of <1 (m³/h. m²@50Pa)
 - Thermal bridging of 0.04(y-value)
3. Power Efficiency Measures
4. System Efficiency Measures
5. Window Areas
 - All elevations are within the LETI recommendations of 25-40%
 - 83% of the buildings glazing has a G-value of between 0.4 & 0.3



Figure 40. Rooftop air source heat pump

SITE ENHANCEMENTS

BIODIVERSITY

1. Pollinator provision:

- 5 no. insect boxes specified for solitary insects and lacewings
- 50% of the soft landscaped area planted with species providing nectar sources.

Refer to Macgregor Smith drawings 1389-203 : Planting Plan Roof Level and 1389-401 : Biodiversity Features Plan

2. Bird nest and bat roost sites:

- 5 no. universal bat roost boxes installed on existing retained trees
- 4 no. tree-mounted bird nest boxes, including 2 no. triple cavity swift nest boxes and 1 no. sparrow terrace with three brood chambers.

Refer to Macgregor Smith drawing 1389-401 : Biodiversity Features Plan.

3. Biodiversity Net Gain

- 70.35% biodiversity net gain

Refer to Ecology Solutions' Biodiversity Metric and BNG Report.

BIODIVERSITY ROOF

- Extensive biodiversity roof with PVs covering approximately 1,500². Raised PVs working in synergy with the green roof below.
- 40% succulents with 14 no. species of Sedum plugs, and 60% wildflowers planted with 24 no. species of drought tolerant native wildflower plugs.

Refer to Macgregor Smith drawing 1389-203 – Planting Plan Roof Level.

ROOF TERRACES

- Meadow-style planting palette planters
- Mix inspired by native species grasslands.
- Colourful palette, wind and sunlight tolerant.

Refer to Macgregor Smith drawing 1389-203 – Planting Plan Roof Level.

SUDS

- A large proportion of allocated as blue roof.
- Attenuation cell layer integrated below areas of paving, roof and planters.
- Ground level storage provided by underground attenuation tanking in conjunction with a lined permeable paving.
- Shallow rain gardens at building entrance.

Refer to Baynham Meikle's Drainage Strategy Report for more detailed information.

TREES

1.Existing trees:

- All the site's 41 no. boundary trees retained.

Refer to the submitted Arboricultural Impact Assessment Report, Arboricultural Method Statement and Tree Protection Plan prepared by Aspect Trees for further detail.

2.Proposed trees:

- 49 no. new semi mature trees proposed. They are predominantly native with some non-native species.

Refer to Macgregor Smith drawings 1389-201 and 1389-202 – Planting Plans Ground Level.

3.Tree canopy Cover

- Tree canopy cover uplift at 25 years, with site coverage of 40%.

Refer to Macgregor Smith 1389-G507 Landscape Statement sections 3.7 and 7.4 for detailed diagrams and calculations of Baseline and Proposed Scheme Canopy Assessments.

WELL-BEING

- Flexible and accessible outdoor spaces at both ground level and roof level.
- Well-being promoted through access to nature.
- A new central green plaza at the building frontage incorporating seating spaces
- A new plaza in the plot's south-east corner provides a landscaped gateway entrance.

Refer to Macgregor Smith 1389-G507 Landscape Statement

CYCLING PROVISION

- Clear visual links from John Smith Drive to the main building entrance
- Safe pedestrian routes,
- A legible layout for visitors.
- An enhanced footpath / cycleway with 24-hour open access, new lighting and fencing.
- A lockable gate leading from the existing footpath
- A new paved plaza.

Refer to Macgregor Smith 1389-G507 Landscape Statement



Figure 41. Insect boxes



Figure 42. Blue roof system



Figure 43. Sedum mix

15.0 LANDSCAPE DESIGN

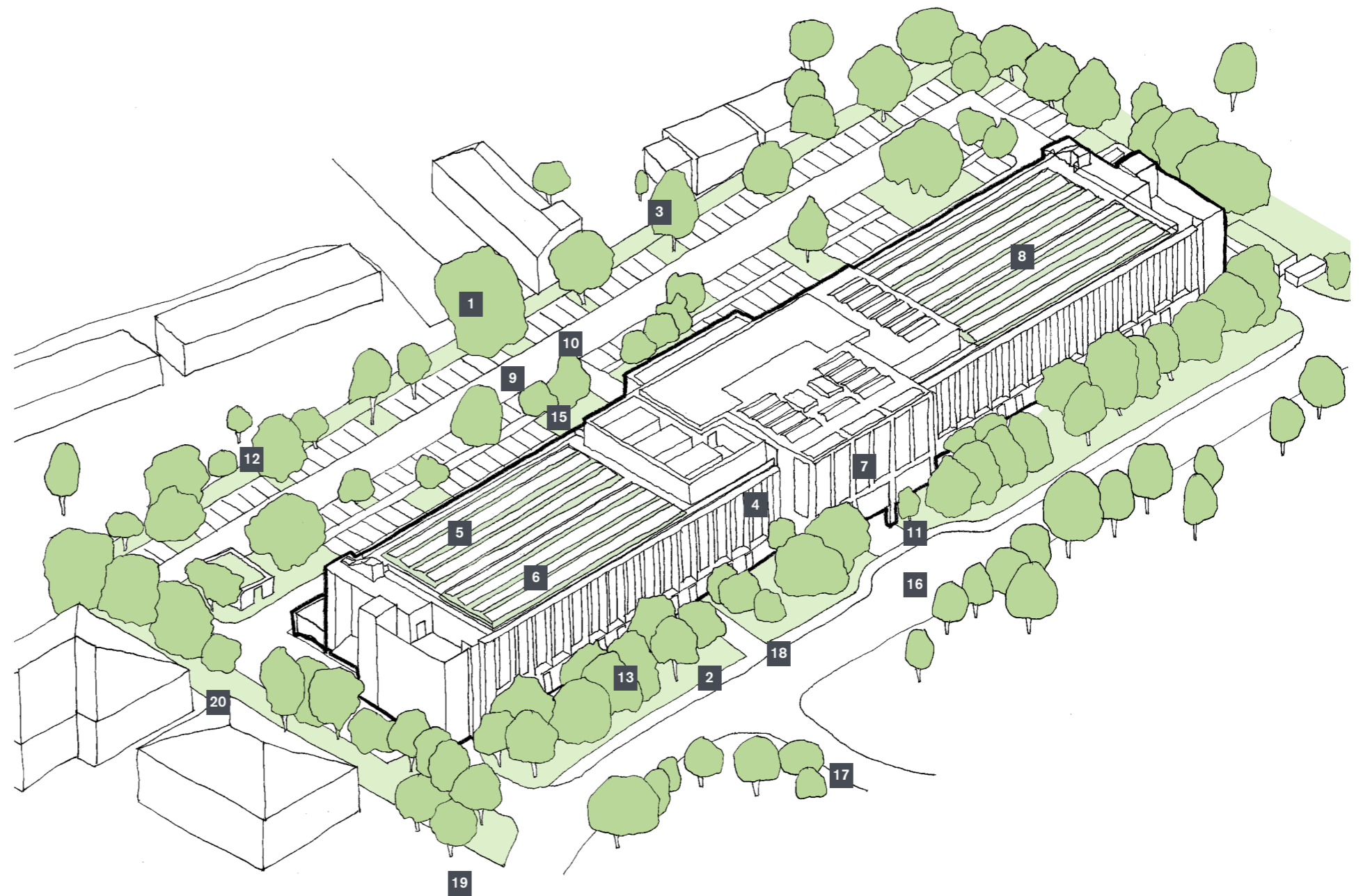
LANDSCAPING DESIGN

The landscaping scheme incorporates innovative and sustainable systems to enhance its core principles of sustainability. This includes the retention of existing trees, together with the introduction of meaningful greening and the creation of new habitats which provide improved biodiversity and tree cover. The landscaping scheme is designed to be adaptable to climate change through the provision of new planting, rain gardens and biodiversity roof.

Further detail is set out in Macgregor Smith's Landscape Statement.

KEY PLAN

- 1** New insect boxes
- 2** Soft areas planted with nectar providing species
- 3** Bat Roosts
- 4** Bird Boxes
- 5** A large area of biodiversity roof combined with PV panels
- 6** Succulent, sedum and windflower planting
- 7** Roof terrace planters
- 8** Large proportion of blue roof
- 9** Water attenuation cell layer below paving
- 10** Permeable block paving system above underground tanking
- 11** Rain gardens
- 12** Boundary tree retention
- 13** New native tree species planting
- 14** Flexible and accessible outdoor spaces
- 15** New central green plaza
- 16** New landscaped gateway entrance
- 17** Visual links from cycle path to entrance
- 18** Safe pedestrian routes
- 19** Enhanced footpath / cyclepath
- 20** New lockable gate

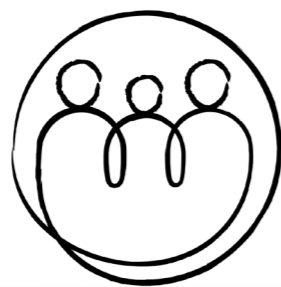




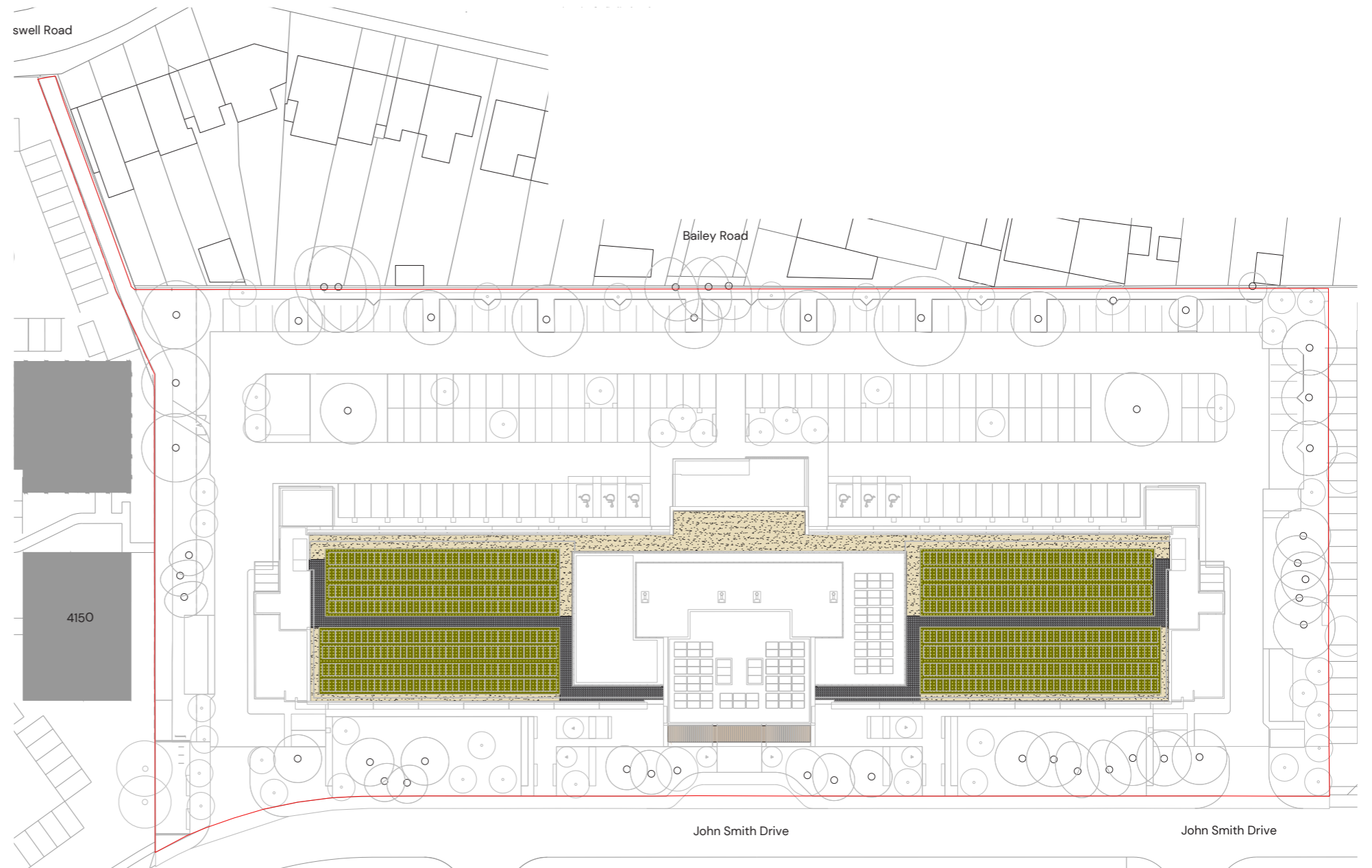
CLIMATE



CHARACTER



COMMUNITY



ENHANCEMENT OF EXISTING FOOTPATH

1. 24/7 CAMPUS

Removal of existing gate that is locked at night;

2. LIGHTING

The existing footpath will be accessible at any time of the day and night; Additional artificial lighting will be provided to the full path and plaza to maintain a level of security and comfort for the visitors;

3. LANDSCAPING

Enhanced greenery will be introduced to make the experience of accessing the campus through this path as pleasant as possible.

4. MATERIALS

Sustainable materials and details will be specified when work to the existing path will be necessary. New planting and hard surface will be required when remodelling the accesses to the site.

5. SENSE OF ARRIVAL TO THE CAMPUS

With a better connection into Plot 4200 for walking and cycling, the access to the Plot will be pleasant and safe.

The existing pathway to Barns Road also links to a more active road which contains bus stops/ route and a direct route into the commercial / retail areas of Cowley.

Note: further detail is presented in Macgregor Smith's pack







16.0

CONCLUSION