

AMSTC

Advanced Manufacturing Skills and Technology Centre

Feasibility Study | Welsh School of Architecture

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INTRODUCTION

This document compiles research undertaken by the Welsh School of Architecture into a feasibility study for the proposed Advanced Manufacturing Skills and Technology Centre, Deeside.

BRIEF

aims + objectives



Flintshire enjoys a privileged position in respect of Manufacturing with (at 33%) the highest proportion of its workforce engaged in the sector of anywhere in the UK. This includes a range of advanced materials and manufacturing technologies spanning a number of sectors, with particular strengths in Aerospace, Automotive, Construction, Food Processing and Paper, and with emerging positions in sectors such as Renewable Energy (including Energy from Waste). The industrial base is clustered in and around the Deeside Industrial Park (DIP) and the Howarden Business Park (HBP). The DIP accounts for around ~9000 employees with a range of sectors and sizes of organisation from SME's to anchor industries (3 of the 4 anchors are located there, namely Tata Steel, Toyota and UPM). The HBP also employs around 9000 people, including Airbus which is the 4th anchor company and North Wales' largest industrial employer.

The Deeside Enterprise Zone (DEZ) is clustered around both sides of the Dee and encompasses both of the above industrial parks and a range of more residentially focused areas in between. The Strategic Vision for the DEZ is based substantially around sustainable growth in Advanced Materials and Manufacturing and the Low Carbon Economy.

New product and technology development is represented well in the area through the Composites Centre in Broughton, the Engine Centre at Toyota, the LCRI's Sustainable Building Envelop Centre at the Tata Steel site in Shotton. Within the DEZ the development of the Northern Gateway site is of critical importance to the growth plans for the area, and represents one of the largest mixed use land projects in the North of the UK.

Fundamental to the DEZ is the development of an Advanced Manufacturing Skills and Technology Centre (AMSTC), which will be located on a site yet to be selected on the Northern Gateway. This centre will support the existing manufacturing base all organisations of all sizes (supporting sustainability, differentiation and growth), as well as acting as a catalyst to attract new inward investment into the area. As well as supporting the Deeside activity base, the Centre will more generally engage across whole of the North Wales region with a primary axis the A55 corridor from Anglesey (and the Energy Island EZ) in the West, through to North West England in the East. Another key axis is to the industrial, HE and FE activities in the Wrexham area (including Glyndwr University, Coleg Cambria and JCB).

Through networking with industrial, HE and FE partners throughout Wales, and with the Technology Development and Innovation Centres in which these are engaged, the AMSTC aims to bring a critical new dynamic to engineering skills and technology development.

The initial and defining phase of the AMSTC is the creation of an iconic new building in the heart of the Enterprise Zone. This centre will support collaborative research between industry and academia, through co-located resources and a range of underpinning initiatives, and skills development along the full range of qualifications from Apprenticeships and workforce development courses through to Bachelors, Masters and Doctoral qualifications.

The collaborative activities are critically underpinned through strategic enabling partnerships with the Welsh Government and Flintshire County Council. Whilst the primary focus is to bring a pan Wales approach to engineering skills and technology development through engaging with Welsh HE and FE partners, it is also a key objective to engage more widely with HE partners that can add distinctive competencies to the skills and technology development across strategic sectors and manufacturing process areas. Over time the strategic ambition is for the AMSTC to be recognised nationally and internationally as a centre of excellence.

BUILDING SPECIFICATION

The design of the centre needs to be iconic, with a high sustainability signature, and embrace both the current strengths and diversity of the region, and the vision for the future. The building needs to co-locate synergistically a range of activities and be capable of future expansion in a modular manner without compromising the design integrity and architectural impact of the initial building. In overall size terms the building should have a gross internal area of 4000m², split broadly as follows:

- 35% (1400m²): engineering workshop and manufacturing space
- 15% (600m²): laboratory and research space
- 50% (2000m²): training and development facilities (including an auditorium), exhibition and showcase areas, meeting and project spaces, cafe and interaction space, reception and atrium space

Further detail on the individual building elements over the two floors is as follows:

An open atrium and reception space should be located close to a cafe that promotes open interaction and an area that showcases the activities, partners, aims and objectives of the Centre and acts as a portal and showroom for the DEZ generally.

A ground floor business development centre which will bring together in an integrated manner the full suite of business support activities provided by WG, FCC and other key partners and create a one stop shop for businesses both within and looking to potentially locate in the DEZ. This should have hot desks and meeting room spaces to enable meetings with support providers.

The ground floor workshop and manufacturing space should be large enough to accommodate up to 20 items of equipment and associated IT infrastructure to support simulation, modelling and other process development activities.

A 1st floor teaching and learning space including 4 separate teaching rooms and an auditorium facility that is capable of accommodating up to 150 people, and which can be segmented into two smaller lecture theatres for flexibility purposes.

1st floor office space for the Centre Management Team, including dedicated offices (4) and an open plan office space (with capacity for 10 desks).

Car-parking space to support up to 150 vehicles, and appropriate external landscaping features.

The building should incorporate wherever possible products manufactured in Deeside (1st priority) and Wales generally (2nd priority), in particular any products of a premium or advanced nature (such as renewables) which will enhance the impact of the building, improve its sustainability signature and/or signal the Centre's advanced engineering skills and technology development objectives. Tata Steel has offered

its construction design expertise to support WSA and should be consulted with the aim of incorporating premium and sustainable building envelope products onto the building.

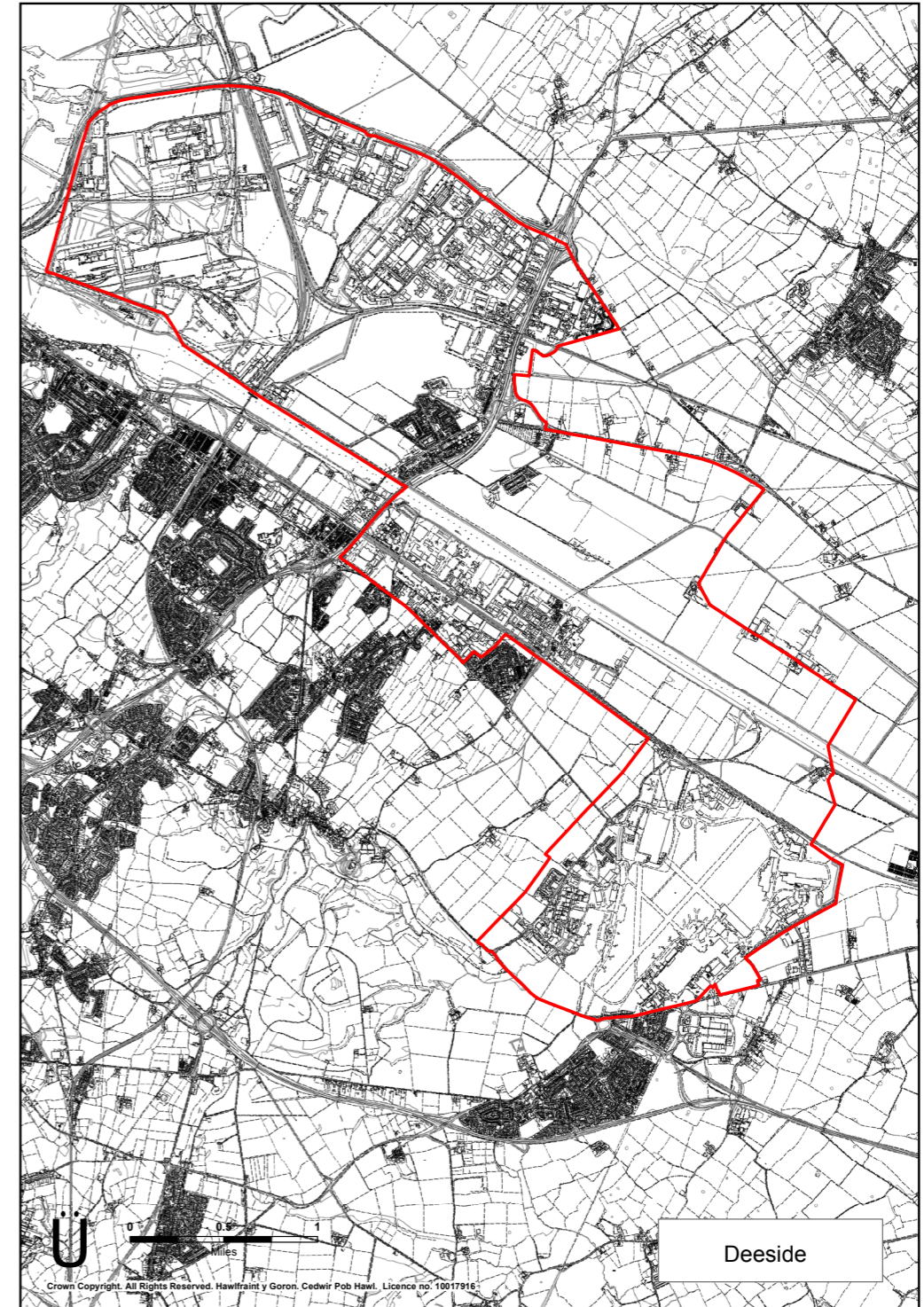
As the site cannot yet be selected and is subject to a competitive tender process, the architectural brief needs to work on the basis that the site will be 2 hectares (covering building, car parking and landscaping space) on a level plot which imposes no design constraints and where a southerly facing orientation will be possible for walls and facades which may wish to incorporate solar technologies. The maximum cost for the building including VAT should be £10m.

SITE LOCATION

North Wales - Deeside



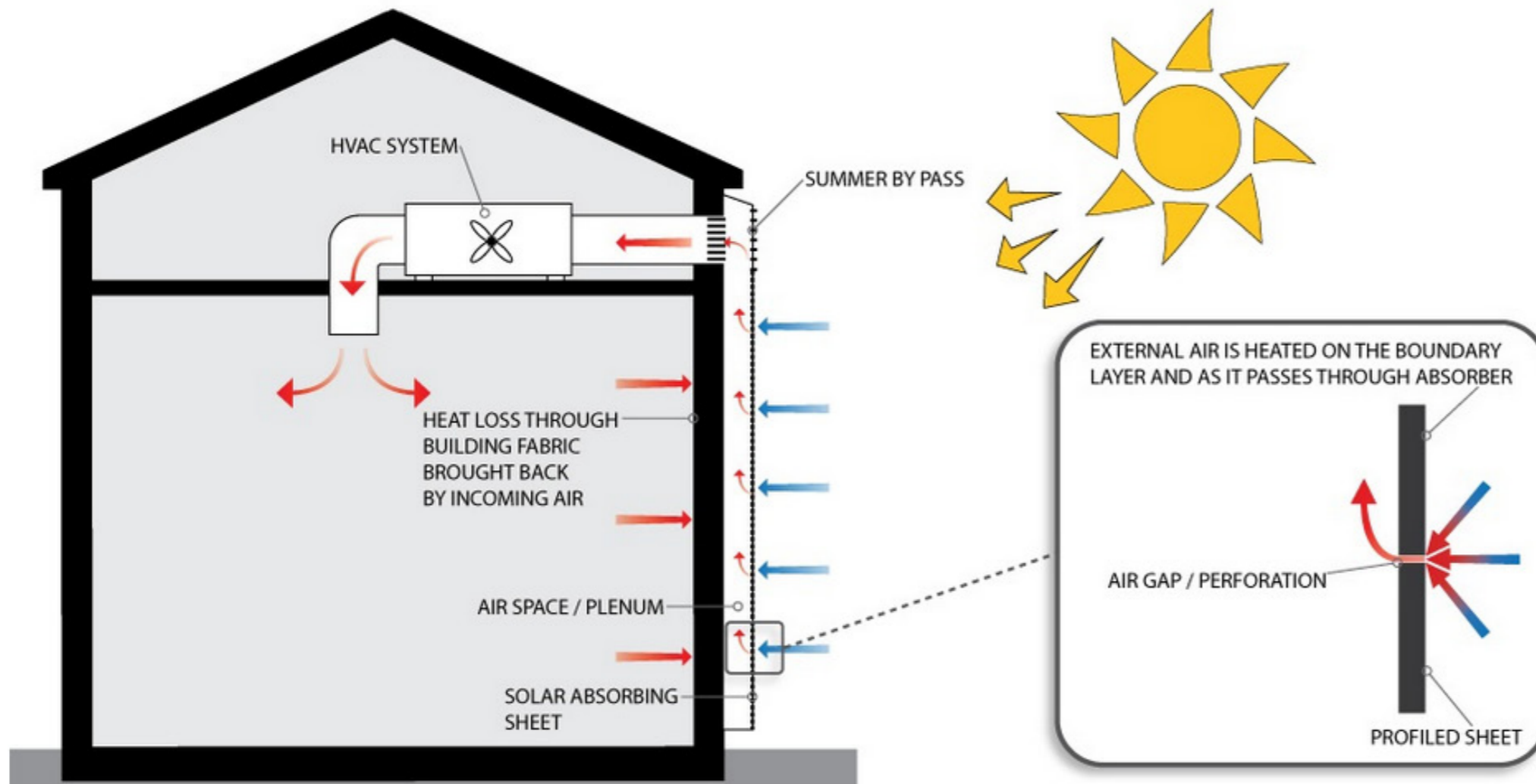
Deeside at the beginning of the A55 corridor



Deeside Enterprise Zone Boundary
from <http://business.wales.gov.uk/sites/enterprisezoneswales>

PRECEDENTS

energy + technology



Transpired Solar Collectors
from <http://sbed.cardiff.ac.uk/transpired-solar-collectors/>



Transpired Solar Cladding
from <http://sbed.cardiff.ac.uk/transpired-solar-collectors/>

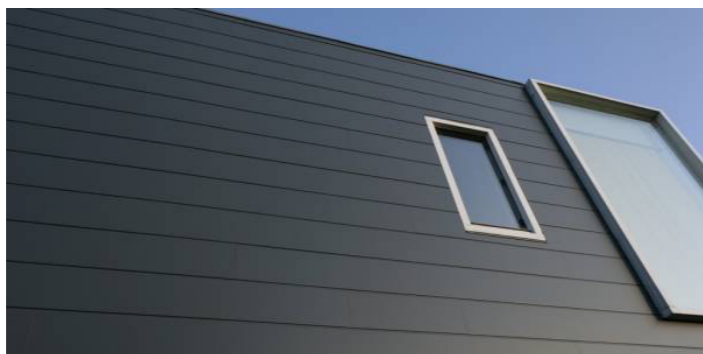
three types of widely-available cladding systems for use in transpired solar collectors (tscs)



Profiled steel sheeting



Cassette panels



Tongue and groove planks



Solcer House, incorporating Transpired Solar Collectors
from <http://www.cardiff.ac.uk/archi/news-items/solcer-house>

PRECEDENTS

arrangement + organisation



The Green Incubator

+3 Architects

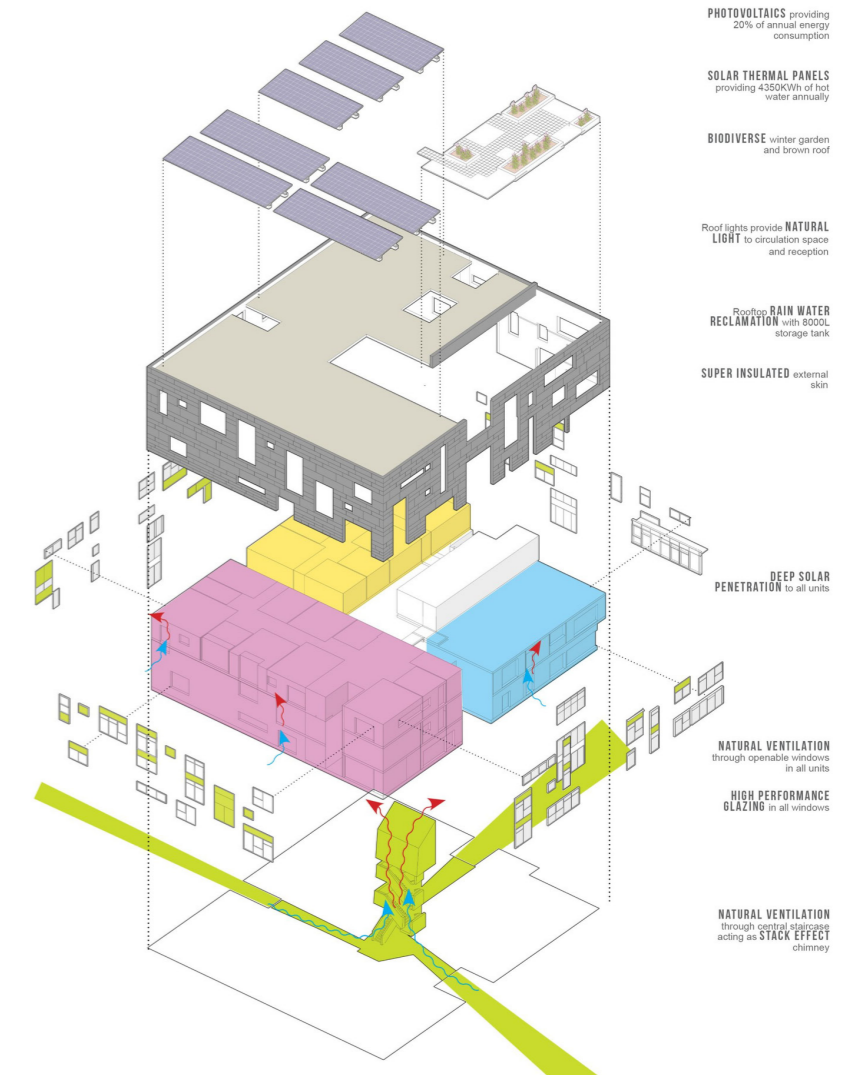
South Shields, 2012

3085m²



' One Trinity Green is a new, high-tech business centre for SMEs in the renewables sector. Forming Phase 1 of the Trinity South development in South Shields, the scheme redevelops and regenerates a brownfield site formerly occupied by an electronics factory which was one of the major employers in the town.

The building is conceived as 3 contemporary, flexible, 'Victorian' warehouses each with a distinctive character but bound together by a singular ribbon of elevation and a range of shared social spaces. An elevated roof garden provides further amenity and further differentiates One Trinity Green from other similar 'incubator' developments. '





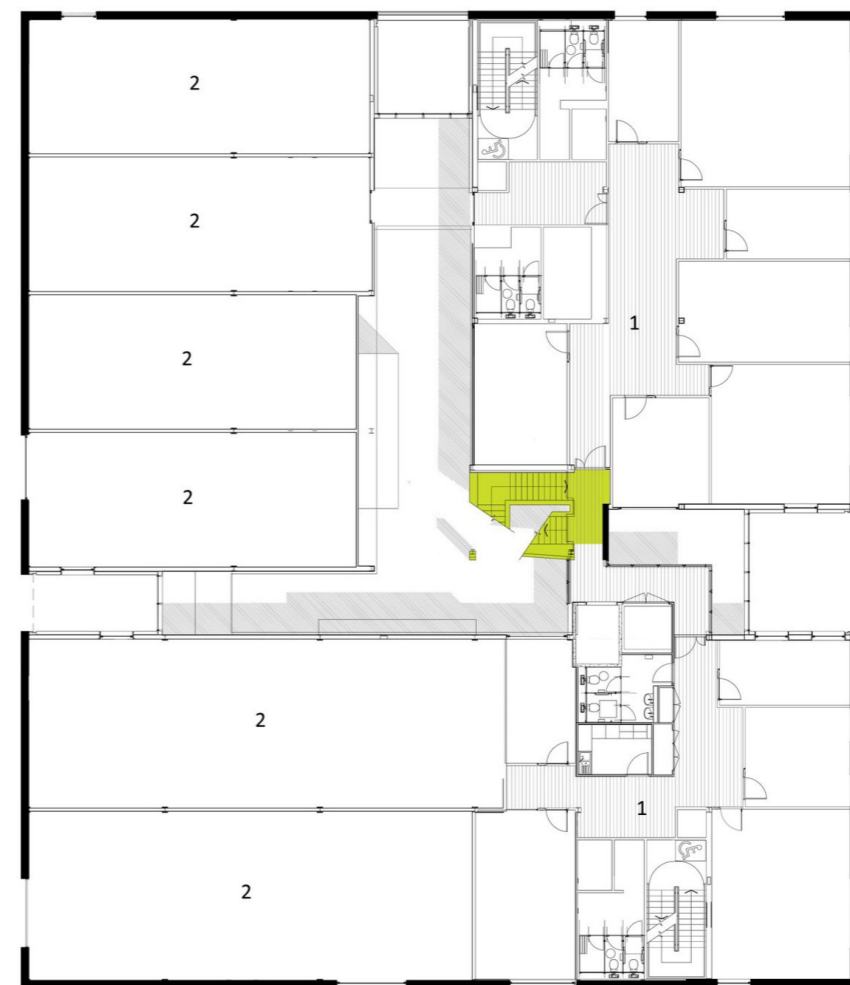
Ground Floor Plan

- 1. Main Entrance
- 2. Secondary Entrance
- 3. Reception
- 4. Meeting Space
- 5. Workshop
- 6. Hybrid Unit
- 7. Cellular Offices

1:200@A3 0 1 2 5 10m



+3A
plus three architecture



First Floor Plan

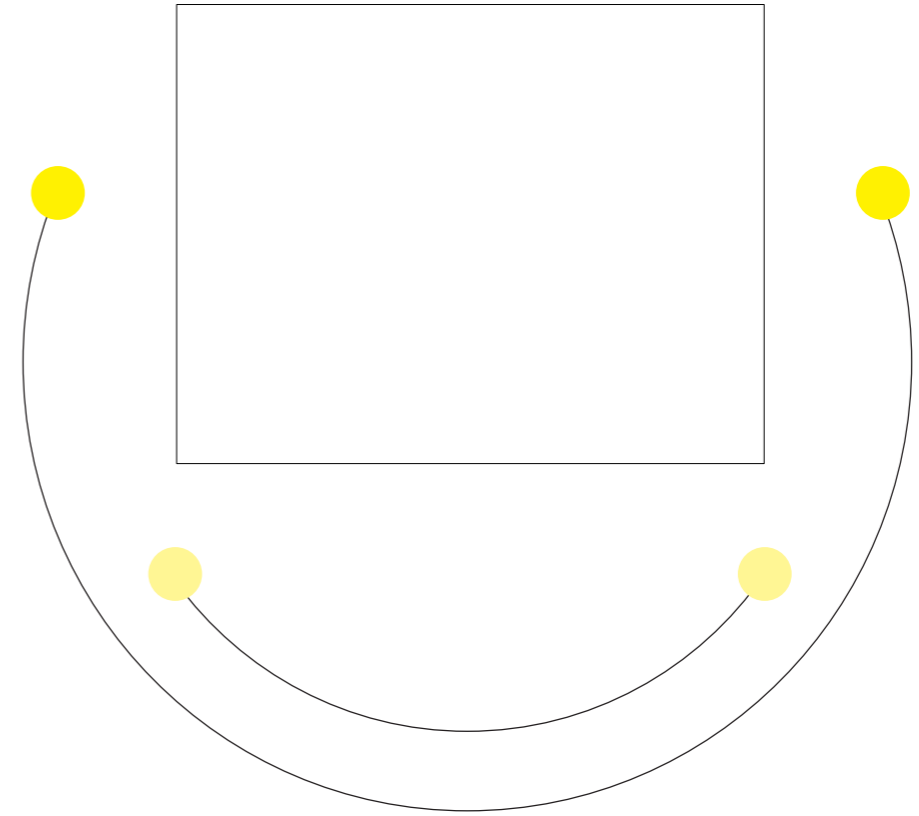
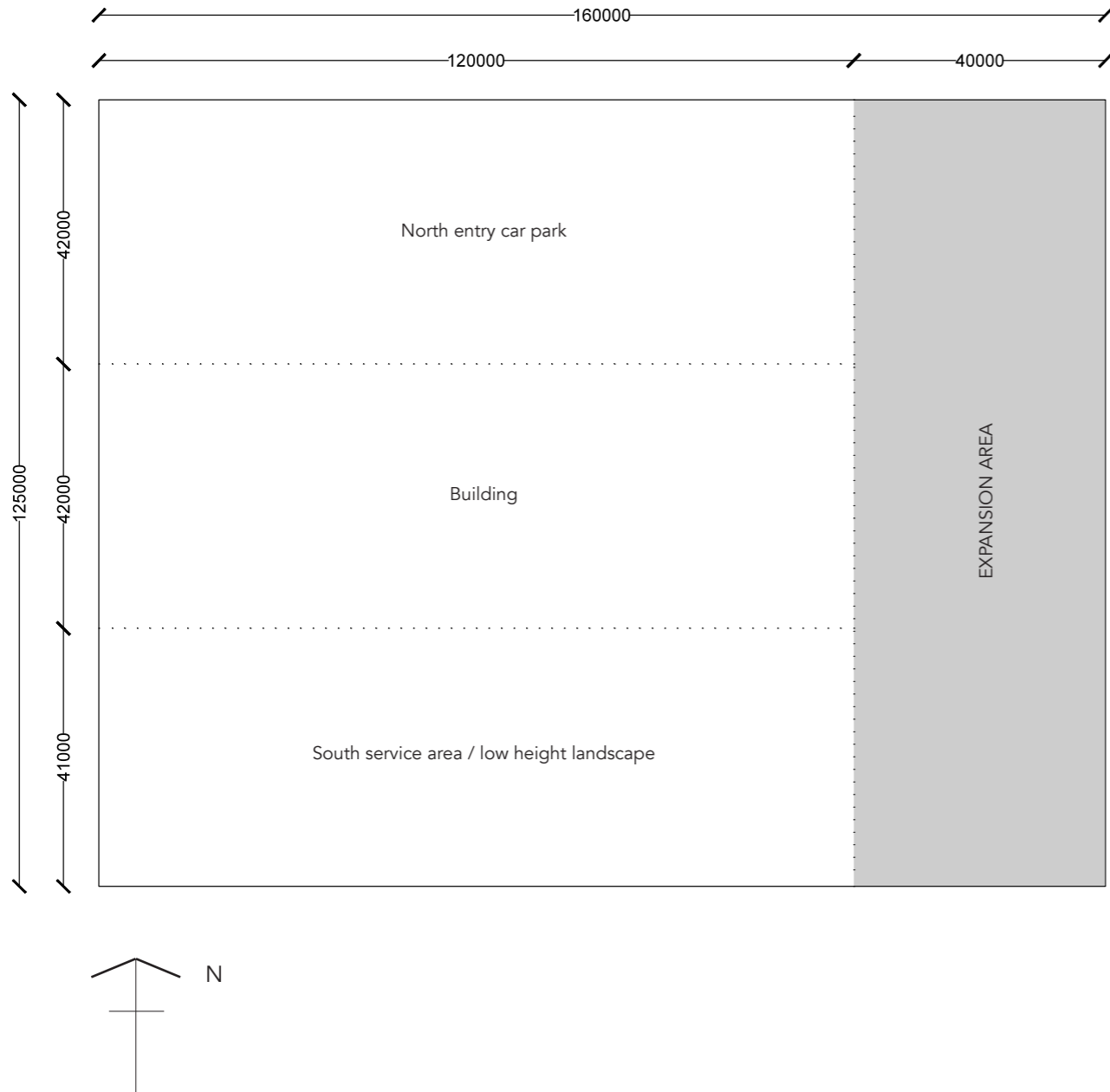
- 1. Cellular offices
- 2. Void to Workshop Below

1:200@A3 0 1 2 5 10m



+3A
plus three architecture

SPECULATIVE SITE CHARACTERISTICS



The site will cover approximately 4 hectares of ground, with nominal dimensions as shown. The orientation of the building will be set by environmental considerations regarding the energy generating facade, with its orientation maximising energy potential. However the building's placement on site will be to suit the segmentation as shown here.

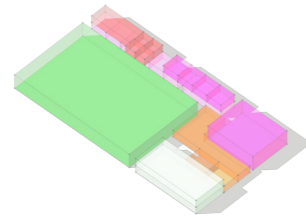
The renewable energy strategy on site will influence design decisions and layout of building elements.

SCHEDULE OF ACCOMMODATION

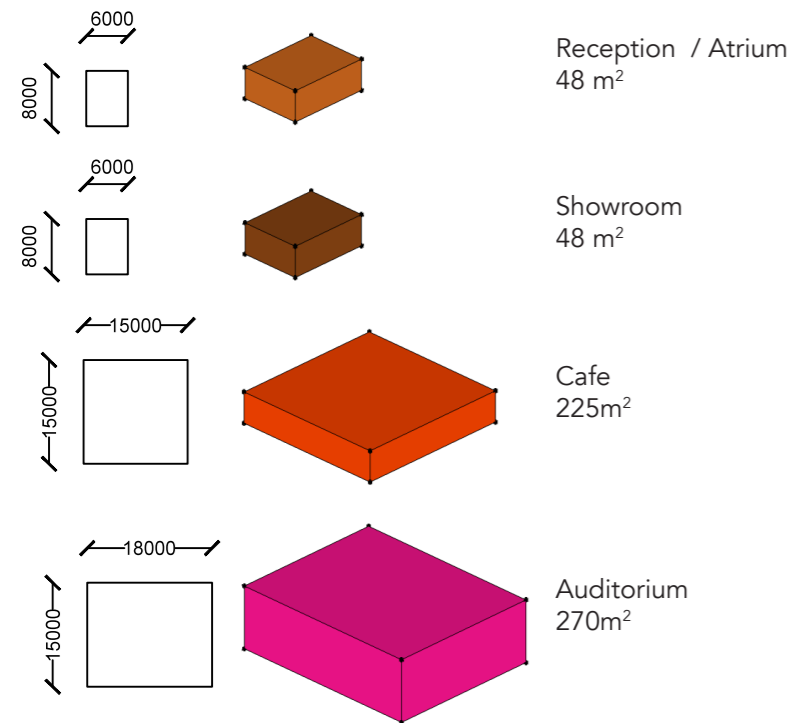
Areas and functions

These elements show initial sizes of functional spaces in answer to the brief.

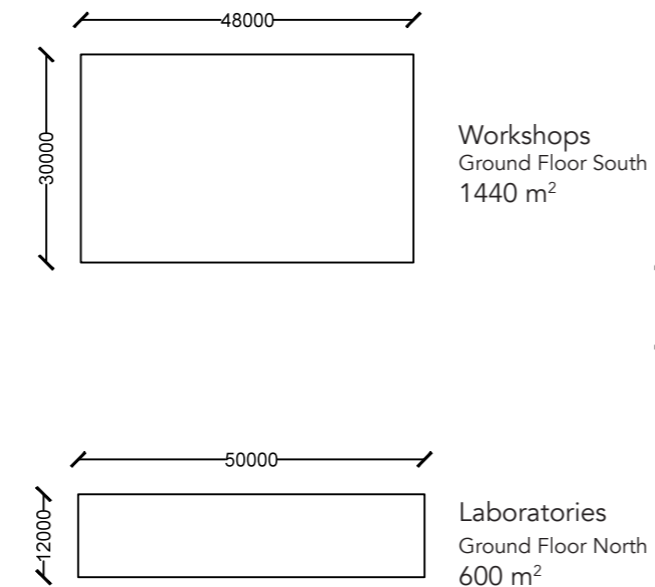
What follows is a series of massing studies investigating possible configurations.



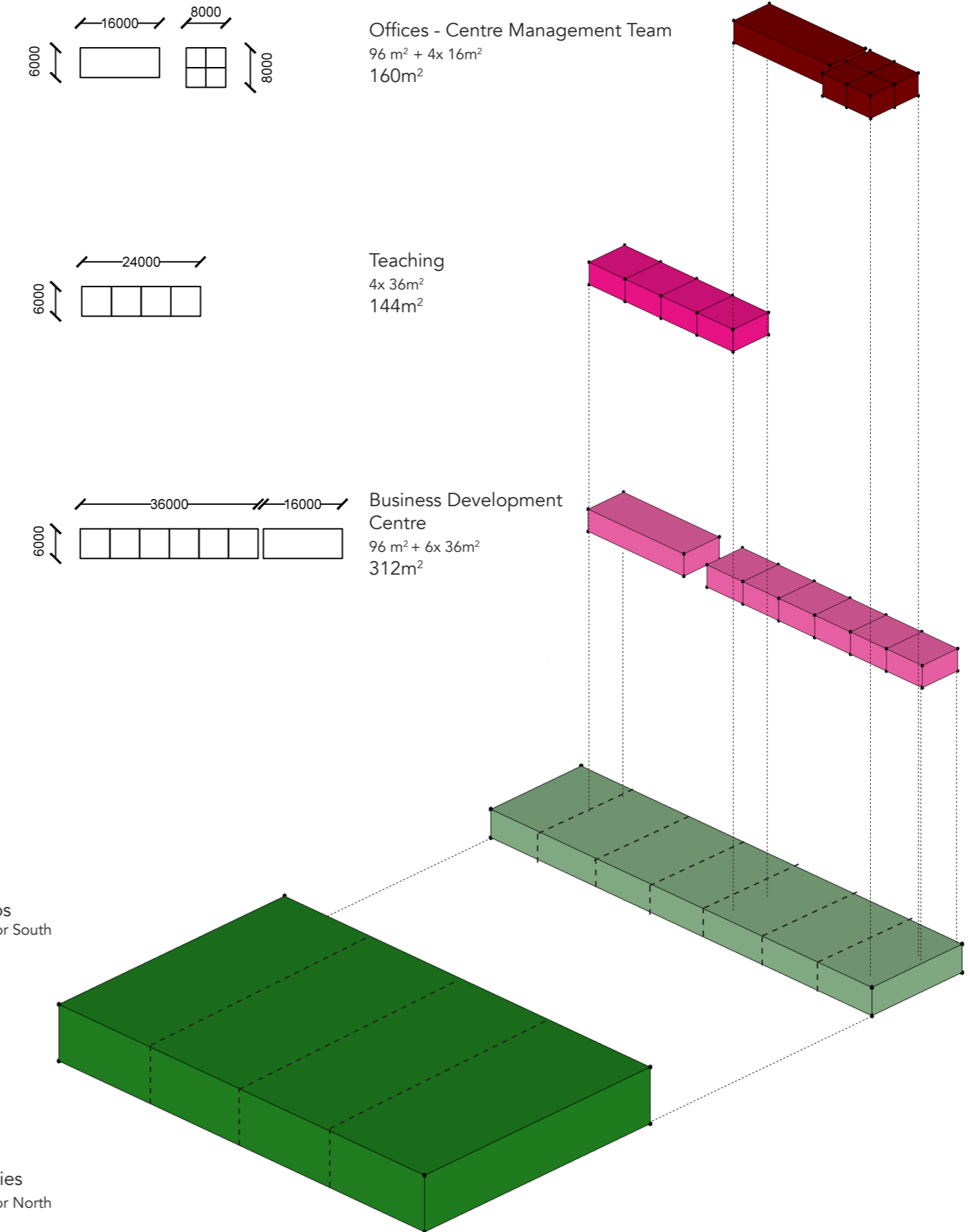
Mixed use facilities ground floor - total 591m² + auxiliary



Manufacturing / research ground floor - total 2000m²



Learning / administration first floor - total 616m²



OPTION 1

'STREET / COURT'

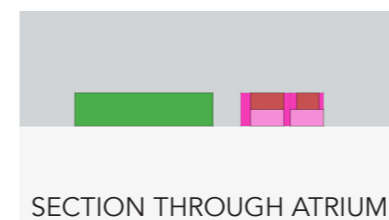
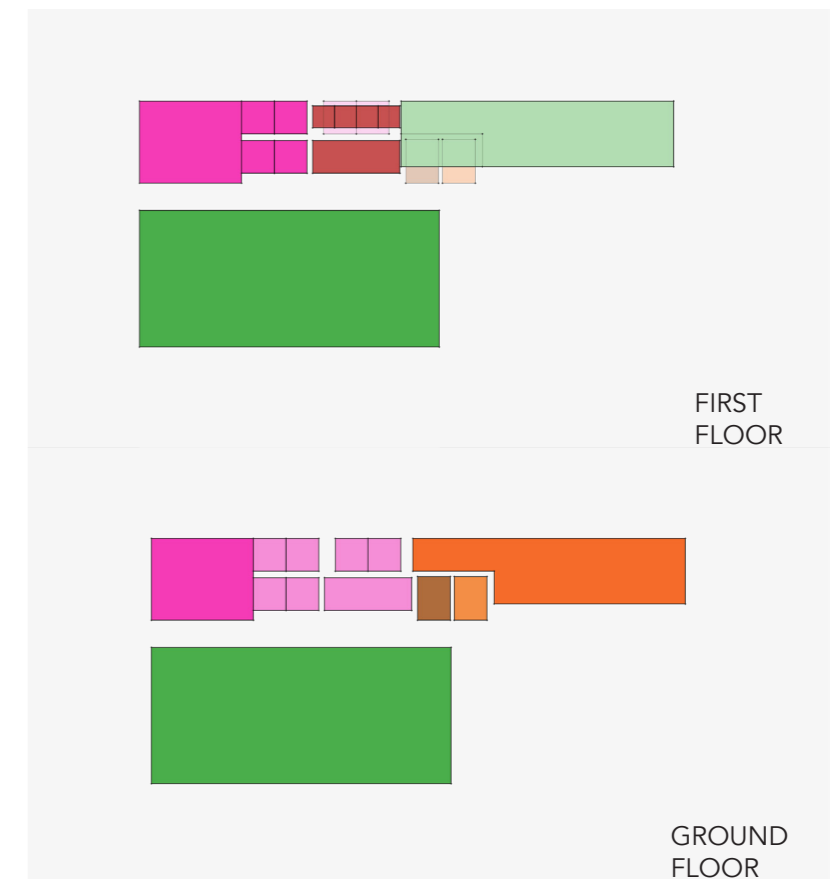
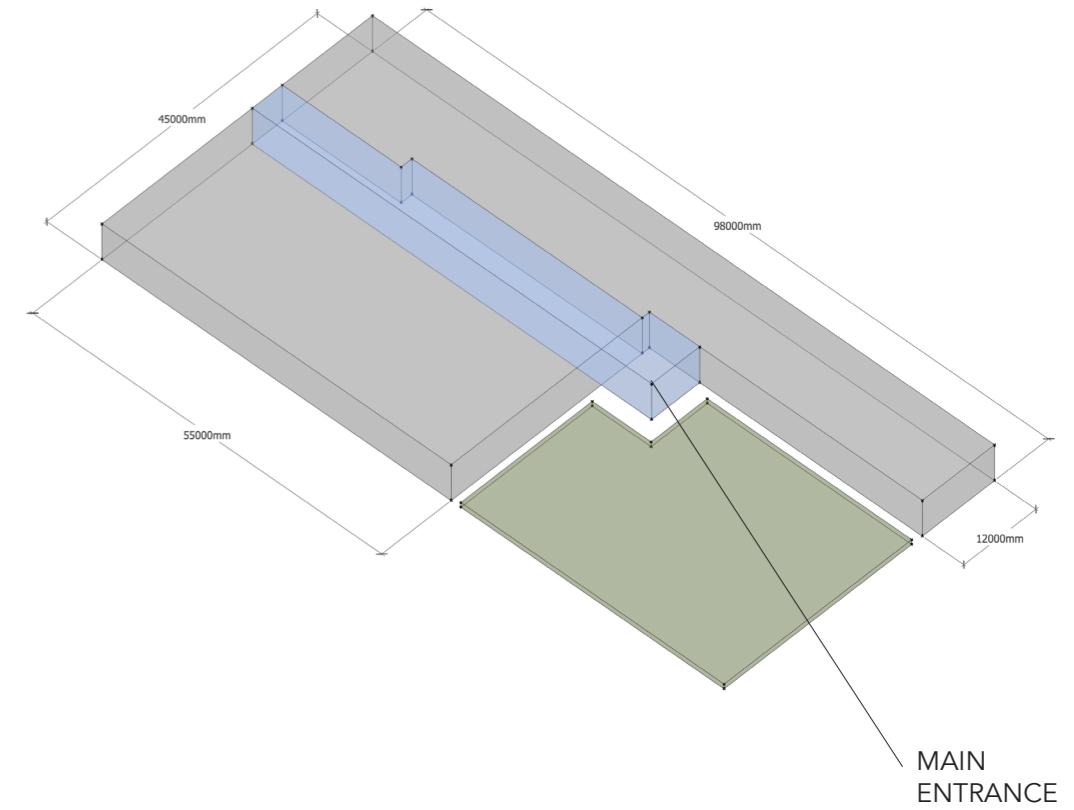
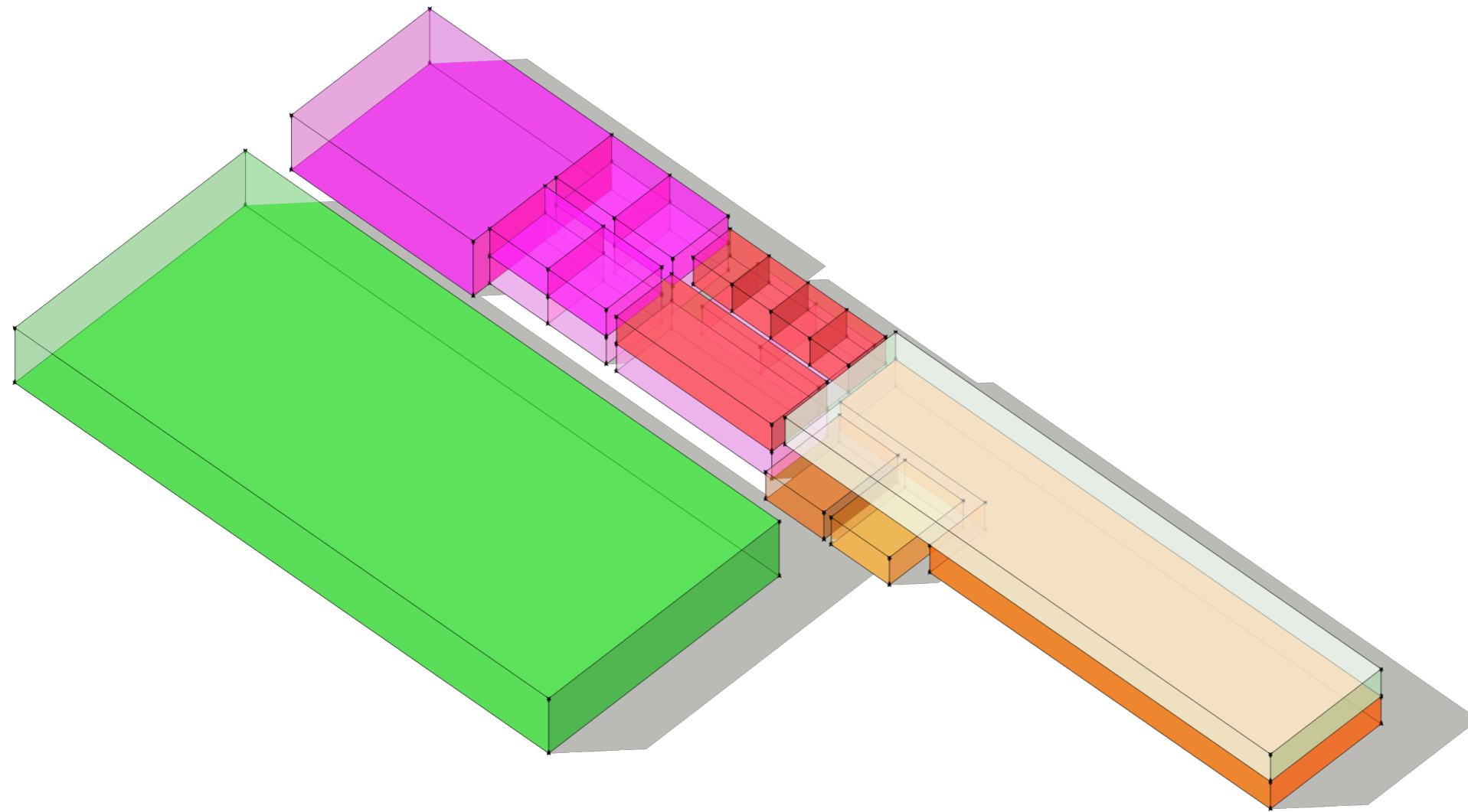
- Long, South / North axis, 90m long South facade able to generate energy
- Socially strong
- Daylight in workshops
- Sunlit public outdoor space

Mixed use facilities + laboratories
2406m²

Manufacturing space
1375m²

Atrium
310m²

TOTAL
4091m²



OPTION 2

'ATRIUM / COURT'

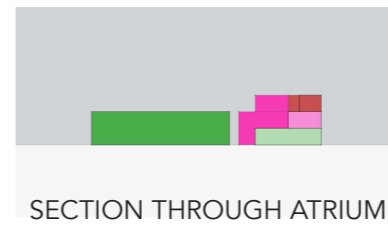
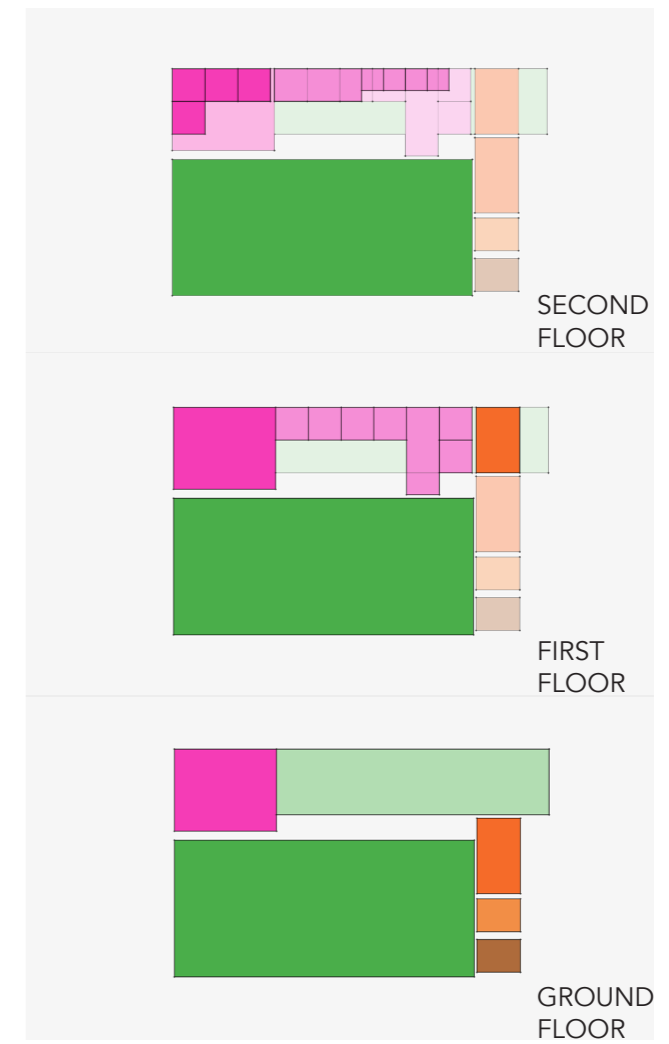
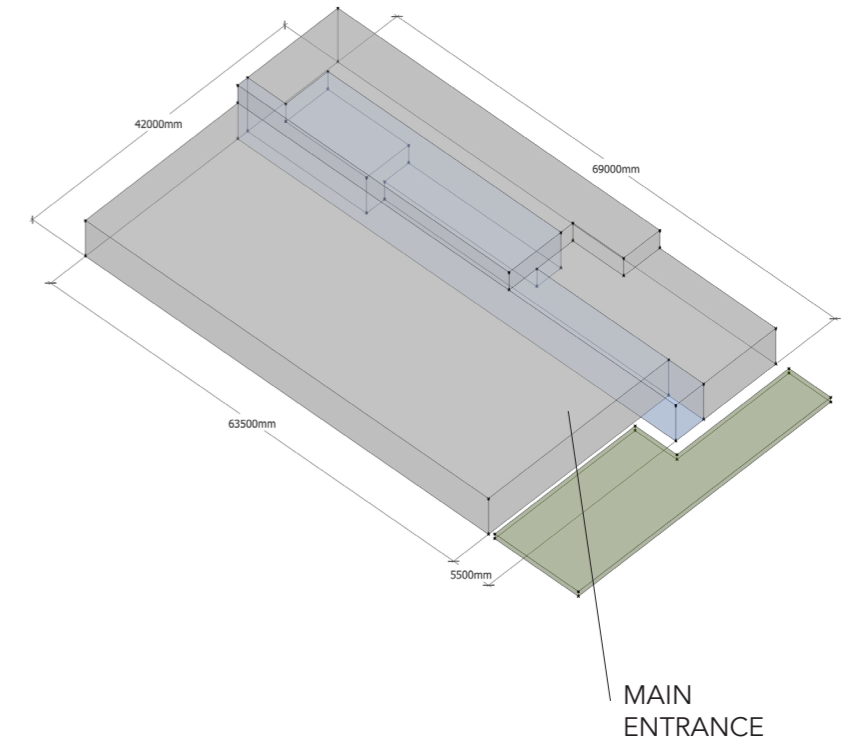
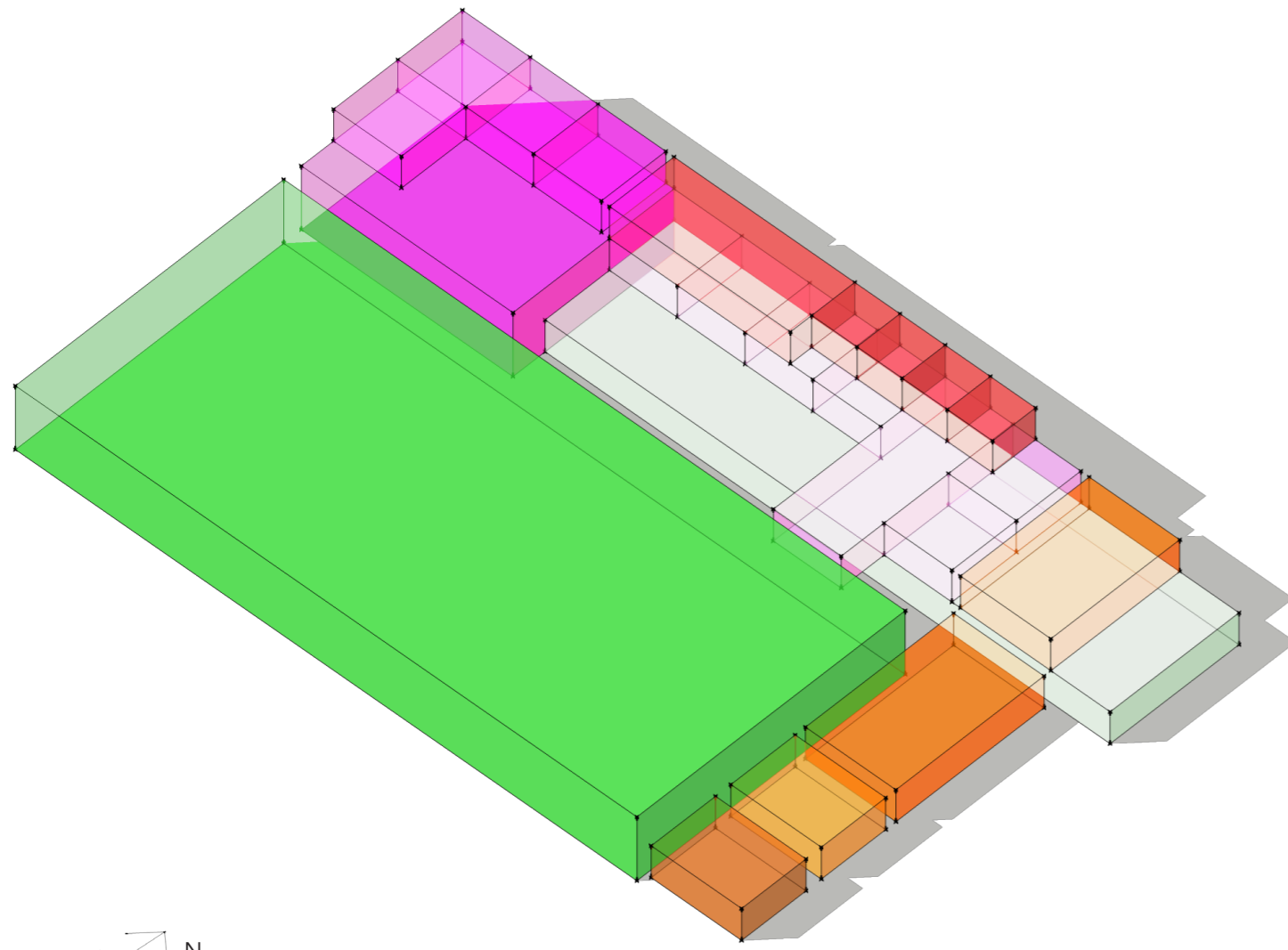
- More compact
- All learning and labs to the north
- Daylight in workshops
- Learning and office space over three floors
- Three storey atrium space

Mixed use facilities + laboratories
2206m²

Manufacturing space
1375m²

Atrium
448m²

TOTAL
4029m²



OPTION 3

'STREET / EVENT'

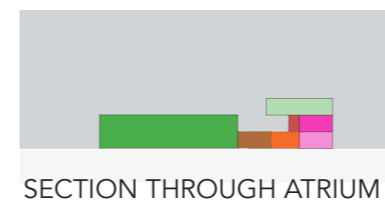
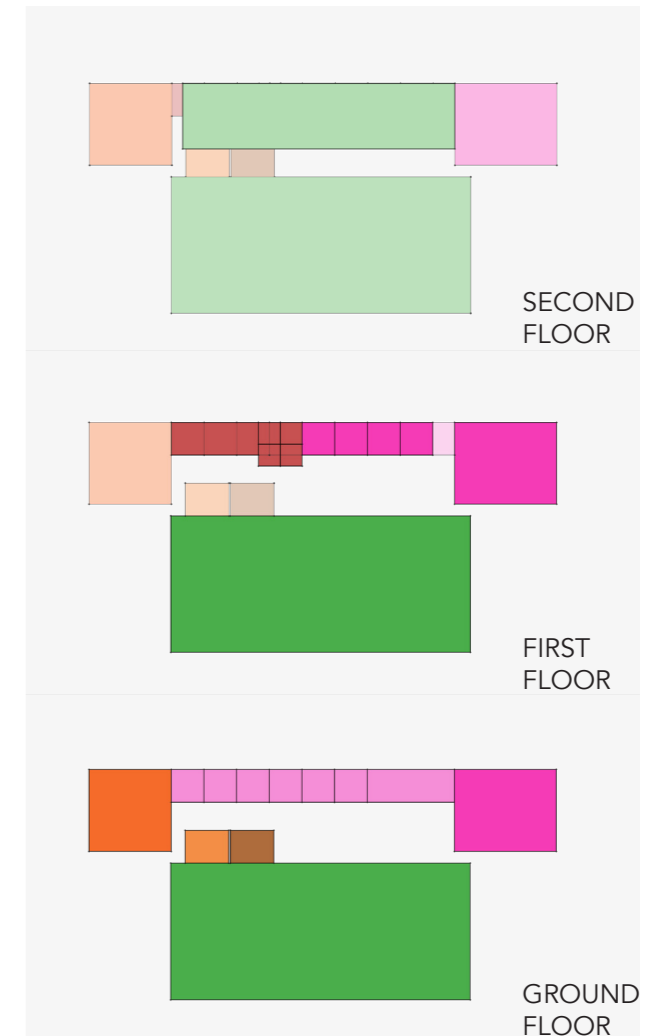
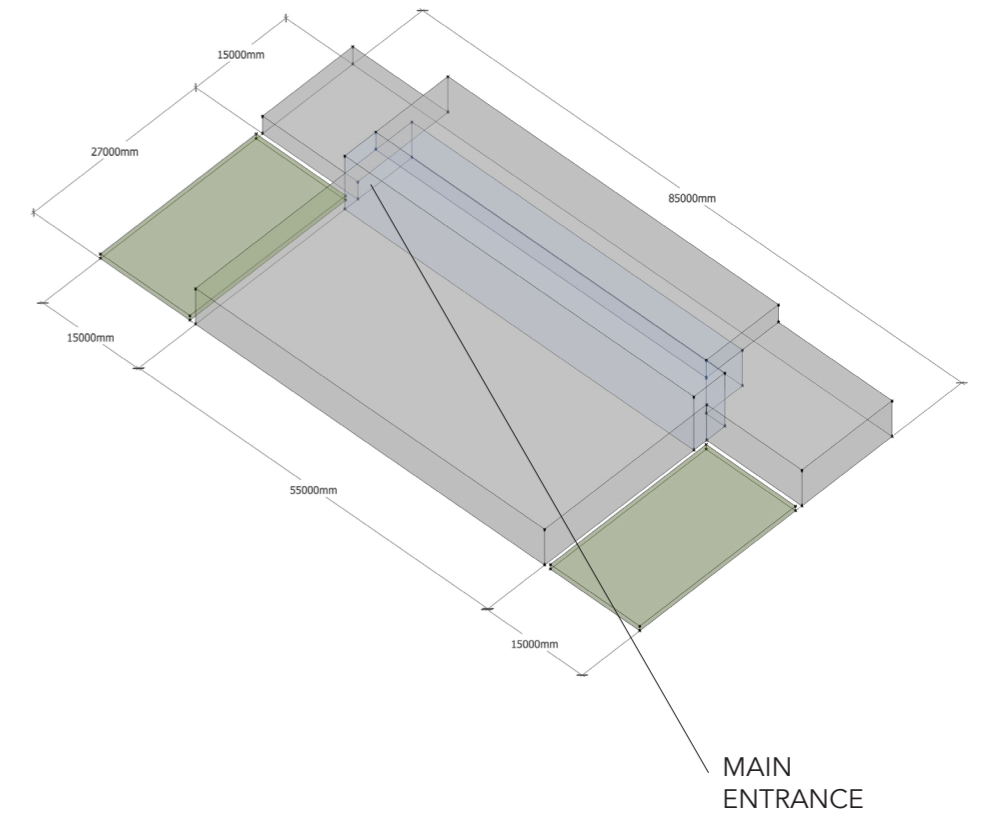
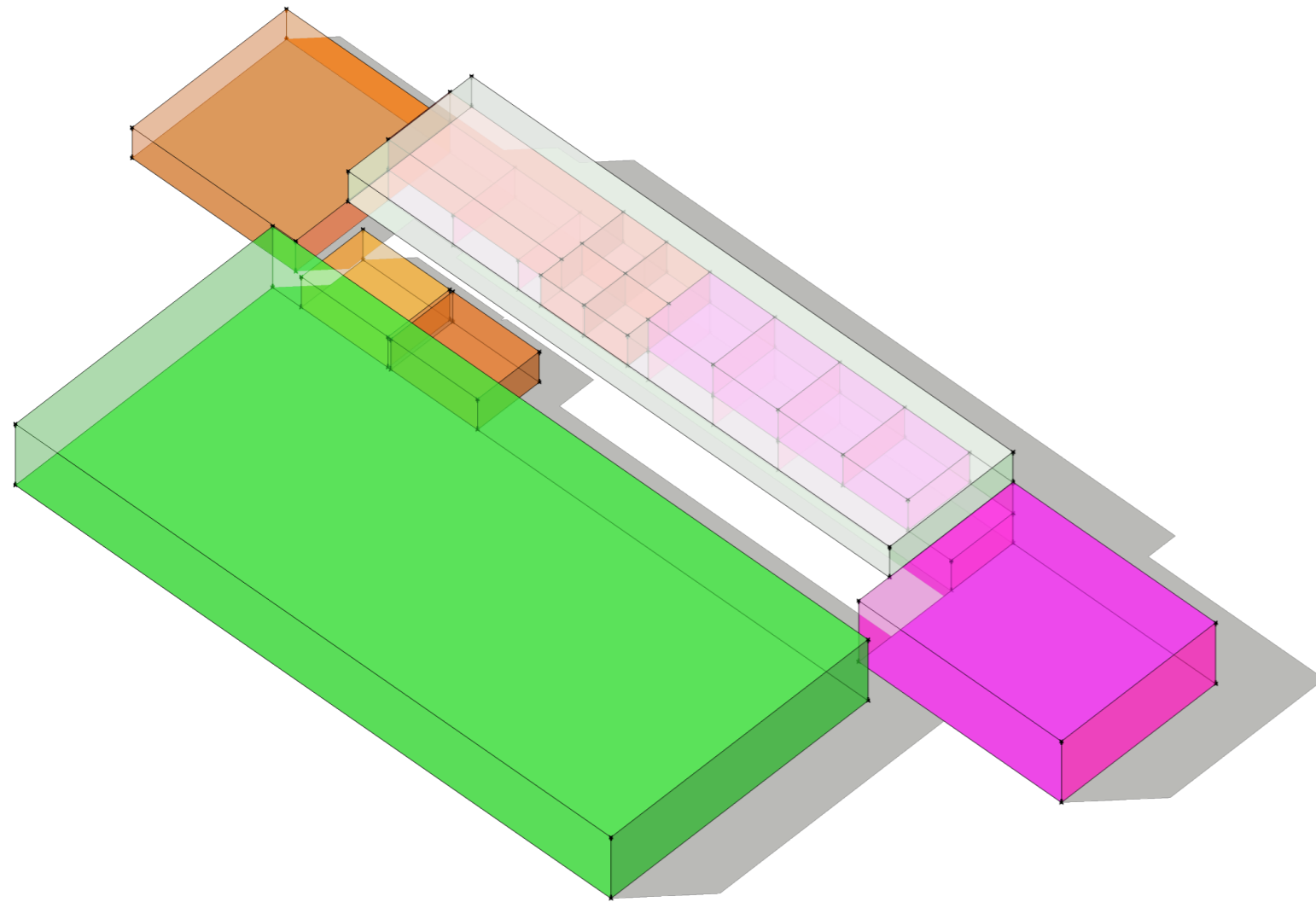
- Daylight North / South
- Public / private space denoted by longitudinal/breakout
- Shorter active facade
- Good potential for spill-out spaces

Mixed use facilities + laboratories
2310m²

Manufacturing space
1375m²

Atrium
580m²

TOTAL
4265m²



OPTION 4

'COMPACT 2 - hallway'

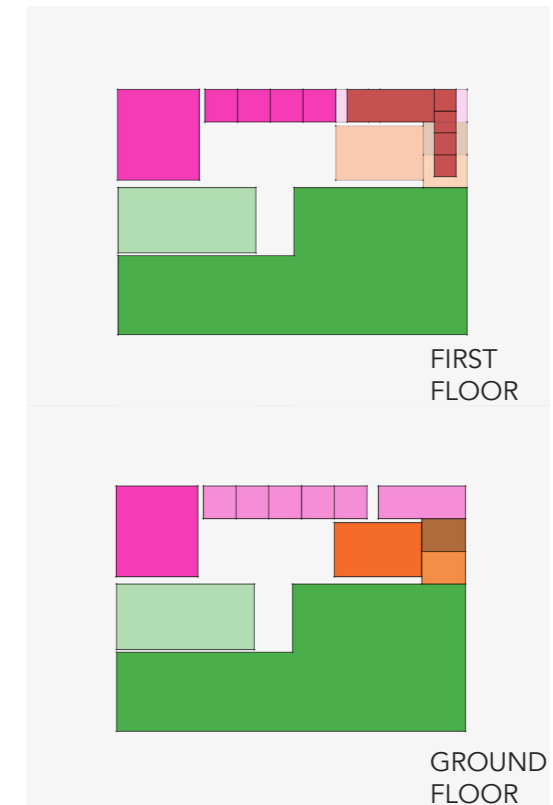
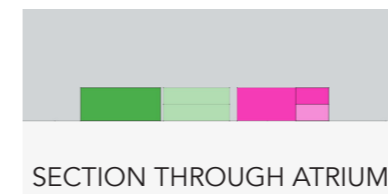
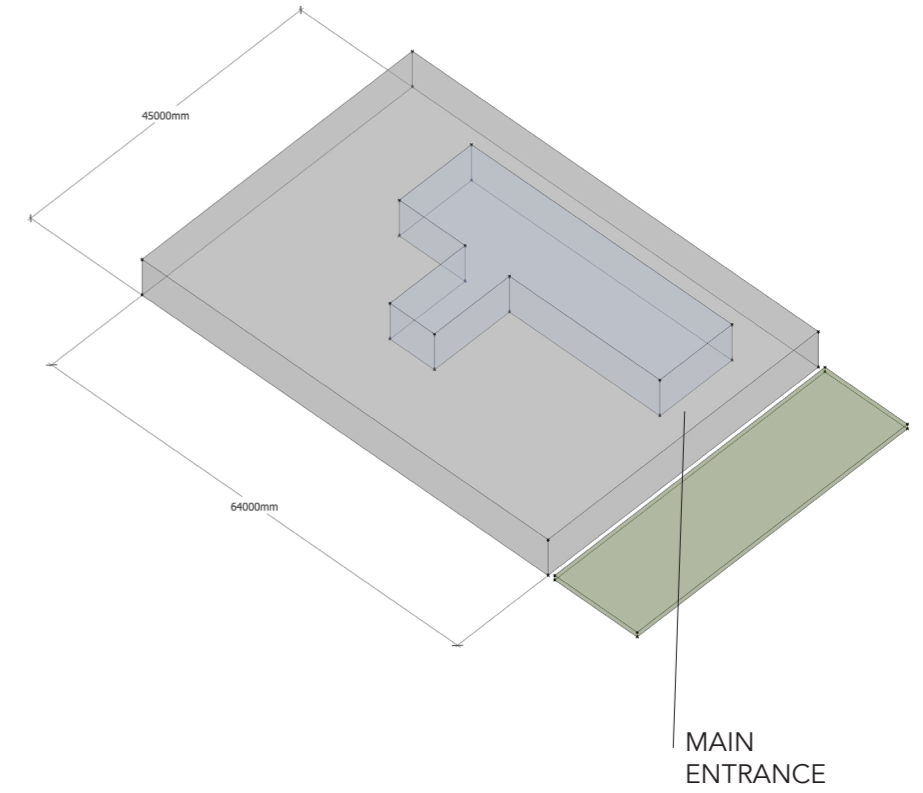
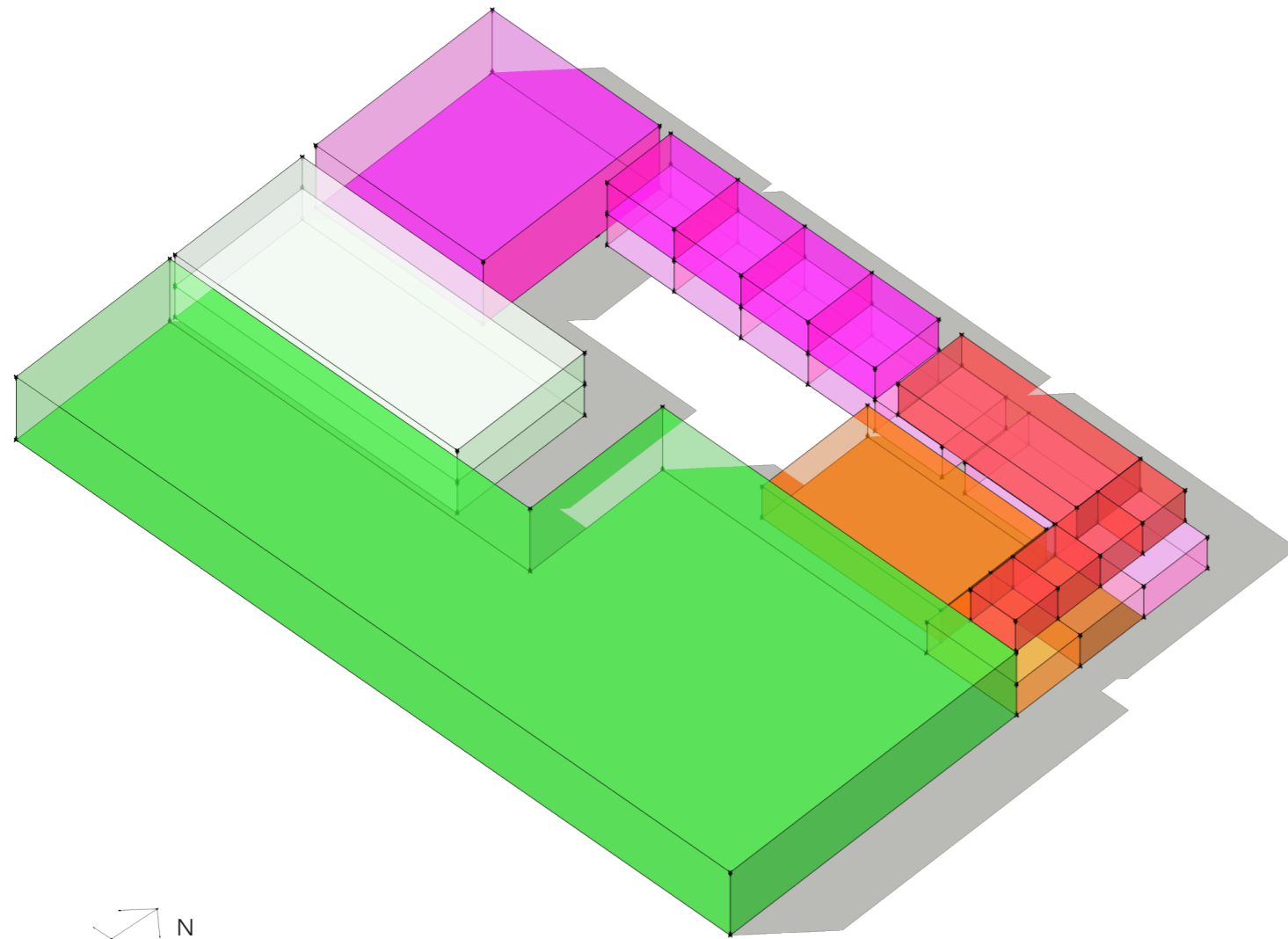
- Central atrium and core
- Partial toplighting

Mixed use facilities + laboratories
1857m²

Manufacturing space
1326m²

Atrium (not including cafe/reception)
330m²

TOTAL
3513m²



OPTION 5

'ATTENUATED'

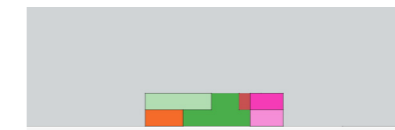
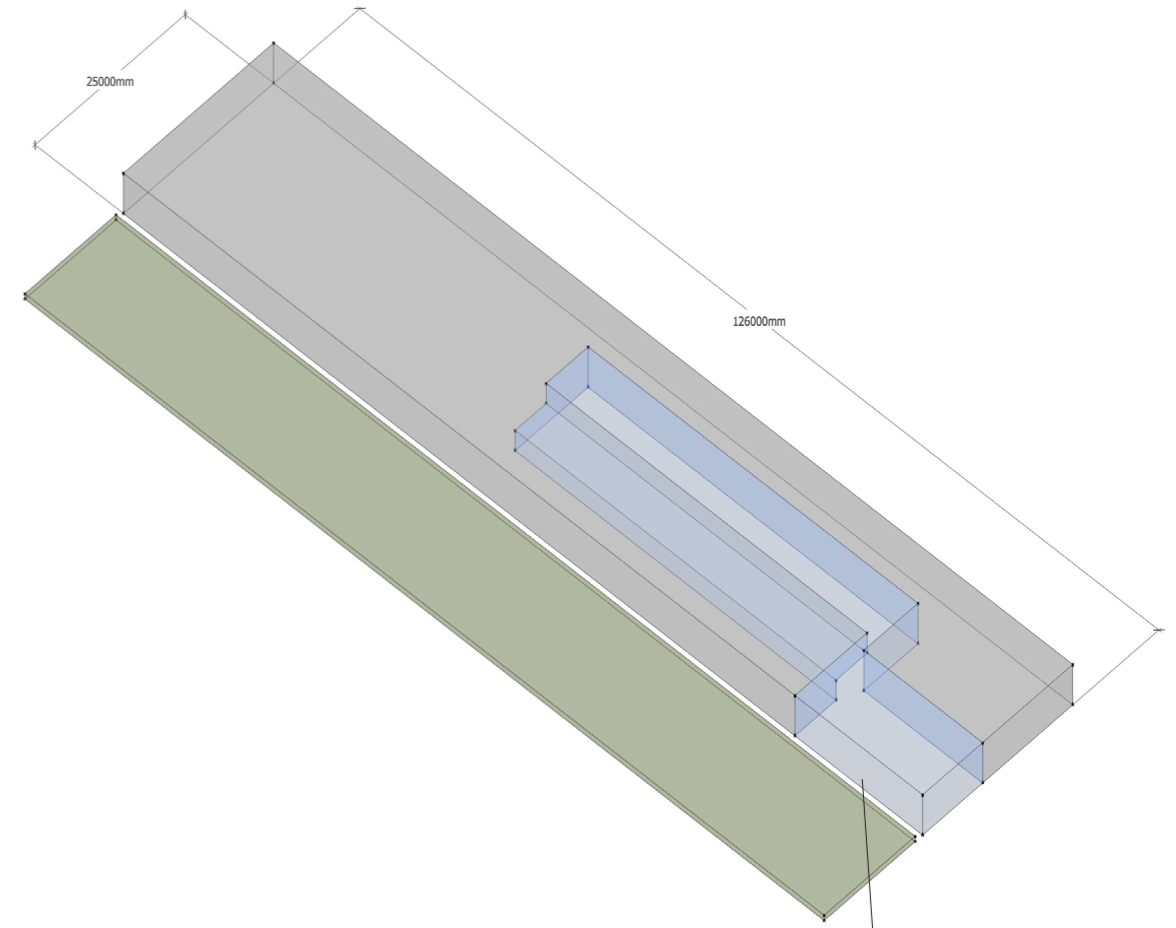
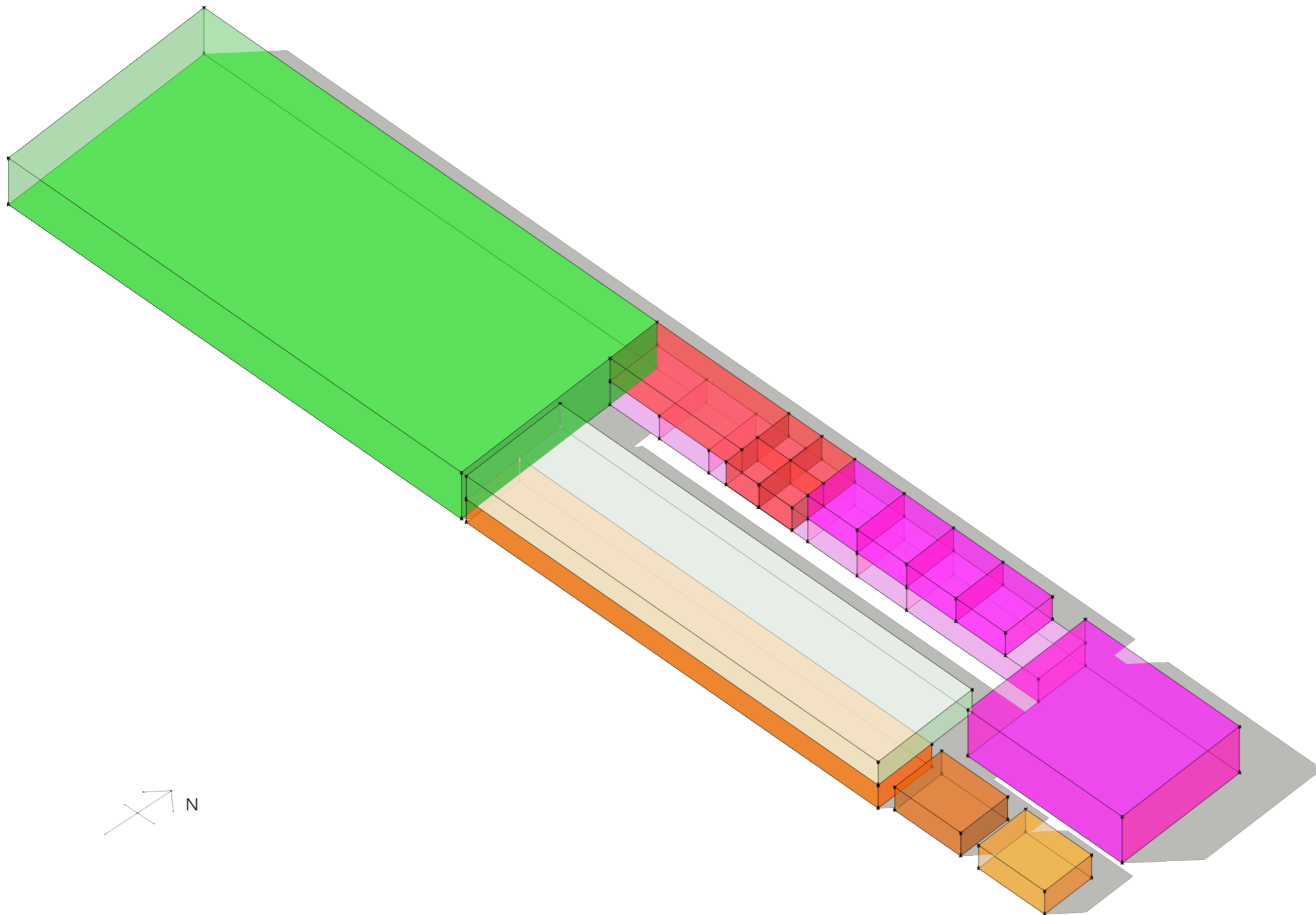
- Very long active facade
- Enhanced separation of manufacturing and other uses
- Central atrium / street
- Flexible usage of manufacturing space

Mixed use facilities + laboratories
2110m²

Manufacturing space
1375m²

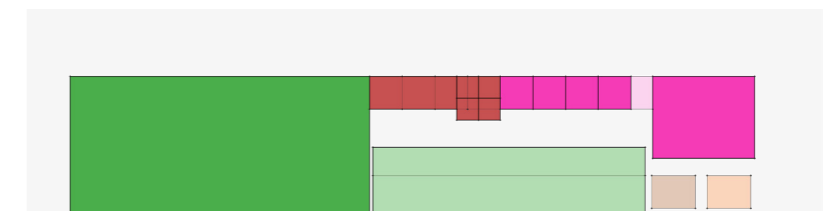
Atrium (not including cafe/reception)
622m²

TOTAL
4107m²

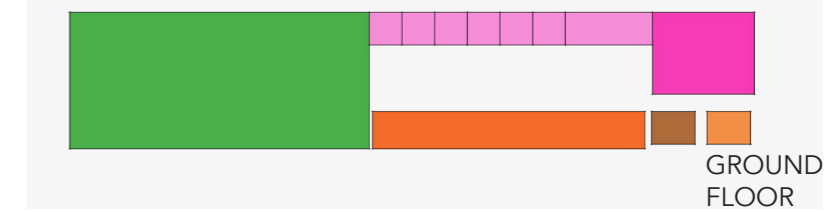


SECTION THROUGH ATRIUM

MAIN ENTRANCE



FIRST FLOOR



GROUND FLOOR

DEVELOPMENT

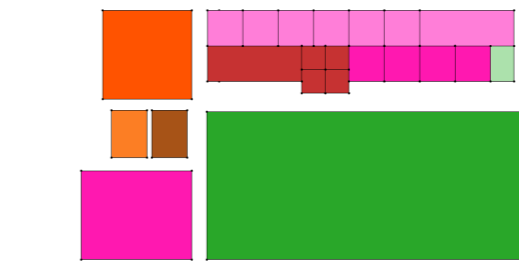
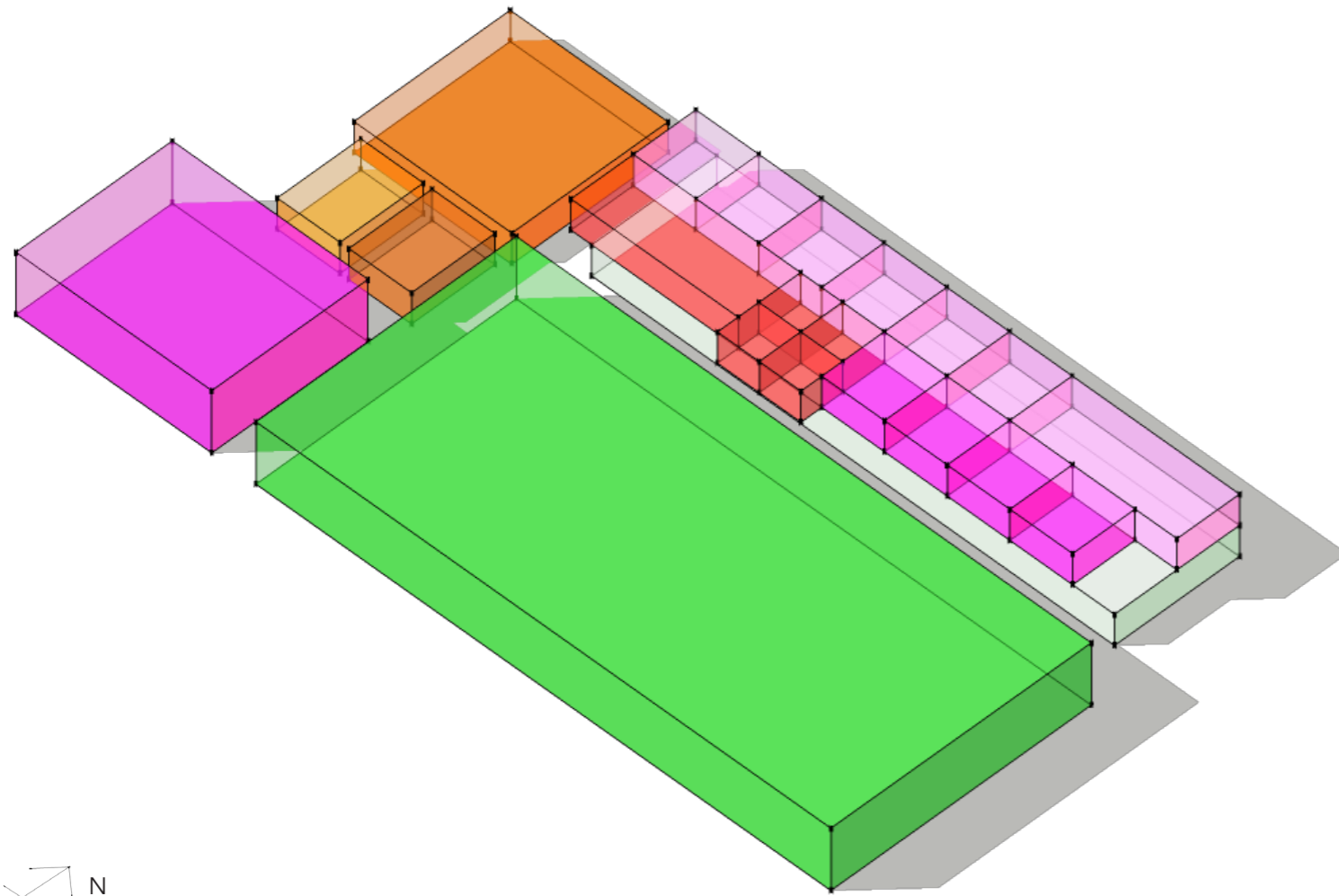
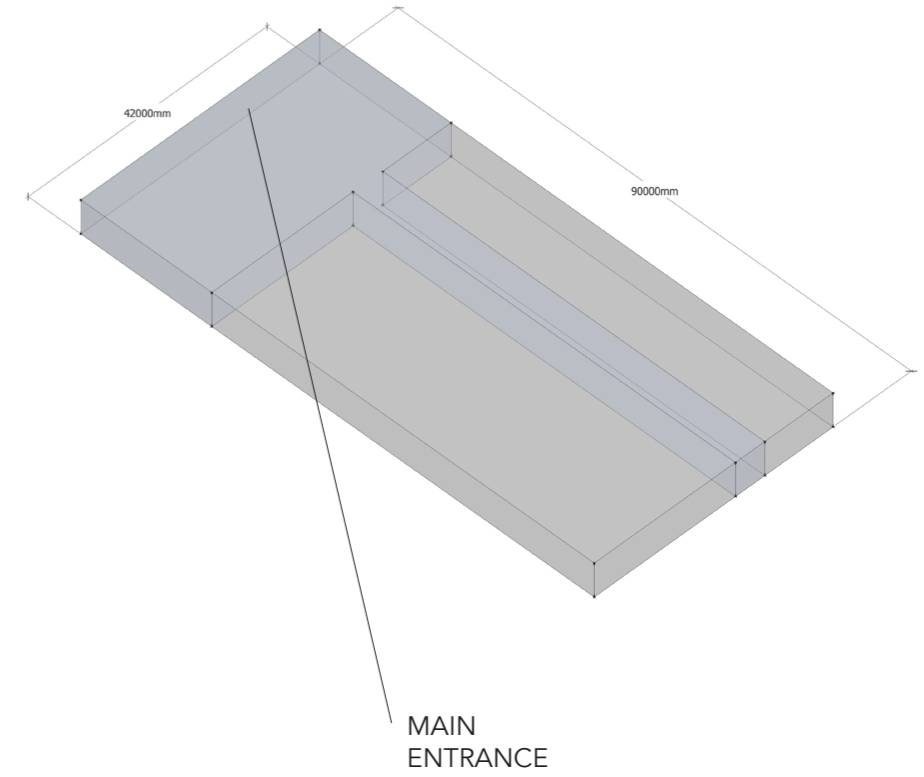
chosen version based on option 3:
a two storey 'street'

Mixed use facilities + laboratories
1440m²

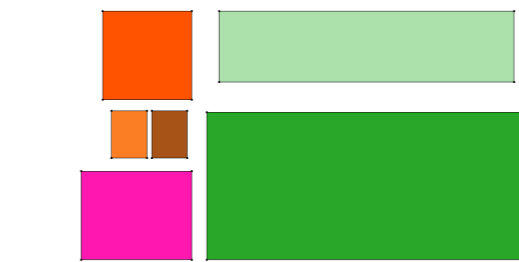
Manufacturing space
1728m²

Atrium / cafe / auditoria
1188m²

TOTAL
4356m² + auxiliary



FIRST FLOOR



GROUND FLOOR

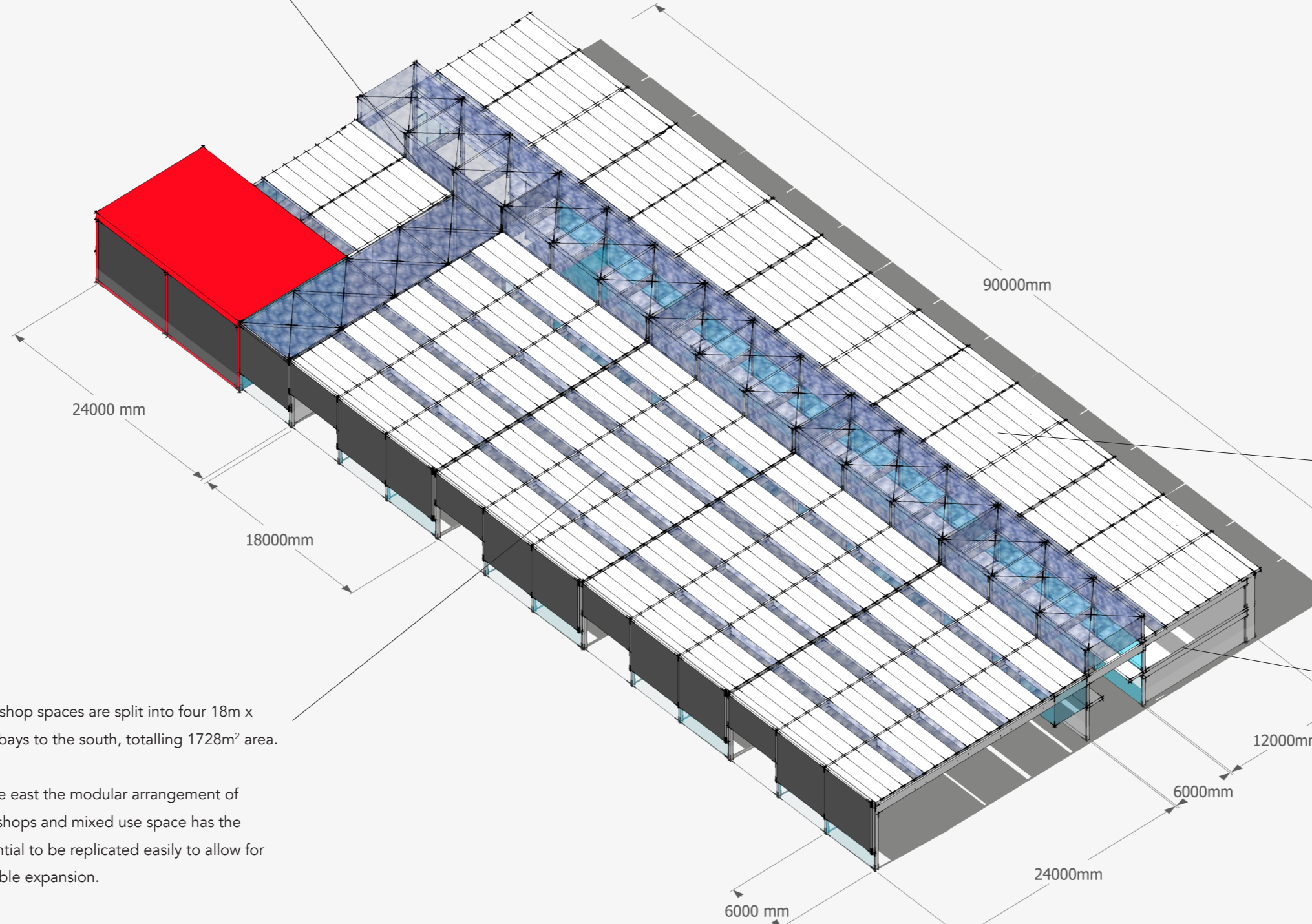


arrangement

The cafe, entrance space, auditoria and showrooms are grouped at the west end of the building

We have chosen this option as it fits the functional brief most closely and provides potential for an Energy Plus building. The orientation, sizing of facades and active roof have been optimised.

The building has been set on a 6 metre grid which affords a number of possibilities of modular, additive and flexible construction and use.



Workshop spaces are split into four 18m x 24m bays to the south, totalling 1728m² area.

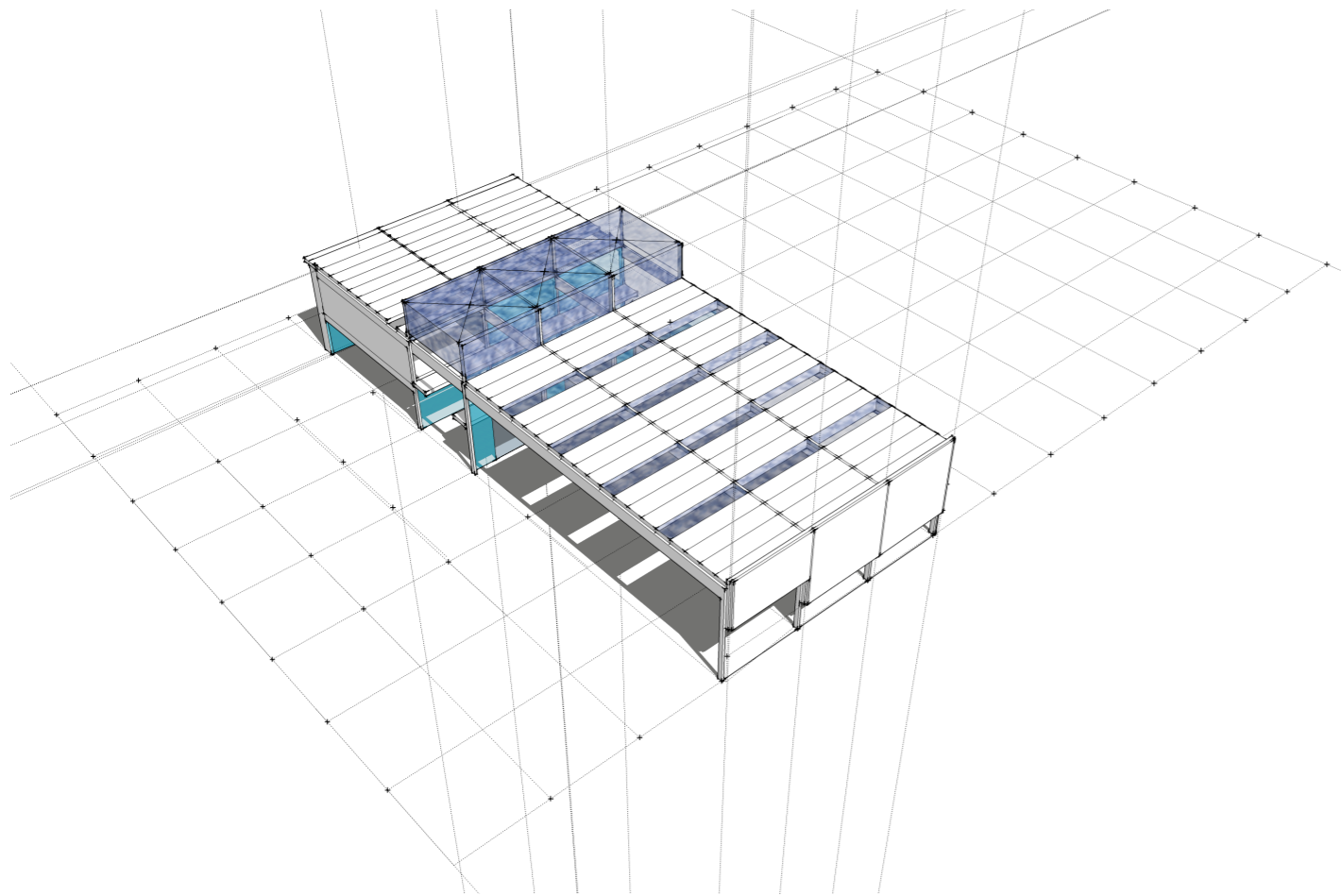
To the east the modular arrangement of workshops and mixed use space has the potential to be replicated easily to allow for possible expansion.

The northern edge houses laboratories to the ground floor on a grid of 6m x 12m, giving 720m² working space in ten bays. Above them the business development centre, management offices and learning spaces fit into the same grid which offers flexibility and cohesion.

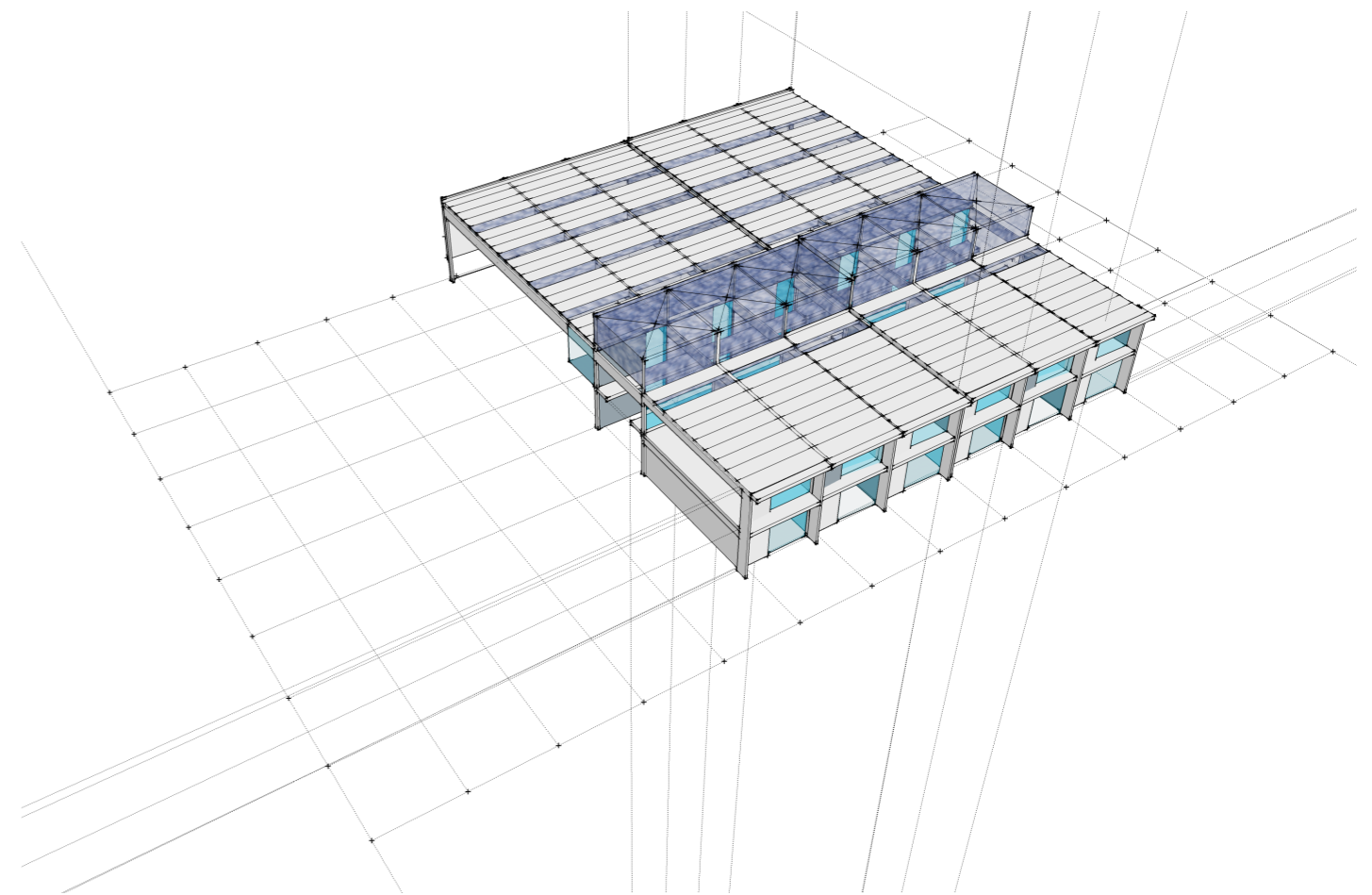
At each end a stair core housing plant and WCs provides access to the ground floor.

modularity and flexibility

1 bay



2 bays combined



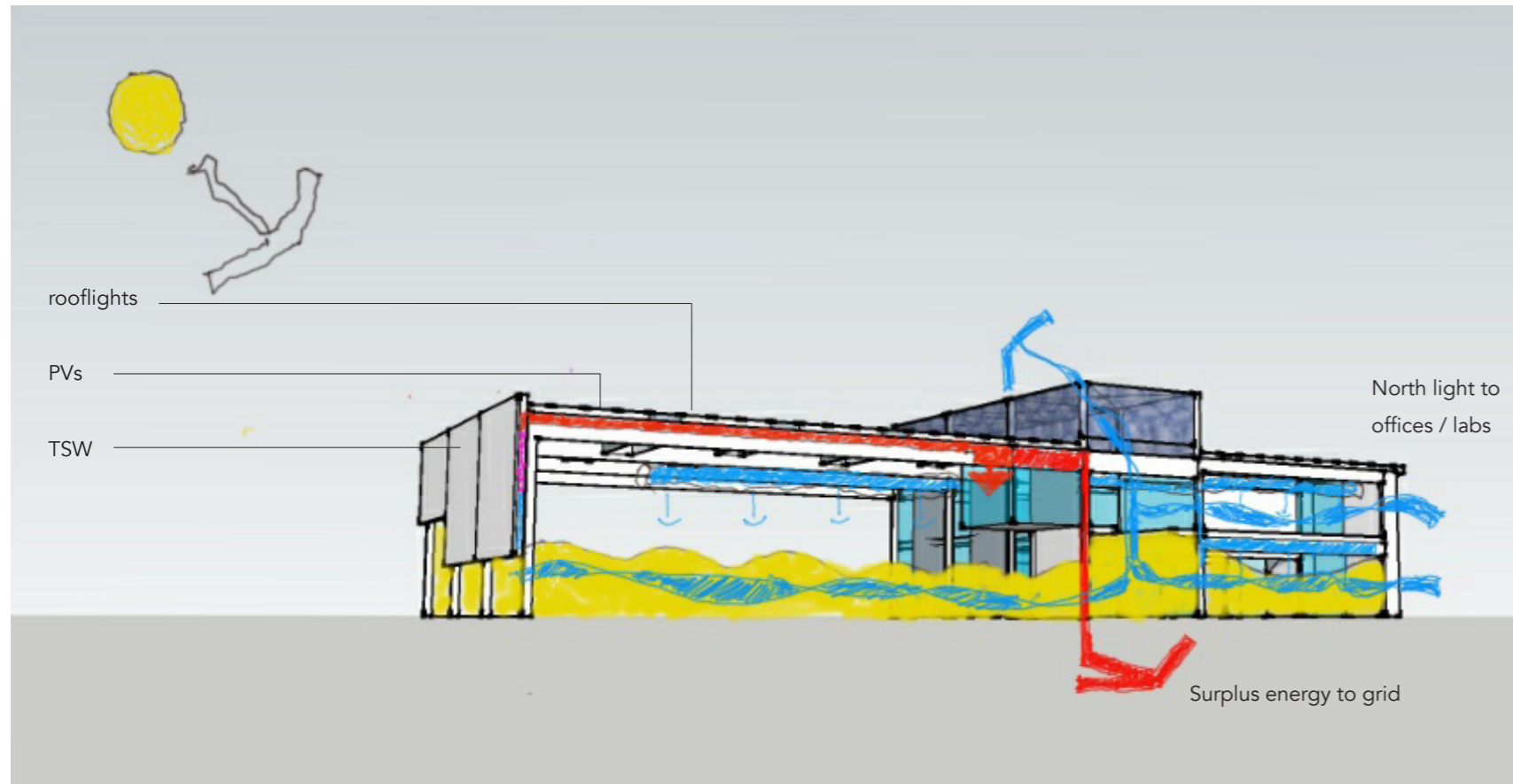
Although without fully knowing letting strategies at this stage it is proposed that the scheme could be developed and let in a number of stages.

A functional unit of 18m wide south facing workshops, separating street and north facing 3x 6m bays of laboratories and office/education above has been configured.

This enables the scheme to advance in these modules if required.

The environmental strategy is configured in the same way - each module is optimised for environmental comfort and low carbon design, and each module has its own plant and equipment enclosure.

low carbon design



SUMMER

Building is 'free-running', with natural ventilation and daylighting.

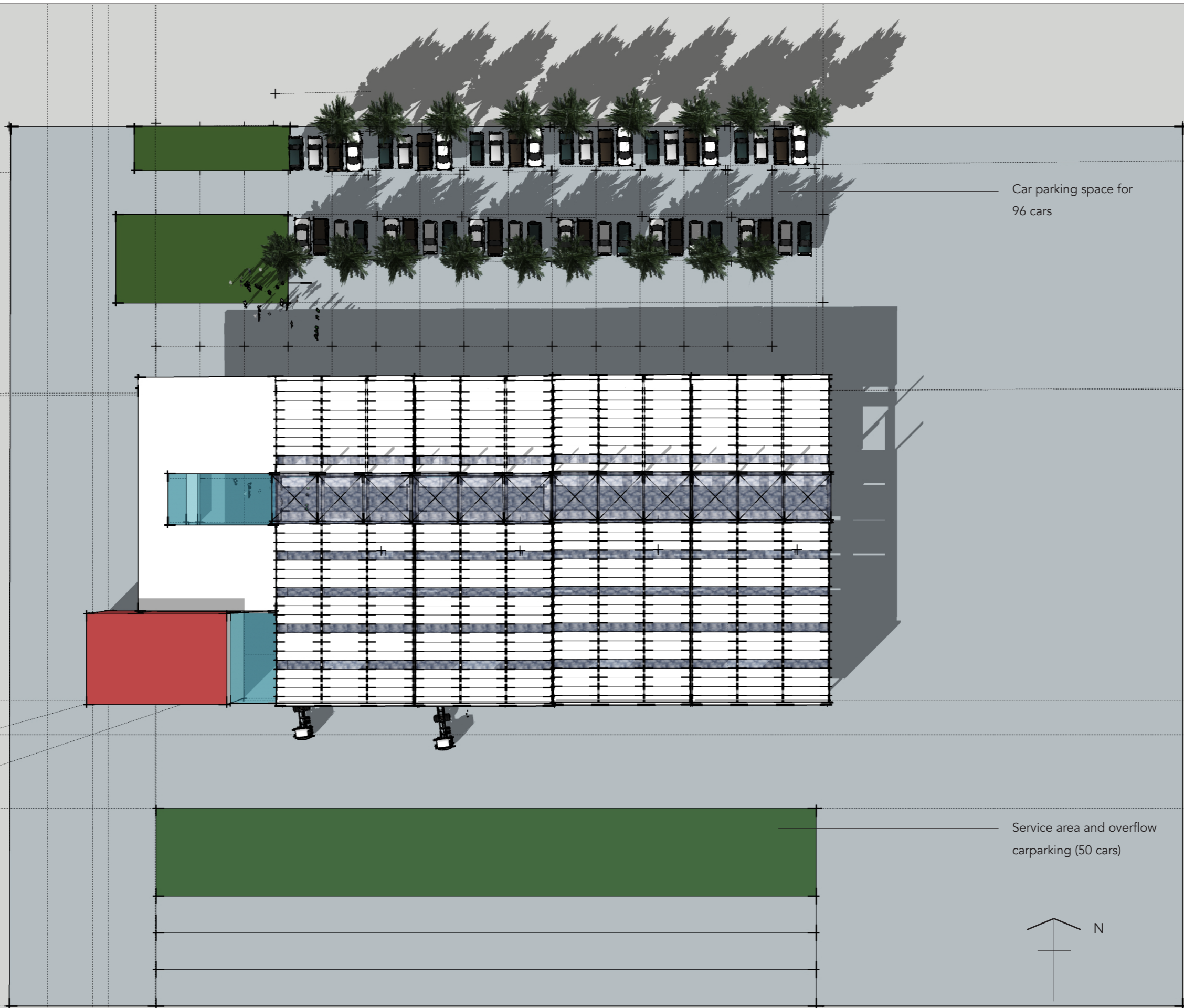


WINTER

Building is powered by TSWs and PVs.

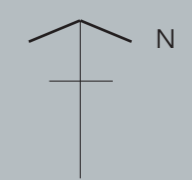
The building will employ the intelligent use of renewable energy technologies to generate its own energy. 500m² of transpired solar wall on the south facade is combined with 400m² of roof mounted PVs. Additionally the building is insulated to an average of 0.15W/m²C for opaque elements and the roof has been configured to enable daylighting throughout: 500 lux for production areas and 300 lux for classrooms, offices and laboratories (see left).

SITE PLAN

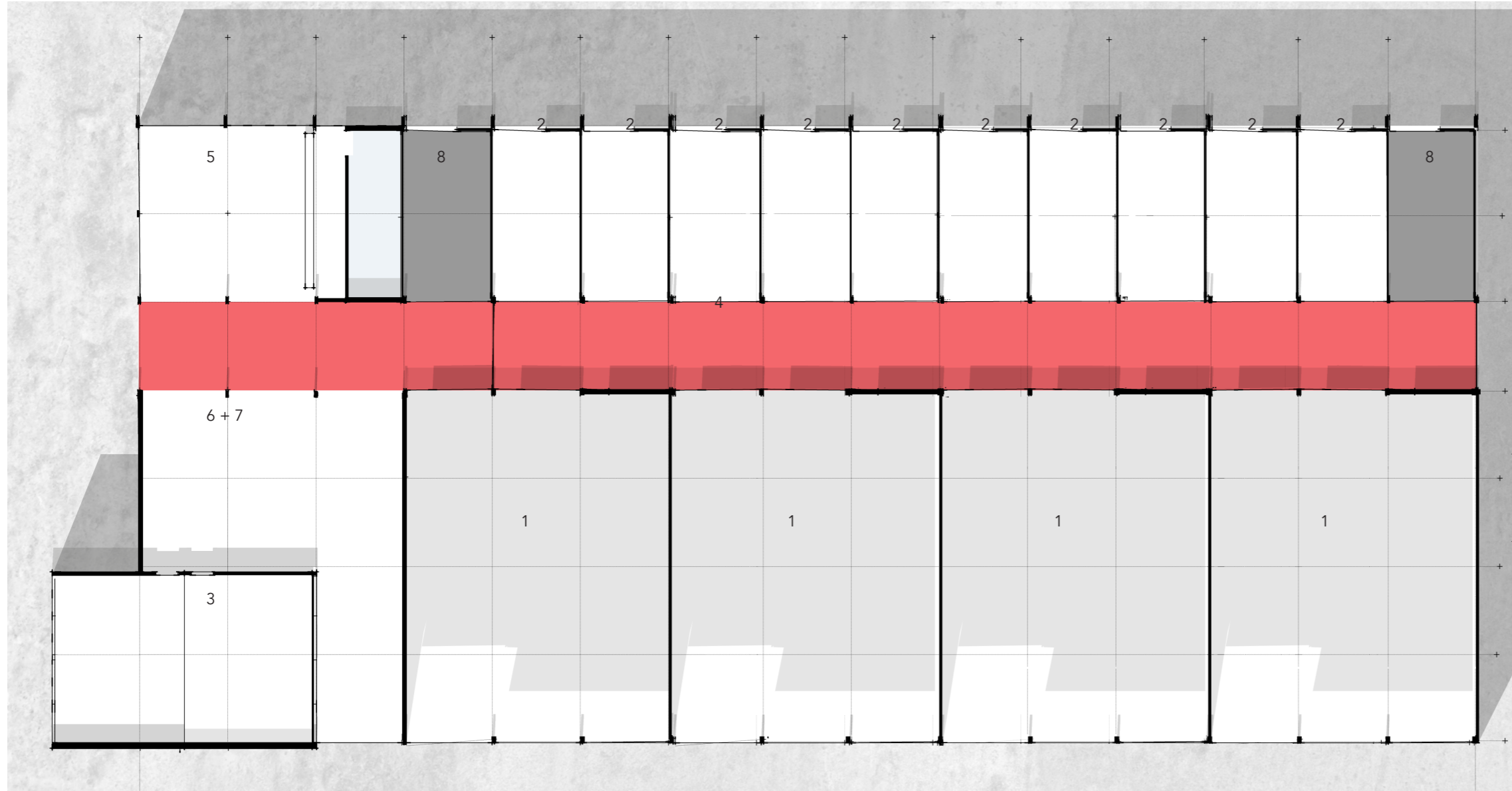


Car parking space for
96 cars

Service area and overflow
carparking (50 cars)

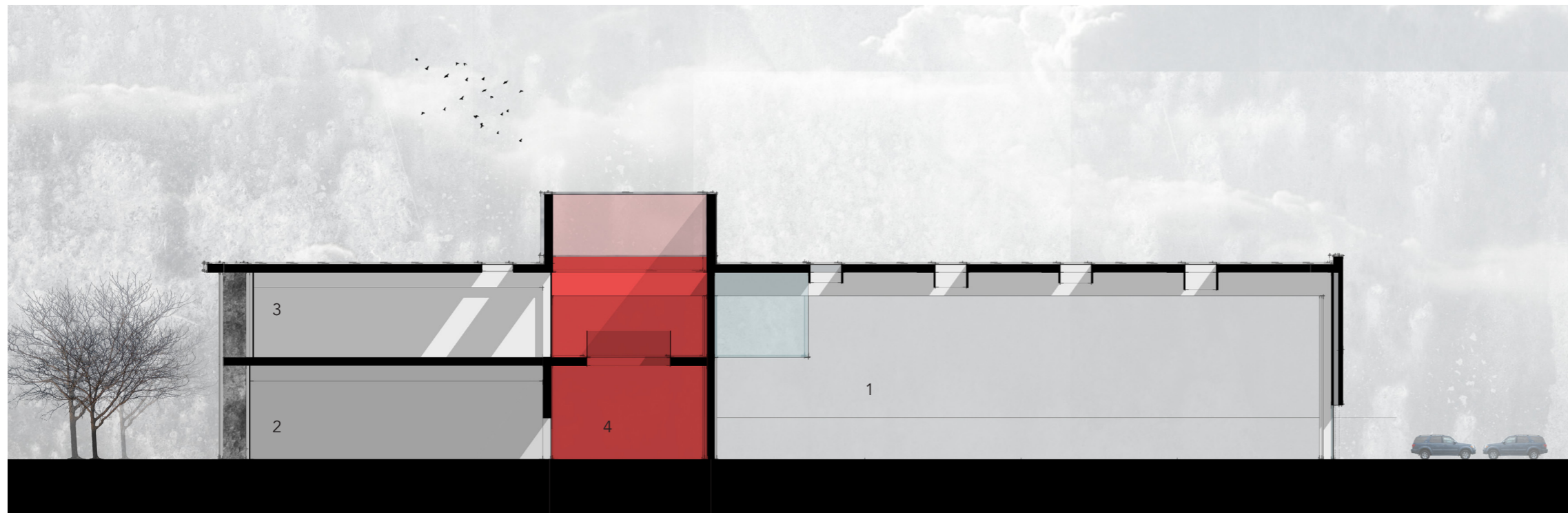


PLAN AND SECTION



GROUND FLOOR PLAN

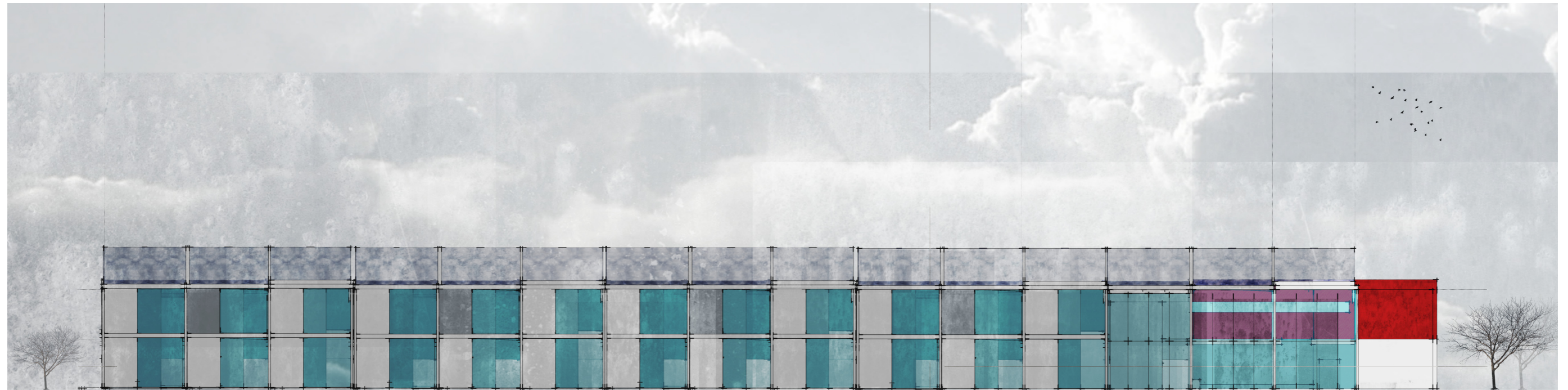
- 1 Workshops
- 2 Laboratories
- 3 Auditorium
- 4 'Street' / Atrium
- 5 Cafe
- 6 + 7 Entrance / reception / showroom / exhibition space
- 8 Service cores



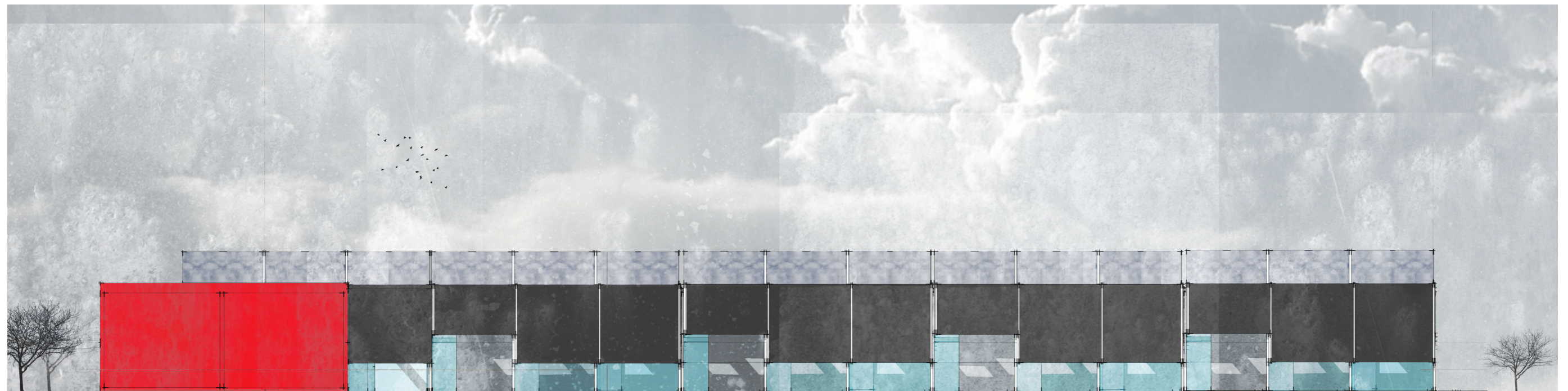
SHORT SECTION THROUGH WORKSHOPS

- 1 Workshops
- 2 Laboratories
- 3 Education / offices / Business Development Centre
- 4 'Street' / Atrium

ELEVATIONS



NORTH ELEVATION



SOUTH ELEVATION

3D REPRESENTATIONS



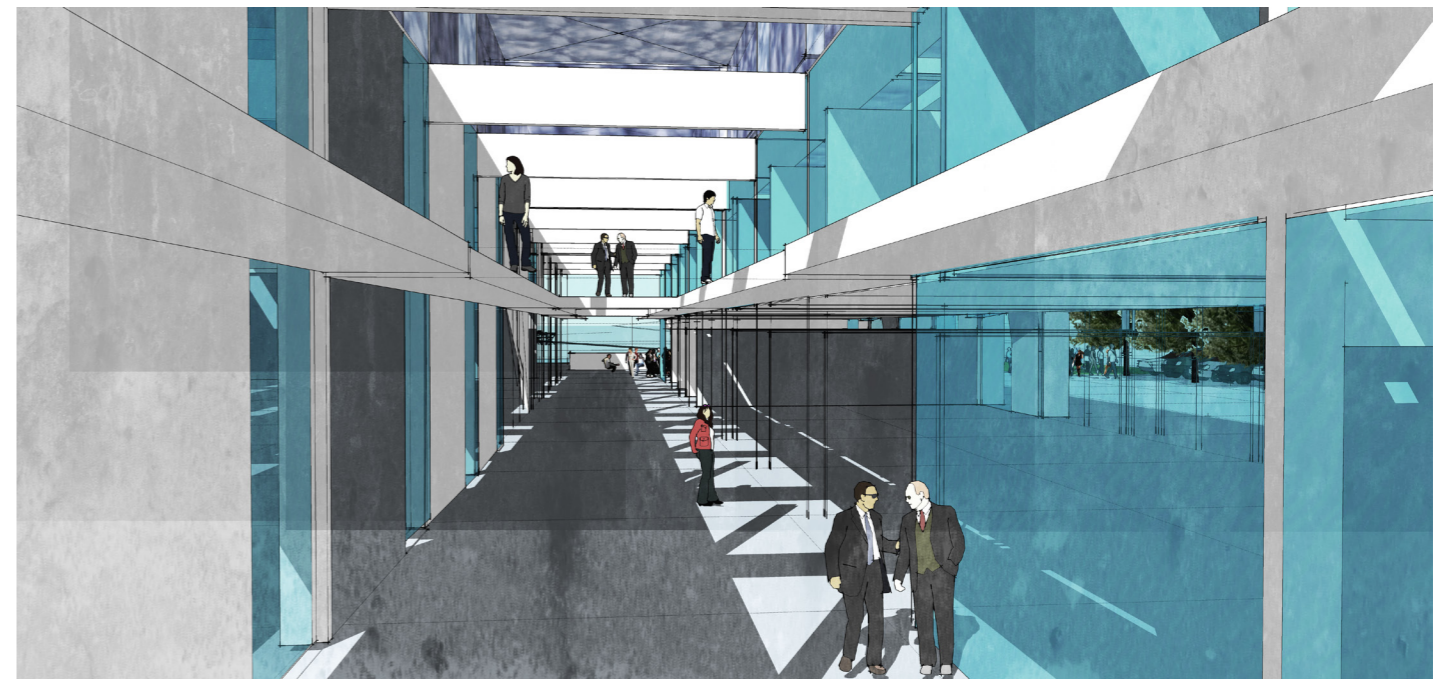
SOUTH FACADE VIEW



ENTRANCE FOYER, CAFE AND STREET



NORTH ENTRY VIEW



STREET VIEW