SHAPING OUR FUTURE

‘Our challenge is to become a leading global university.’

Professor David Eastwood, Vice-Chancellor

Edgbaston Central Campus Development

Hybrid Planning Application

March 2012

Design and Access Statement Appendix A New Sports Centre Project 1

UNIVERSITY OF BIRMINGHAM

UNIVERSITY OF
BIRMINGHAM

UoB Sports Facility

design access & impact statement

(0755 doc 19)

executive summary

Design, access and impact statement

This document has been prepared by Lifschutz Davidson Sandilands, in conjunction with the design team listed in section A1, and forms part of the Edgbaston Central Campus Development hybrid planning application submitted by the University of Birmingham. This document specifically relates to redevelopment proposals for the south-eastern corner of the University of Birmingham's main Edgbaston Campus (National Grid Reference [NGR] of 405050, 283370). The total site area is approximately 2.48 hectares, and is currently split into two areas; the existing 'south car park' covering the upper two thirds of the site, and the 'Gun Barrels' public house, covering the lower third of the site.

The site location is shown on drawing 0755/P0101 submitted as part of this application.

The purpose of this document is to set out the analysis, design development and concepts that have been applied to the proposals. In addition, accessibility both to and within the development has been addressed.

This document has been prepared in line with both CABE's guidance on design and access statements and government guidance as contained in PPS1 'General Policy & Principles' and Circular 01/2006. The latter of which advises that such statements be submitted with planning applications and states that proposed development should be considered in relation to the wider context and not just the development site and its immediately adjacent buildings.

<u>This document contains:</u>
- scheme proposal and design statement
- townscape and visual relationship analysis
- landscape and external works design statement
- accessibility statement
- lighting concept design statement
- site drainage design statement
- structural strategy design statement
- piling strategy design statement
- mechanical and electrical design statement
- environmental noise survey design statement
- technical considerations

<u>This document should be read in conjunction with the following documents submitted as part of the hybrid planning application</u>
- hybrid planning statement
- hybrid application forms
- hybrid application design and access statement
- hybrid transport statement, particularly WSP New Indoor Sports Centre appendix document
- hybrid Ecology & arboriculture statements
- hybrid archaeology report
- hybrid flood risk assessment report

contents

1.0 Project team

Project team

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2.0 introduction

The University of Birmingham' new Indoor Sport Facility is sited on an existing brownfield site, located at the South East corner of the Edgbaston Campus. In total the site extends to approximately 2.48 hectares.

The facility will accommodate a 50meter swimming pool, inclusive of a movable floor and boom, a 12 badminton court sports hall with 700 bleacher seats, hybrid sports hall, 6 squash courts, large members gym, performance gym and wellbeing centre, spa, two activity rooms, dojo and a climbing wall. The facility will be backed up by office, administrative, back of house and service accommodation commensurate with a new indoor sports facility of this scale and is being engineered to provide an Environmental Performance Certificate rating of 'A'.

The new Indoor Sports Facility University will be a world-class facility which significantly enhances the student and staff experience and the city itself. From the elite athletes representing the University in over 50 sports to the highly successful Active Lifestyle programme encouraging exercise in daily life, the new Indoor Sports Facility will build on the University of Birmingham's exceptional reputation as one of the UK's leading sports universities.

The UoB Sports Facility signposts the campus to the local community through high quality architecture, providing new physical routes into the campus and a strong social connection through employment, participation and access to world class events.

As Britain's second largest city, Birmingham has a wealth of cultural assets and striking new architecture. The new Indoor Sports Facility will complement the leafy red brick campus with world-class architecture.

Edgbaston campus

site boundary

1. main entrance

2. external landscaping / amenity

3. cafe/ public terrace

4. view into pool

5. pedestrian link/ route

6. arcade access

7. plant enclosure

8. car park

9. service yard

10. visible activity

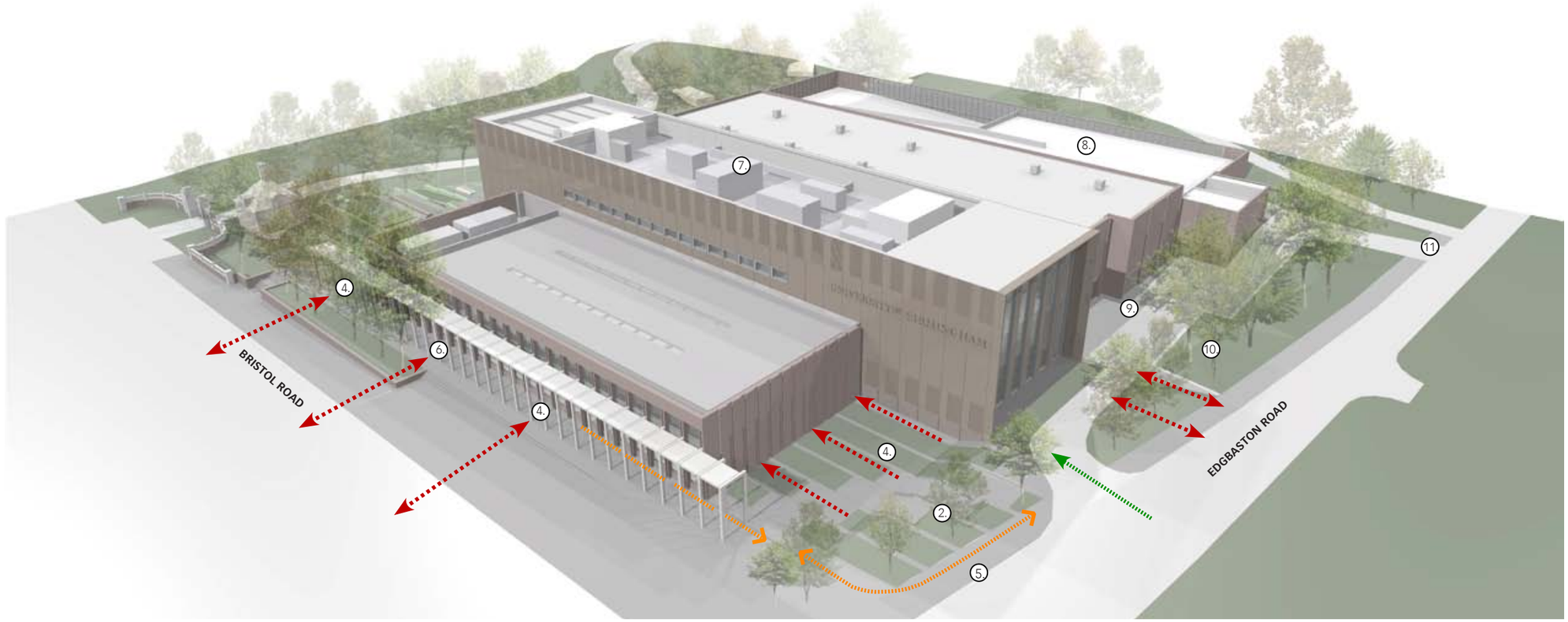
11. car park entrance

key

routes

views

Service vehicle access



3.0 project overview

The University of Birmingham' new Indoor Sport Facility is an integral part of the overall UoB hybrid planning application submitted by Turley Associates on behalf of the University.

The new sports facility will replace the current Munrow Sport Centre, constructed in the 1960's, which fails to meet current sport standards or the Universities sporting requirements. The new facility will enhance the ability of the University to attract the best students, achieve sporting excellence and enhance user experience in line with its vision of becoming a premier global University.

Principle design objectives include:

- an architecturally excellent building at a prime gateway into the University, advertising the campus to the wider city
- a functional, high quality indoors sports facility allowing for future internal flexibility
- achieve an EPC A rating and BREEAM excellent

UoB Sport have identified their strategic goals as follows:

- participation - wellbeing, balanced lifestyles, recruitment, reputation & VFM
- performance - BUCS ranking, reputation, profile recruitment
- leadership & employability through sport
- business sustainability

The building format and composition sympathetically responds to the existing topographical context, hugging the existing plateaus, thus limiting the volume of import/export fill and reducing off-site vehicular impacts. Four main building elements sit upon this topography, these being; the swimming pool, core accommodation, sports halls and car park.

The swimming pool is located along the south of the site, maximising the University's opportunity to engage with Bristol Road and advertise sport activities to the public. As sport halls and squash courts do not require any natural light they have been located to the rear of the site, sitting between the car park structure and the core accommodation block. The remaining sports accommodation has been strategically positioned between the swimming pool and the sports halls, permitting visual connections throughout the building and beyond. This element is therefore defined as the core of the building. To the north of the site, the car park structure has been imbedded between the sports halls and an existing retaining wall approximately 8.4meters in height.

a.

b.

c.

a. View of the Jospeh memorial clock tower

b. Great Hall and Quadrant range

c. Barber Institute of Art

3.1 University of Birmingham

A brief history

The University of Birmingham grew out of the radical vision of first Chancellor, Joseph Chamberlain and was established by Queen Victoria under Royal Charter in 1900.
The 25-acre (100,000 m2) main Edgbaston campus is located approximately 2.5 miles to south-west of Birmingham's city centre.

The first phase of building work on the campus was completed in 1909 under the auspices of the esteemed architect Sir Aston Webb and is arranged around the Joseph Chamberlain Memorial Clock Tower. The University of Birmingham represented a new model for higher education, this was England's first civic university, where students from all religions and backgrounds were accepted on an equal basis.

The campus has a wide diversity in architectural typologies and architects and is home to the Barber Institute of Fine Arts and the Lapworth Museum of Geology.

Today, the Universities population stands at approximately 28,000 students and 6,000 staff, making the University of Birmingham the largest university in the West Midlands and 11th largest in the UK.

In August 2011 the University announced a £175M, five year investment plan to transform the Edgbaston campus, reinterpreting founder Joseph Chamberlain's vision for the estate for the 21st century and extending the services available to the local community. One of the key developments announced within the plan was the UoB Indoor Sports Facility.

4.0 site analysis

campus geometry:
North-south axial relationship of core campus buildings to Joseph Chamberlain Memorial Clock Tower.
Radial relationship of buildings:

- zone 1: Aston Webb, Great Hall, Bramall music building, Physics, Poynting,
- zone 2: Physics buildings (east), Barber Institute, the Guild of Students (east), Old Gym (west), Haworth building (west), Bioscience,
- zone 3: Business School (east).

The site of the new indoor sports centre sits adjacent to the radial geometry of chancellor's court but largely within the orthogonal grid running along Bristol Road.

campus geometry

primary relationship to the clock tower
secondary relationship to the clock tower
buildings that respond to an independent geometry on the campus

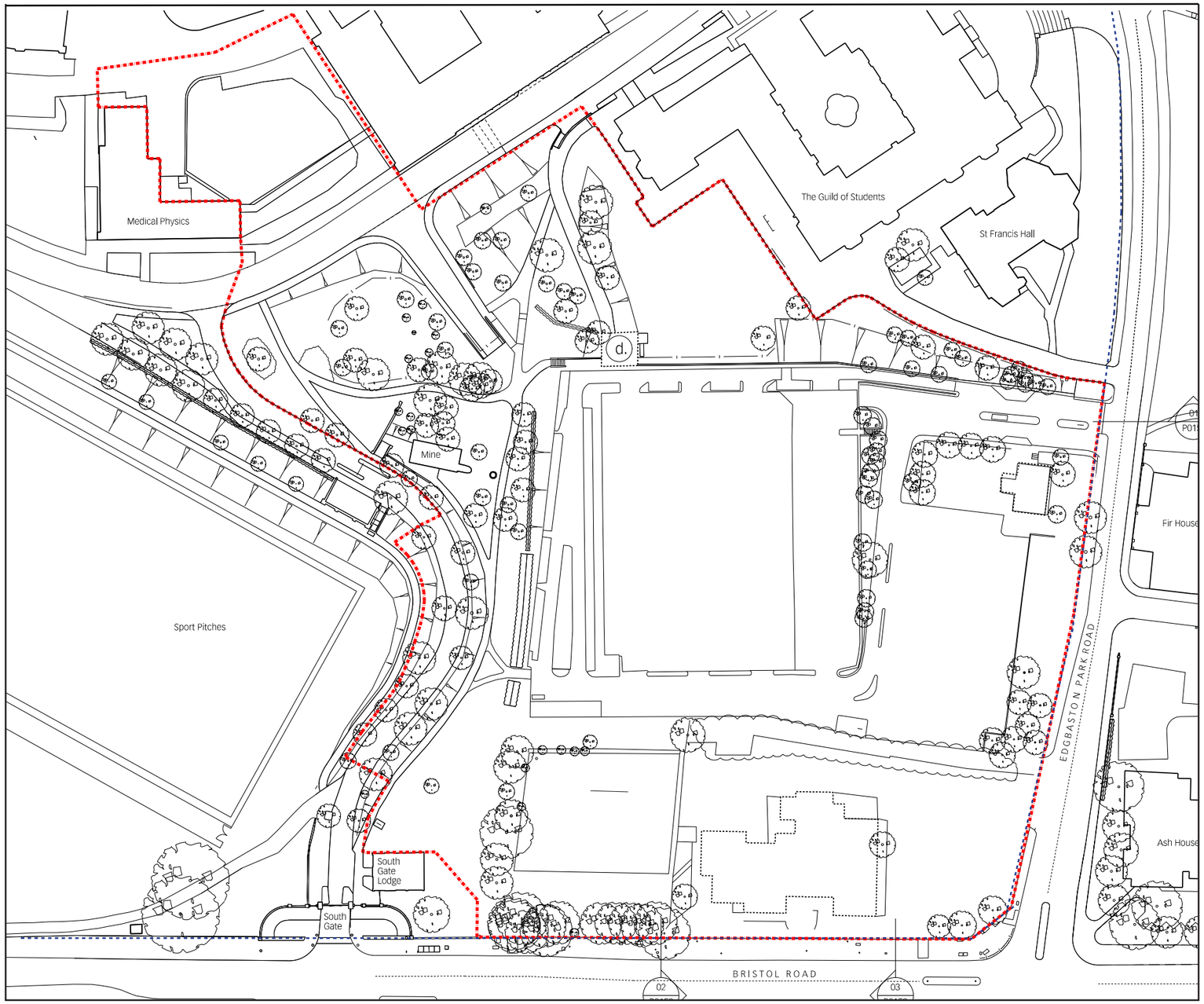
campus entrances:
4no key perimeter entrances serve the core campus for both pedestrians and vehicles:

1. University Road (west),
2. Pritchatts Road (north),
3. Bristol Road (south),
4. Edgbaston Park Road (east).

The site is located next to two of these entrances, one at edgbaston park road, which primarily serves vehicles and on at south gate, which is used by both pedestrians and vehicles.

campus entrances

vehicular routes
railway
student access flow
vehicular/pedestrian access point
symbolic access



Site plan

4.1 site context

a.

b.

General

The site is located on the south-eastern corner of the University of Birmingham's main Edgbaston Campus (National Grid Reference [NGR] of 405050, 283370) and is currently split into two areas; the existing 'south car park' covering the upper two thirds of the site, and the 'Gun Barrels' public house, covering the lower third of the site.

Relating to the distinctive geometries of the Aston Webb buildings and Chancellors Court within the heart of the University, designed and built by architect Sir Aston Webb in 1909, the proposed development shall act as a gateway drawing students and the wider public onto the campus.

The site is a key gateway for visitors to the University and a landmark to people passing the site. The site sits adjacent to a formal pedestrian and vehicular campus entrance from Bristol Road (South Gate) and approximately 120m to the south a formal pedestrian and vehicular campus entrance from Edgbaston Park Road (East Gate).

South Car Park

The south car park site is bound by Edgbaston Park Road to the east, the Gun Barrels site to the south, South Gate Road to the west and an existing retaining wall to the north, retaining the Guild of Students lawn.

The site is predominately occupied by surface level car parking, other than a small cottage (No. 101 Edgbaston Park Road) and associated garden on the east side of the site. There is a model mine including a small single storey brick built entrance building to the west of the site. The mine does extend into the south car park site.

Levels vary across the site from approximately 124m Above ordnance Datum (AoD) on the Gun Barrels boundary to 134m AoD on the Guild of Students lawn, although much of the site is at the lower level. The change in level is created by a concrete retaining wall to the north, approximately 8.4m high. There are also a number of other smaller concrete and brick retaining walls across the site to cater for changes in level as the site rises up towards the east.

Vehicular access to the site is from Edgbaston Park Road, adjacent to No. 101. Currently there are a number of footpaths and steps in the North West corner of the site to provide pedestrian access to the main campus. We propose to maintain such connections and create a fully Part M compliant route into the heart of the campus.

Gun Barrels Site

The Gun Barrels site is bound by the car park to the north, Edgbaston Park Road to the east, The A38 Bristol Road to the south and the University south gate and lodge house to the west.

The site is occupied by the public house in the centre of the site, with a beer garden to the west and car park to the east. Levels vary across the site from approximately 121m AoD on the southern edge adjacent to the Bristol Road, to 124.5m on the northern boundary with the car park. A brick built retaining wall approximately 1m high is present on the northern boundary to cater for the level change with the south car park.

There are a number of mature trees on the south western site boundary which are subject to tree preservation orders. This report and accompanying application drawings identify which trees shall be affected by the proposed Indoor Sports Facility. The overall landscape and arborculture strategy has developed in line with BCC guidance provided through the BCC pre application process and on site review.

a. Existing retaining wall

b. Existing Gun Barrels pub

a.

b.

c.

a. View of South Gate Lodge

b. View of lodge

c. South elevation of site along Bristol Road

4.2 planning context

Generally

Throughout the design process the design team, in accordance with the University of Birmingham's requirements, have consulted Birmingham City Council' planning authority.

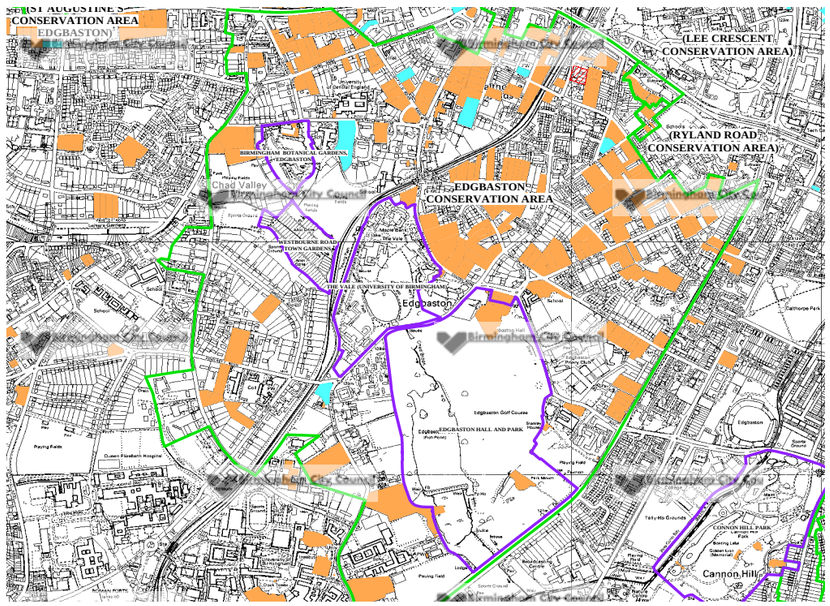
The following pre planning consultation meetings have been completed:
12.09.2011: BCC initial design briefing
04.10.2011: BCC planning consultation 01
07.11.2011: BCC planning consultation 02
21.11.2011: BCC planning consultation 03 (on site)
14.12.2011: BCC planning consultation 04

The following pre planning arbriculture & landscape consultations have been completed:
21.11.2011: BCC landscape and tree site review
17.01.2012: BCC on consultation tree review

Listed Buildings

There are no listed buildings on the site. However, there are a number of listed and notable buildings within close proximity of the site and on the Edgbaston Campus:

South Gate Lodge - inc. gates and wall (Grade II listed)
Aston Webb Buildings (Grade II* listed)
Chamberlain Clock Tower (Grade II listed)
The Guild of Students (landmark building)
The Barber Institute of Fine Arts (Grade II listed)
Ashley Building (Grade II listed)
Science faculty (Grade II listed)
561, The Old Varsity Tavern, Bristol Road (Locally listed - Grade A)
Westley Richards and Co. Ltd, Grange Road (Locally listed - Grade A)



Edgbaston Conservation Area map (green outline)

Heritage

A heritage statement covering the hybrid application proposals, including reference to the Sports Centre proposals is submitted and should be read in conjunction with this Design, Access and Impact Statement.

Conservation Areas

The site is adjacent to Edgbaston Conservation Area, the boundary of which aligns the opposite side of Edgbaston Park Road.

Tree Preservation Orders

There are 21 trees within the site which are subject to Tree Preservation Orders (TPO1977 & TPO 1997). These trees are identified within the accompanying landscape statement. The proposal requires the removal of 5no TPO trees. This has been presented to BCC Planning & Arborculture officers during the pre application consultation process.

The proposal assumes the removal of two rows of conifers along the west edge of the site. It is assumed these were originally planted to screen the multi- storey car park from the South Gate entrance and that as these trees are not in keeping with the wider campus their removal is non contentious with either BCC planning or UoB.

Land Use Designation

Land designations include:

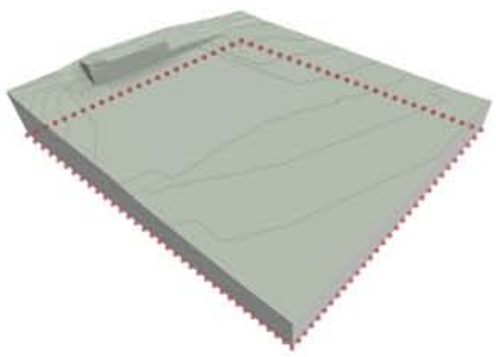
- the Gun Barrels Public House falls within an A4 (drinking establishment) use class
- the car park falls under sui generis land use

The proposed Indoor Sports Centre will sit within D2 (assembly and leisure) land use. The site does not have a particular designation in the adopted Birmingham Unitary Development Plan.

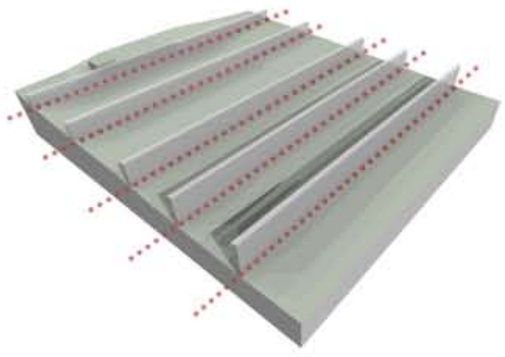
Transportation

The site lies within a highly accessible location. A number of bus stops are located close to the site providing access to a network of bus routes. There are also a number of university run shuttle buses which operate from the campus to other campuses and nearby hall of residences. A train line runs close to the site with a stop within the campus. A detailed Transport Assessment has been submitted as part of this application and is contained within the Hybrid Application Transport Assessment.

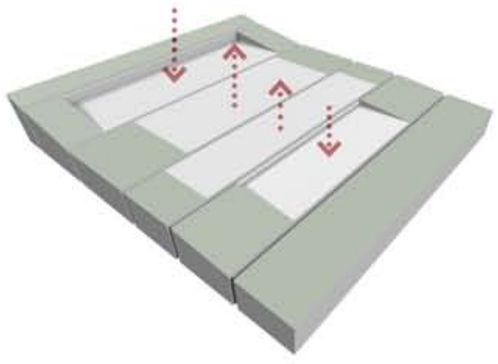
Concept composition



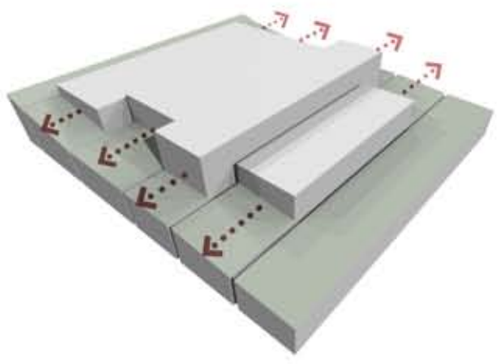
01 the site



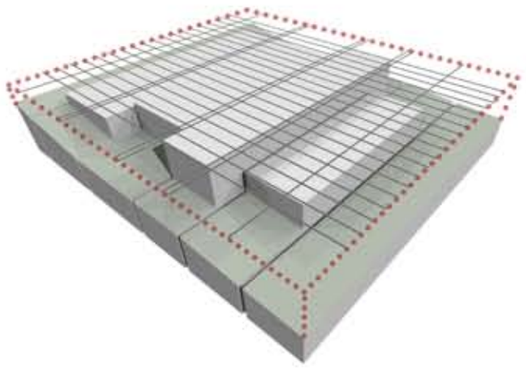
02 division of planes



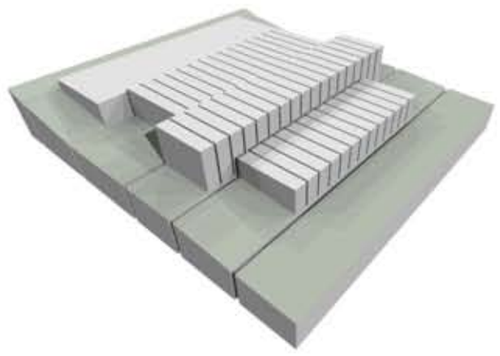
03 modified topography



04 sliding volumes



05 grid



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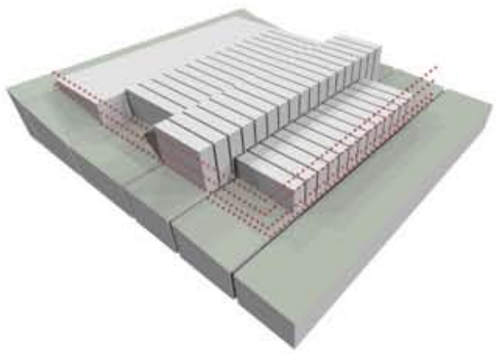
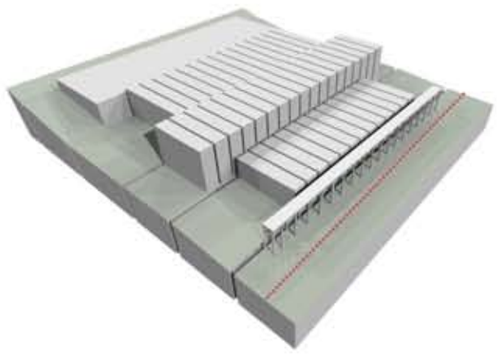
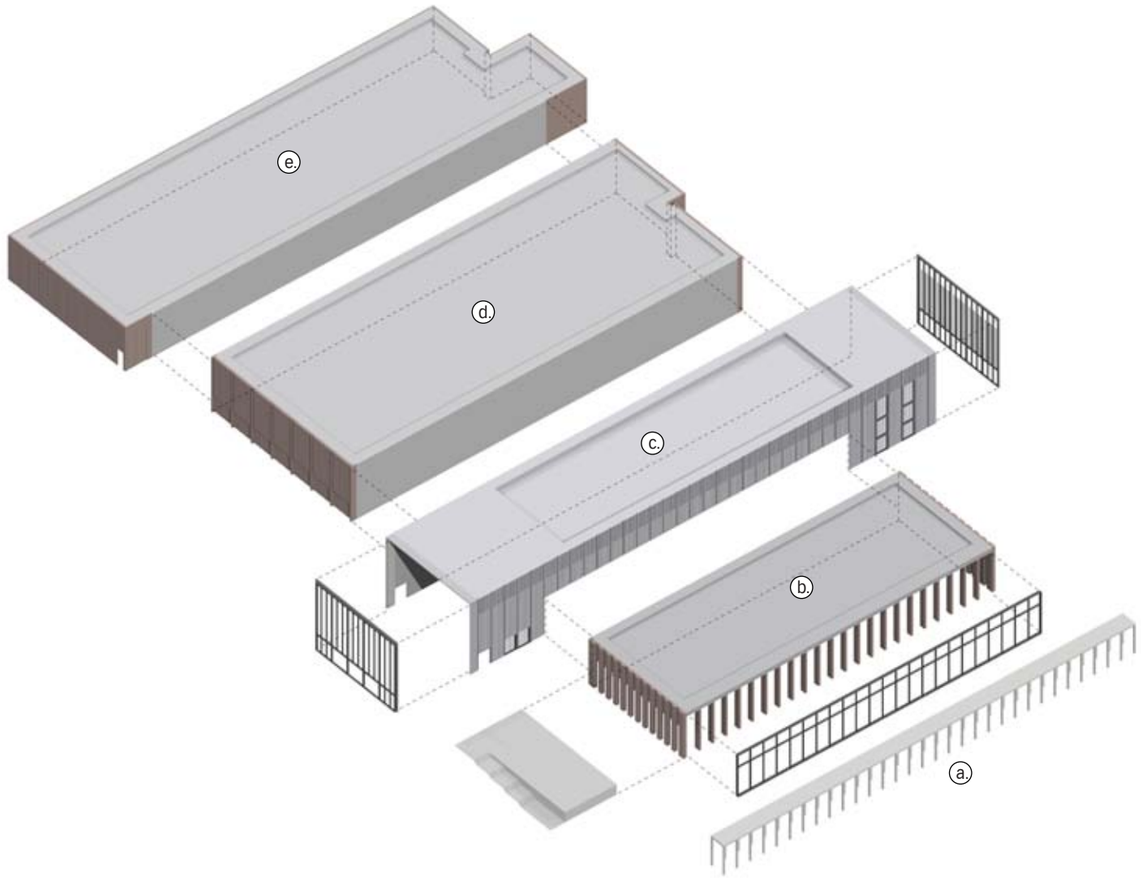


07 datums



08 colonnade

5.0 building design principals



a. Colonnade

b. Swimming pool

c. Core building

d. Sports

e. Carpark

building composition

The success of the buildings architecture has as much to do with its context as with the layout of the building itself, and through our understanding of the site, campus history and townscape that has lead to an elegant and contextual proposal.

The use of robust materials that weather gracefully, shall ensure that the building will only improve with time. Our ultimate ambition is to deliver a building that can improve both the built environment and the public realm, lasting the test of time.

Building Design principles

The building format and composition sympathetically responds to the existing topographical context, hugging the existing plateaus, thus limiting the volume of import/export fill and reducing off-site vehicular impacts. Four main building elements sit upon this topography appearing to slide independently within the mature landscape, these contain the swimming pool, core accommodation, sports halls and car park.

Non black-box sporting activities are celebrated on the elevations, advertising sport to the wider public. This includes two activity rooms on Edgbaston Park Road; the swimming pool on Bristol Road and the main entrance with climbing wall to the west elevation.

As sport halls and squash courts do not require any natural light they have been located to the rear of the site, sitting between the car park structure and the core accommodation block. The remaining sports accommodation has been strategically positioned between the swimming pool and the sports halls, permitting internal visual connections throughout the building and beyond. This element is therefore defined as the core of the building. To the north of the site, the car park structure has been imbedded between the sports halls and an existing retaining wall approximately 8.4meters in height.

The overall composition of the building creates an informal gateway to the University of Birmingham's Edgbaston Campus. The building welcomes the public onto the campus via a colonnade to the Bristol Road elevation. The colonnade delivers the public to the south west of the site where a new axial route links into the heart of the University campus, providing Part M compliant high level access.

The site's relationship to the adjacent roads, and scale of building required to accommodate the sports brief, offers an opportunity to signpost Birmingham's first 50m swimming pool to passers by. The building entrance is oriented into the Campus, making it 'of the campus' and providing a clear relationship with the South Gate entrance/exit road and playing fields beyond. The entrance is centrally aligned to enhance both visibility and access to the activities within. The sports halls abut one another and are located to the north of the facility to enclose the visually passive façades with surrounding accommodation. The 270-space car park is accommodated over 2 storeys above existing ground level and is offered up to the existing retaining wall. Car park access is accommodated on the north-east side of the site as existing whist service access is provided to the east from Edgbaston Park Road, removing the requirement for vehicle access from within the campus.

Internal Layouts overview

Internal layouts maximise visual connections between activities whilst permitting flexibility. Activity rooms are located within the central 'core' block, between the sports halls and swimming pool, addressing the Edgbaston Park road elevation. This provides the opportunity to create openings between the blocks and advertise the different sports the centre has to offer to its users. The interconnected spaces start with the foyer which is located directly below the climbing wall, providing a dramatic entrance.

An outline of the sports accommodation brief, as provided by University of Birmingham is noted below.

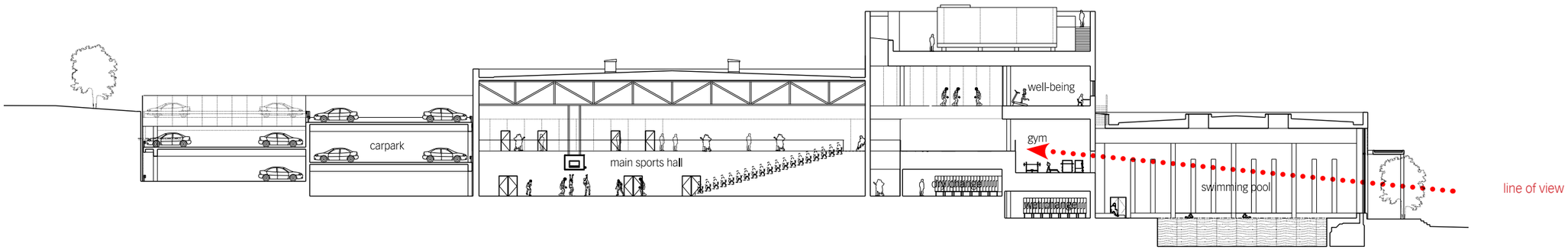
- Sports Hall 37m x 54.6m (with 1000 bleacher seats)
- Hybrid hall 25m x 18m
- 50 x 17m Swimming Pool (with spectator seating) inc. lateral boom and moveable floor over half the pool
- Squash Court 6- squash courts with circa 40 spectator seating per court, plus room for 100 spectators around one court
- Climbing Wall
- Members Gym
- Performance Gym
- Wellbeing and Sports Performance Centre
- Activity Spaces (x2)
- Dojo
- Spinning Room
- Ergo Room
- Spa Area (sauna and steam)

a. Section north- south

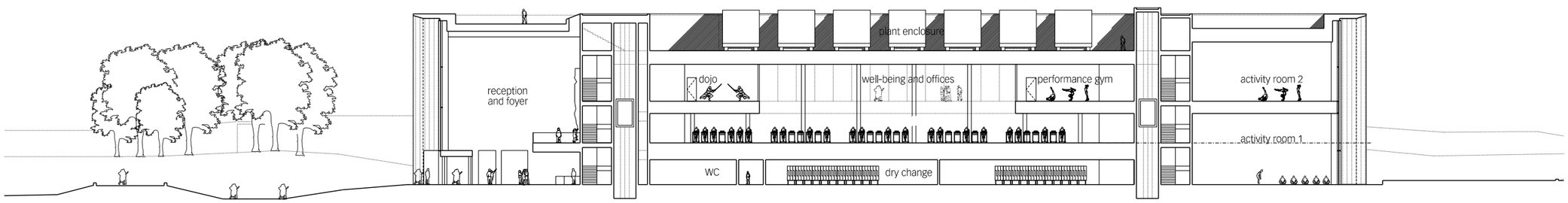
b. Section through foyer

Sectional composition

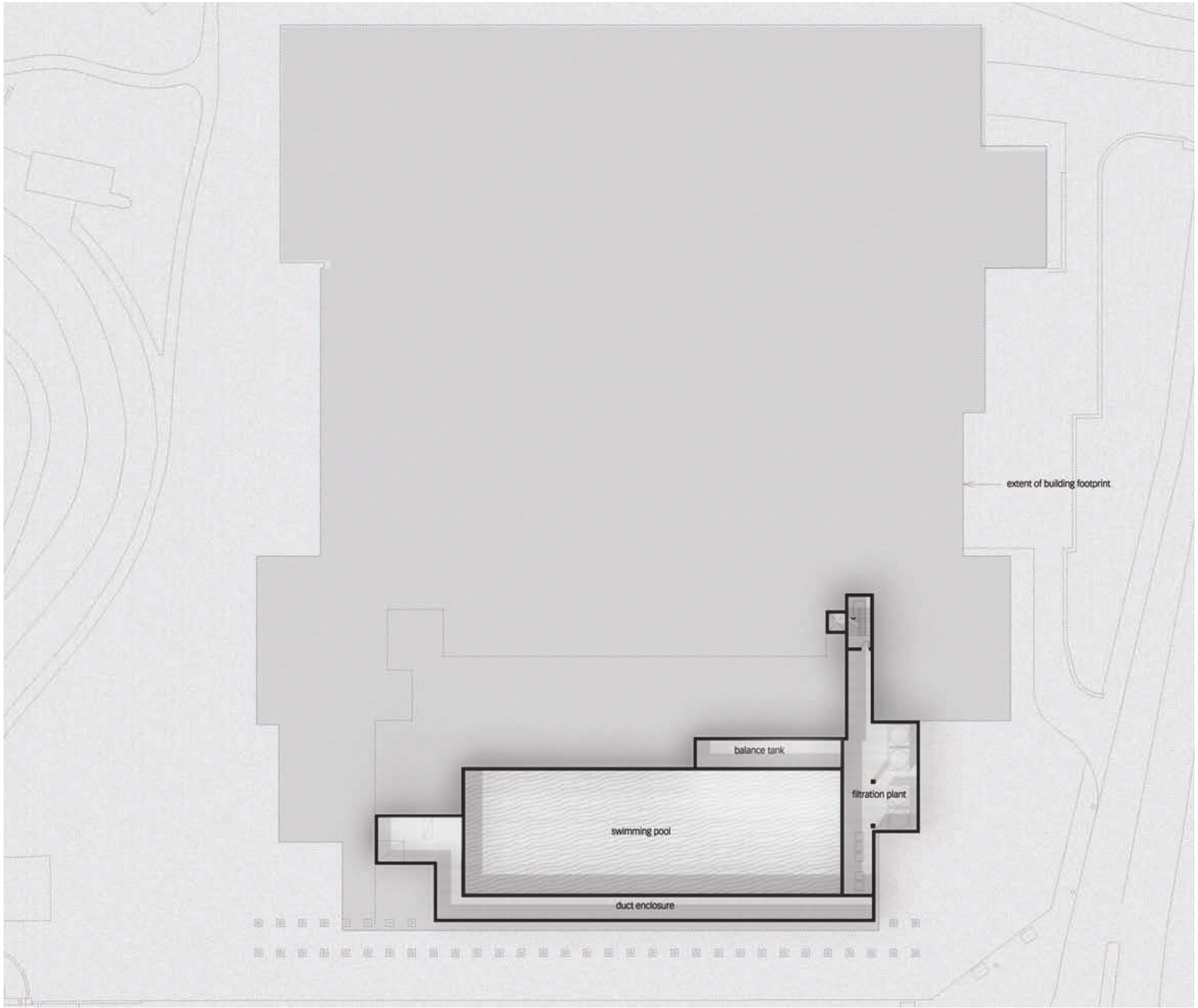
The building is arranged sectionally to maximise views into the building and the various sports contained. Upon approach from Bristol Road visitors pass through the colonnade. This transitional space provides shelter whist permitting views into the pool hall, delivering visitors into mature landscape to the west of the site, and leading to the main entrance foyer with dramatic climbing wall.



Section north-south



Section west-east

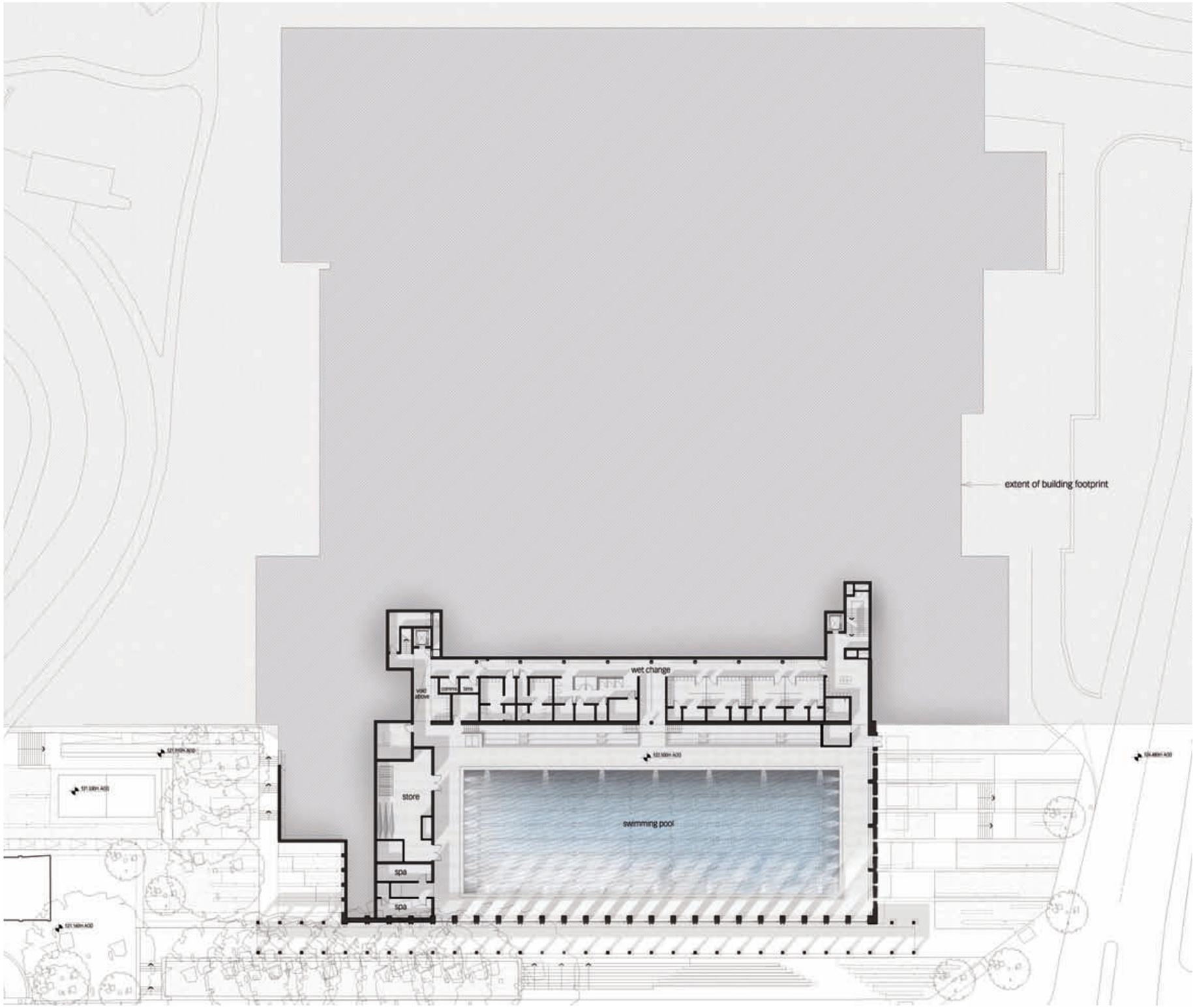

extent of building footprint
balance tank
filtration plant
swimming pool
duct enclosure

5.1 general arrangements

Proposed basement level B01

pool filtration plant

A sand filtration plant is located below ground level, reducing the visual impact on the Bristol Road and Edgbaston Park Road elevations. A perimeter duct shall sit below ground level, supplying warm air to the pool hall glazing and preventing condensation, permitting clear views into and from the pool itself.


extent of building footprint
wet change
void above
store
swimming pool
spa
spa

5.1 general arrangements

Proposed lower ground level B02

pool, wet change and spectator seating

The pool, wet changing, spectator seating with associated "dry" sanitary provision is located at lower ground level. The accommodation is accessed via both west and east core stairs and lifts dependent upon user groups. The general public will access via the west core which is located immediately behind the reception desk. Schools and swimming groups can gain access to the pool via the east core which gives direct access to the coach parking and by-passes the main reception

The pool consists of a 50m x 17m x nominally 2m deep, 8 lane pool tank with 1 x moveable floor, 1 x lateral boom, one portable disabled hoist. The pool surround will have a minimum unobstructed width of 4m at start /finish end, 3m at turning end and 3m on the sides. The pool surround design is fully compliant with BS EN 15288-1:2008 Swimming pools Safety requirements for design.

The pool will be designed to incorporate a number of features to provide access for disabled people including wheelchair users. Sockets for the use of hoists to gain access to the pool for wheelchair users and others who may not be able to use pool steps are provided in a number of locations to ensure that a hoist point can be provided in each corner of a subdivided pool. Ramped access is not practicable into the pool due to space requirements and the adjustable pool floor.

Ancillary accommodation to support the pool including wet first-aid, store and spa (sauna and steam) is accessed directly of the pool surround. There is level access to all pool side areas and ancillary rooms and throughout the pool zone.

Pool hall spectator seating

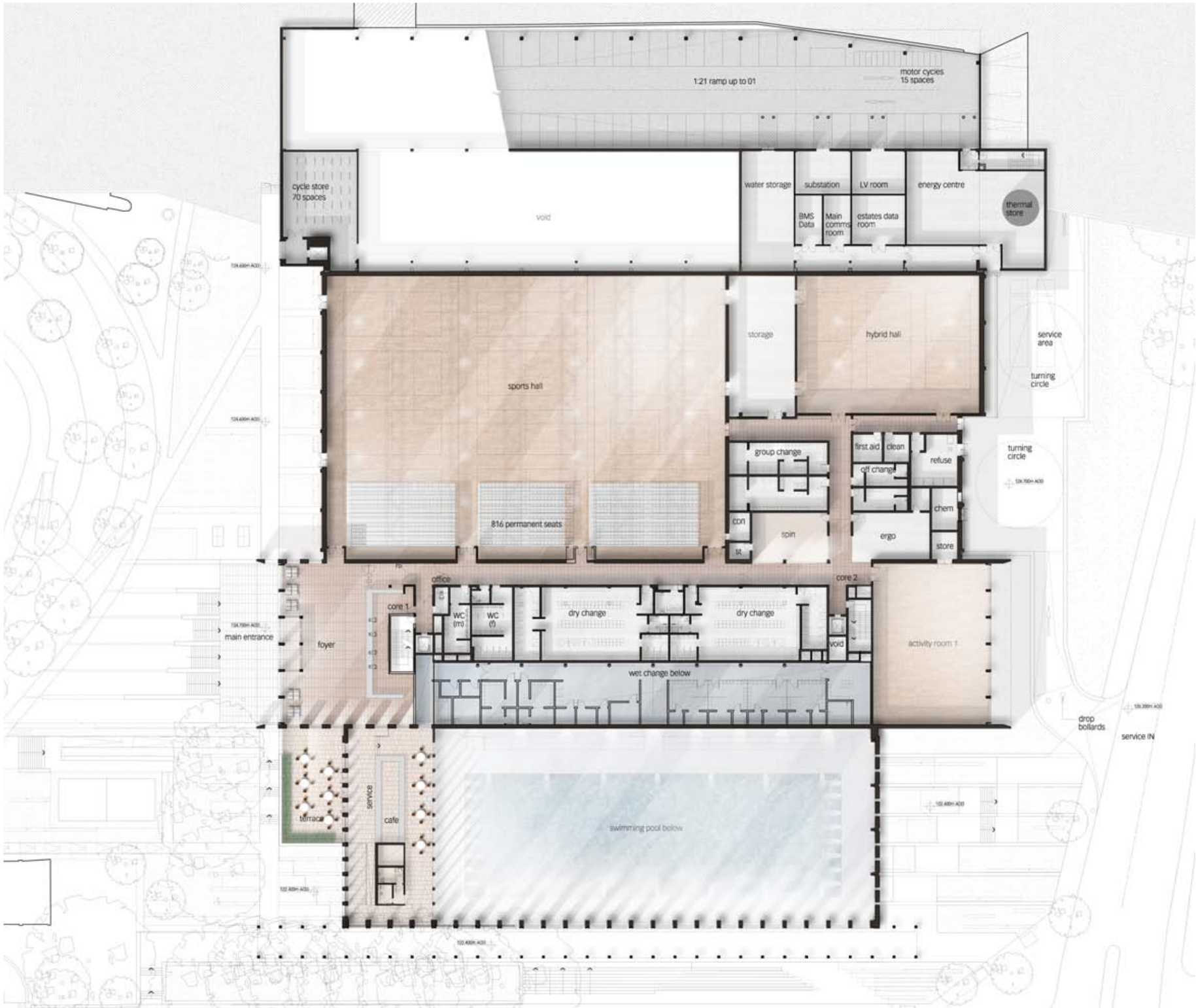
Spectator seating is provided for 200 spectators overlooking the 50m pool, with 2 spaces for wheelchair users with associated companion seats located on the pool surround. Due consideration has been given to ensure visibility of all lanes from all tiers of seating. Access to the seating is via the west core with dedicated "dry" WC facilities at pool level, including disabled provision.

Wet side accommodation

The proposals are compliant with Sport England guidance, current Building Regulations, Approved Document M 2004, BSI British Standards BS 8300:2009. Wet changing areas have been designed to create a natural flow through from the dry entrance to the pool side, placing all elements into a logical order. Allowance have been made for a shoe removal area prior to entering the wet changing areas to reduce cross contamination between wet barefoot and dry foot traffic.

The design includes single sex facilities, a unisex changing village for family's, a peninsular "Changing Place" unit, accessible changing rooms and four team changing areas. All showers will have step-free access. Suitable grab rails and drop down seats are provided to at least one showering position in each standard shower area. Doors will be sized to achieve the minimum clear widths as required in Sport England "Accessible Sports Facilities" and BSI British Standards BS 8300:2009.

The four group changing rooms are sized to accommodate schools and club usage as well as acting as either additional single sex change, or overflow family change during peak times. When in school/group mode the rooms can be locked by the teacher or coach. Locker provision is sited in the circulation zone allowing access to the lockers from outside changing rooms. This provides natural surveillance of the locker area and follows Secure by Design guidance. A range of locker sizes will be specified including tall locker facilities for storage of prosthetic limbs and wheelchair accessible lockers. All lockers will have tactile and contrasting numbers for the visually impaired.


1:21 ramp up to 01
motor cycles
15 spaces
cycle store
70 spaces
void
water storage
substation
LV room
energy centre
thermal
store
BMS
Data
Main
comms
room
estates data
room
storage
hybrid hall
service
area
turning
circle
sports hall
816 permanent seats
group change
first aid
clean
off change
refuse
turning
circle
con
spin
st
ergo
chem
store
office
core 2
core 1
WC
(m)
WC
(f)
dry change
dry change
void
activity room 1
main entrance
foyer
wet change below
drop
bollards
service IN
terrace
service
cafe
swimming pool below

5.1 general arrangements

Proposed ground floor level

Front of house including climbing wall

The building is accessed at ground floor level, on the South-Western side of the site, addressing the Edgbaston Campus. The facade is designed to permit unobstructed views into the foyer and climbing wall beyond. Internally the foyer has been designed to give easy and obvious access to facilities with all public areas easily accessible and clearly identified, minimising the requirement for orientation signage. Entrance doors and the associated lobby have been designed to ensure maximum energy efficiency whilst complying with Equalities Act 2010.

The reception desk will be highly visible upon entry and comply with Approved Document M, with counters suitable for both standing and seated visitors and staff. Entry to the heart of the building is via Part M compliant turnstiles.

The climbing wall is located immediately above the reception desk in a secure space accessed from first floor level. The wall is fully visible prior to entering the main foyer adding to the dynamism of the space. The wall itself will utilise a belay rope system. Use of the climbing wall will be determined by the operator and via risk assessment.

Circulation

The main sports hall, dry changing, spectator WC's are accessed via the main circulation route at ground floor. All circulation routes are sized to allow two wheelchair users to pass and exceed minimum Approved Document M recommendations. All doors are sized to accommodate clear widths defined by Sport England "Accessible Sports Facilities" and BSI British Standards BS 8300:2009.

Café

The new sports facility shall contain a large café area and external terrace to the south west of the site. Access to the café may be via the main foyer or external terrace. The external terrace space shall provide a vantage point and meeting place for the new sports facility, bridging both the external landscape and internal space beyond.

The café shall provide a destination and meeting space for the local community whilst catering for the needs of the UoB sports centre. It is envisaged that the café shall be leased on a commercial basis by the University of Birmingham.

Sports Hall

The 12 court Sports Hall will measure 37 x 54.6m with a clear ceiling height of 9.1m. Activities that can be accommodated include netball to national league level, basketball, volleyball up to national level. Lighting will be in accordance with BSEN 12193:2007 and CIBSE LG4 guidelines and subject to further design development. The floor and walls will be designed to accommodate the sports listed above, provision for installation of sufficient nets, dividers and equipment so as to allow other activities to take place in the hall at the same time. All surfaces up to 2m minimum height will have true rebound characteristics, with any fittings/controls recessed/covered.

The proposed floor is sprung to provide a good field of play for sports activities and help in minimising injury to players. The court markings will be carried out in accordance to Sport England Guidance and selected sport's national governing body guidance.

Sports Hall Seating

Spectator seating to the sports hall has been provided via bleacher seating at ground floor with provision for 10 wheelchair spaces and 8 companion seats. An additional 100 seat have been provided on the first floor balcony. Of the net total of 816 permanent seat the 10 wheelchair seats which at 1.2%, exceeds the recommended minimum 1% required under Approved Document M. For competitions requiring 1000 seat the additional provision will be via temporary seats.

Sports Hall spectator toilet facilities

The toilet provisions allow for a maximum of 1000 spectators at one time, using ratio of 50% / 50% male / female split. The provision is in accordance with BS 6465-1:2006 non- concentrated use. The wheelchair accessible toilets including a peninsular "changing place" toilet are located directly off the main circulation corridor; these are located no further than 40m from the seating area in accordance with BSI British Standards BS 8300:2009

Hybrid hall

The hybrid hall is 3 court sports hall measuring 25 x 18m. The proposed floor shall be sprung and will have the potential to be used for gymnastics. Storage is shared with the adjoining main sports hall and will be fully accessible by all user groups.

Changing Room Facilities

The dry changing will serve all the dry side functions of the sport halls, gym, activity spaces and squash (all dry side activity spaces). The layout allows for two main single sex changing areas, two group changing rooms (which can be utilised by school groups or teams) and two officials changing rooms with associated sanitary provision and lockers.

The male and female changing spaces are open village type change with benches, changing cubicles and lockers, with WC's, showers and accessible changing room with WC and shower facilities in accordance with BSI British Standards BS 8300:2009 and subsequent guidance.
Between the two single sex changing rooms is a peninsular unit. The peninsular unit or "Changing Places" (CP) facility is for use by people with complex and multiple disabilities that require the help of up to two assistants. This provides a combined toilet, shower and changing room. The CP facility will be fitted out in accordance to the guidance provided within BS 8300 this includes full room cover tracked hoist system, Peninsular WC and Height-adjustable showering / changing bench.

The 2 number group change areas are sized to accommodate school groups or segregated changing facilities. These are located near the hybrid hall to enable separation away from the main hall / changing area to allow the hybrid hall to be used during and event in the main sports hall. There is separate dedicated change for officials.

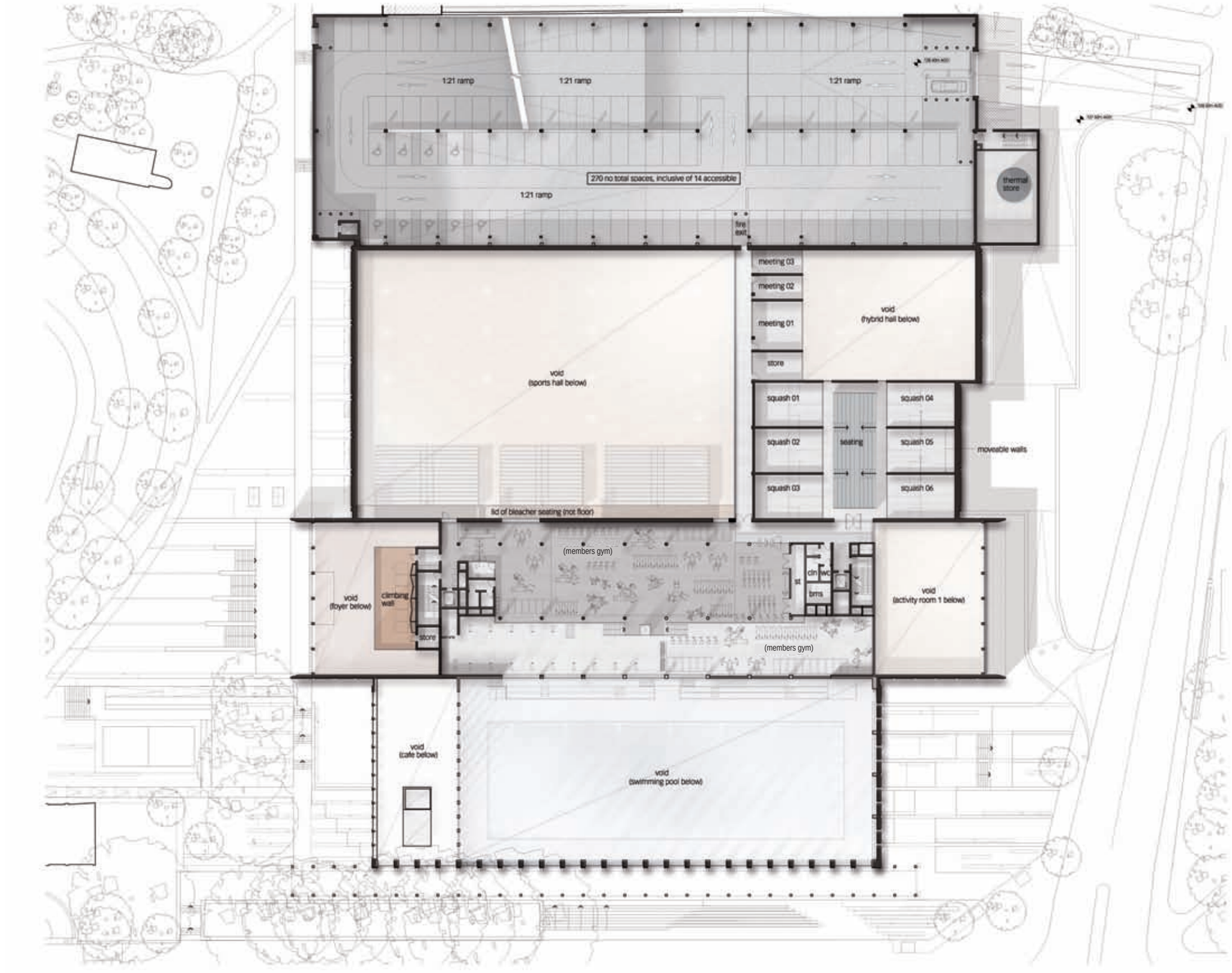
A range of locker sizes will be specified including tall locker facilities for storage of prosthetic limbs and wheelchair accessible lockers. All lockers will have tactile and contrasting numbers for easy identification for people with visual impairments. The lockers are situated in the two main changing areas and in the corridor adjacent to the hybrid hall

Activity spaces

In addition to the main members gym the building has two large activity rooms (studios) which can accommodate a variety of disciplines. Both activity rooms are fully accessible.

The two largest activity spaces are located adjacent to the east core; Activity room 1 is located on the main ground floor circulation corridor. Activity room 2 is located immediately above, on level 1.5. Activity rooms will have a sprung floor and can accommodate a variety of sport and activities such as yoga, aerobics, keep fit and are fully accessible.

On level 2 a dedicate dojo room has been included with a matted floor, this will allow for martial arts and a range of gymnastic activities.


1:21 ramp
1:21 ramp
1:21 ramp
270 no total spaces, inclusive of 14 accessible
1:21 ramp
thermal store
fire exit
meeting 03
meeting 02
meeting 01
store
void
(hybrid hall below)
void
(sports hall below)
squash 01
squash 02
squash 03
seating
squash 04
squash 05
squash 06
moveable walls
lid of bleacher seating (not floor)
(members gym)
void
(foyer below)
climbing wall
store
st
cln
wc
brms
void
(activity room 1 below)
(members gym)
void
(cafe below)
void
(swimming pool below)

5.1 general arrangements

Proposed first floor level

Members Gym

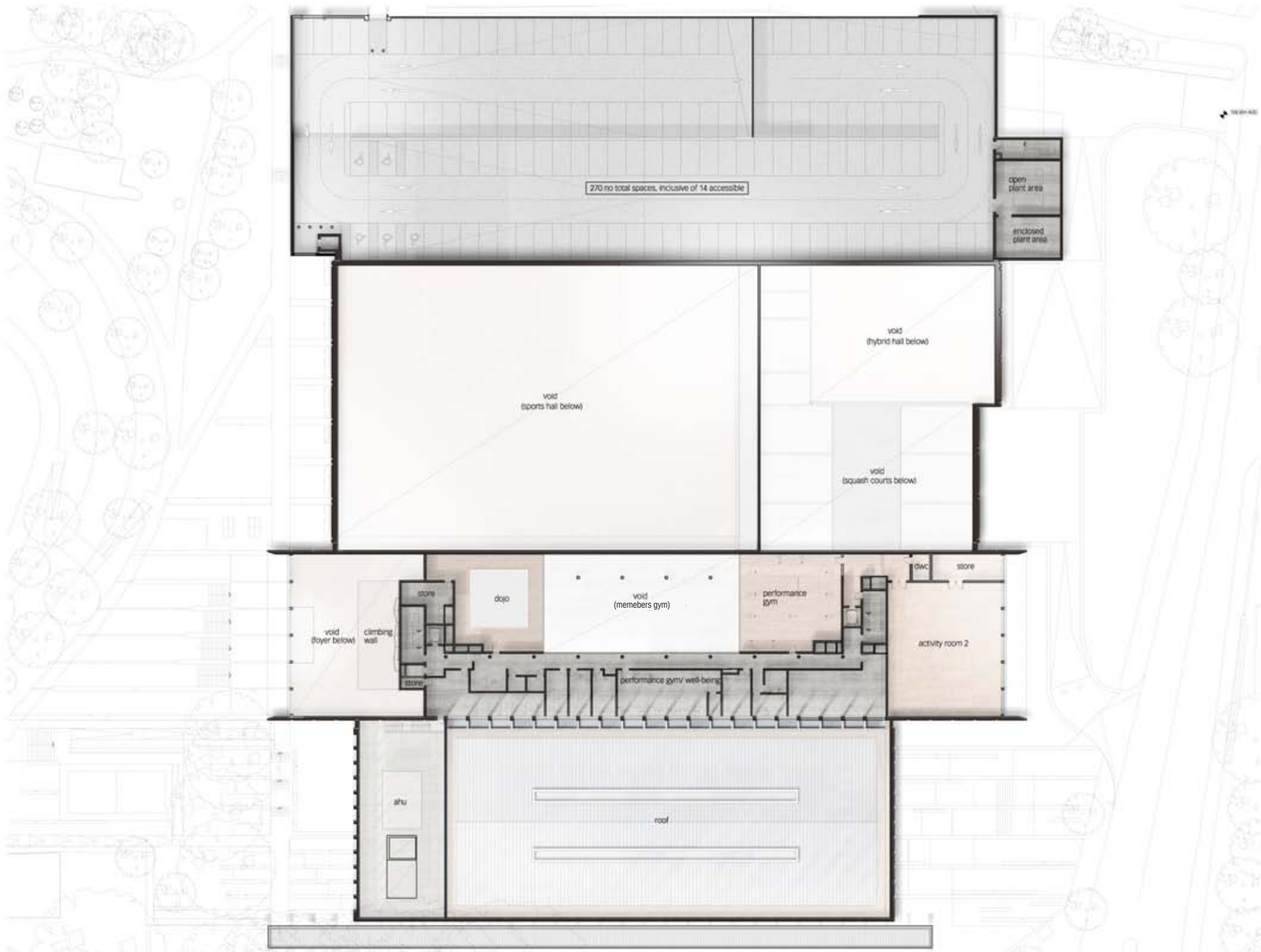
The main members gym and wellbeing suite are located on levels 1 and 2, access between these two levels will be via a feature staircase and wheelchair accessible lift. The Gym/wellbeing area has visual links to both the sports hall and pool hall. The gym measures 1100 sqm and is suitable for 170 stations including a free weight area, cardiovascular area, resistance training, together with appropriate warm up area, cool –down and relaxation area.

The structure is designed to prevent noise breakout to other activities. The space will have a minimum of 3.2m clear head height extending to a double height space of 8.4m. A reception desk is located at the entrance from the circulation area into the gym. Care will be taken in the layout of the space to ensure compliance with the IFI fitness initiative.

Squash / Squash Court Spectator Seating

A provision has been made for 6 squash courts in accordance with the World Squash Federations Guidelines. The single courts each measure 6400mm x 9750mm between wall faces, the walls between courts will be a combination of solid fixed walls and moveable walls. The back wall will have a glazed screen with a glazed door allowing for spectator viewing. The squash courts will be fully accessible by wheelchair users.

The current proposal of 6 squash courts has an allowance for 40 – 50 spectator seats to each court with provision for wheelchair spectators. The space between the courts is designed in such a way that a temporary spectator seating structure could be erected to one court allowing for a 100 seats at a competition event.

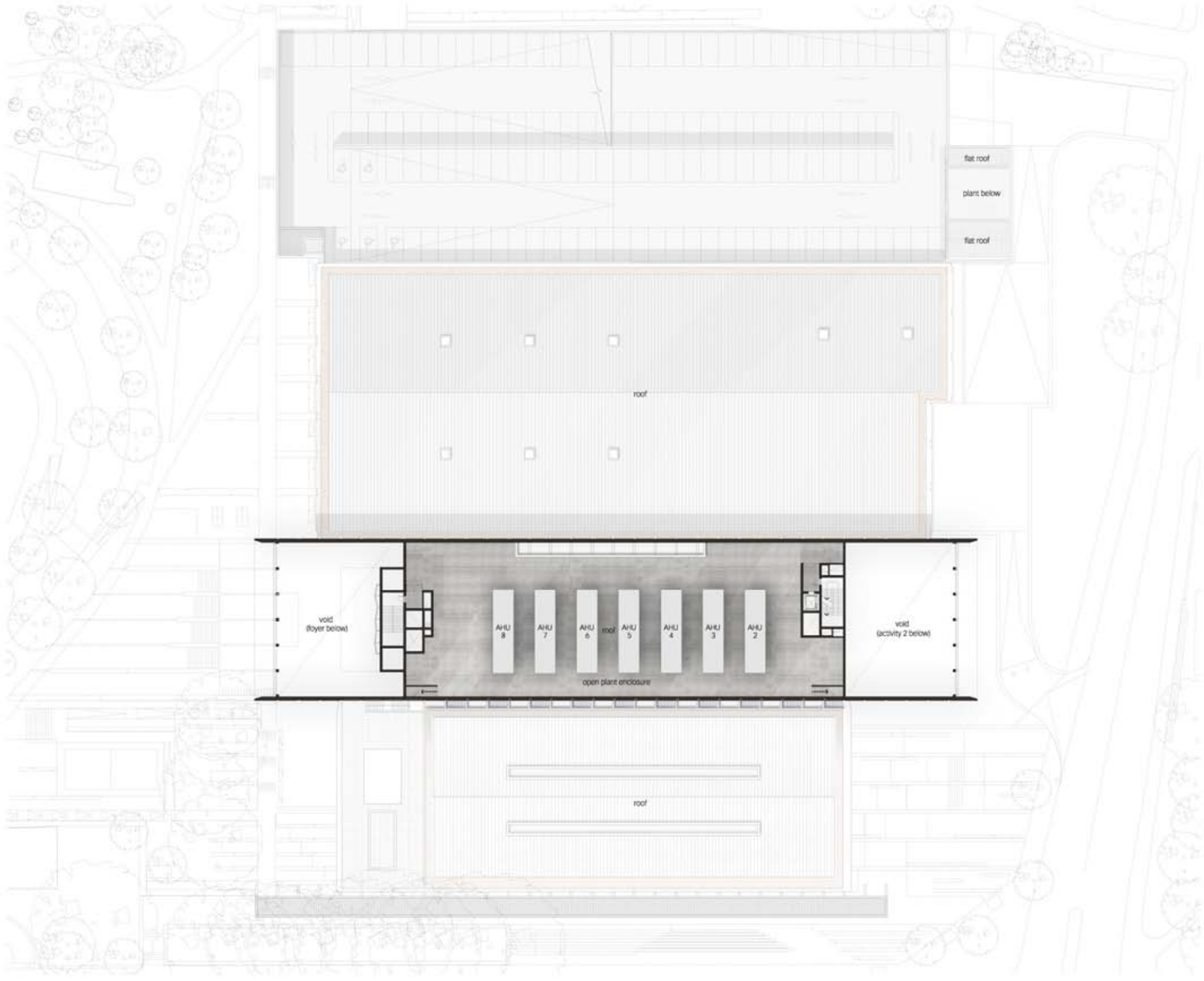

270 no total spaces, inclusive of 14 accessible
open plant area
enclosed plant area
void (sports hall below)
void (hybrid hall below)
void (squash courts below)
dwc
store
store
dojo
void (memebers gym)
performance gym
void (foyer below)
climbing wall
store
activity room 2
performance gym/ well-being
ahu
roof

5.1 general arrangements

Proposed second floor level

Wellbeing Area and Sports Performance Centre

The wellbeing area is located separate from the main members gym accessed via the west core on the second floor. The wellbeing area is a series of modular treatment and assessment rooms, and wheelchair accessible changing facilities with an external wall allowing for natural ventilation and daylight. The wellbeing area is located adjacent to the sports consultant rooms, with the sport medicine located between the two spaces enabling use by both user groups. The sports performance gym and lab is located in close proximity to the wellbeing area on level 2.


flat roof
plant below
flat roof
roof
void
(foyer below)
AHU
8
AHU
7
AHU
6
roof
AHU
5
AHU
4
AHU
3
AHU
2
void
(activity 2 below)
open plant enclosure
roof

5.1 general arrangements

Roof level

Plant enclosure

The roof of the building provides a cental recessed plant deck for air handing units (AHU's) and photovoltaic panels (PV's). The roof plant is visually screened by the continuous central core building facade. The central plant deck does not extend to the East and West elevations, maintaining maximum visibility into the building.

The ventilation strategy for the New Indoor Sports Facility has been integral part of the design process and is critical to the environmental success of this project. All ventilation rates will comply with guidance provided by the British Sports Council, CIBSE recommendations and the current Building Regulations.

The adopted ventilation strategy will provide fresh air to all areas, maintain a good indoor air quality, dilute pollutants (chlorine in the pool area), dilute odours (toilets, gym and changing rooms) and provide a comfortable environment throughout the year.

300sq.m of PV panels are proposed at roof level. PV panels shall provide energy savings and comply with the University's energy saving requirement, to achieve Energy Performance Certificate (EPC) Grade A.

West elevation

The west elevation of the building signifies the entrance to the New Indoor Sports Facility on the University of Birmingham's Edgbaston Campus. The material pallet is predominantly brickwork, relating to the historical campus material pallet. Datum's remain constant across the elevation Conceptually the brickwork breaks down in module from south to north, creating scale, light, shadow and depth to the overall elevation composition, whilst brickwork detailing intensifies from north to south.

The main entrance elevation is predominantly glazed thus defining entry into the building. Such transparency creates depth to the façade, blurring the relationship between the building and the landscape planes.

Proposed materials:

Base

The building sits upon a solid facing brickwork base. This base datum is defined by the colonnade of Bristol Road which provides solar shading to the pool hall and the café. This datum further establishes the height of the main entrance.

Multi-storey car park

The car park façade is constructed of perforated brick above base level. Such perforated brickwork provides natural ventilation and texture, removing the need for mechanical ventilation. At night time the car park perforations shall glow from inside providing a floating quality to the building mass.

Sports hall

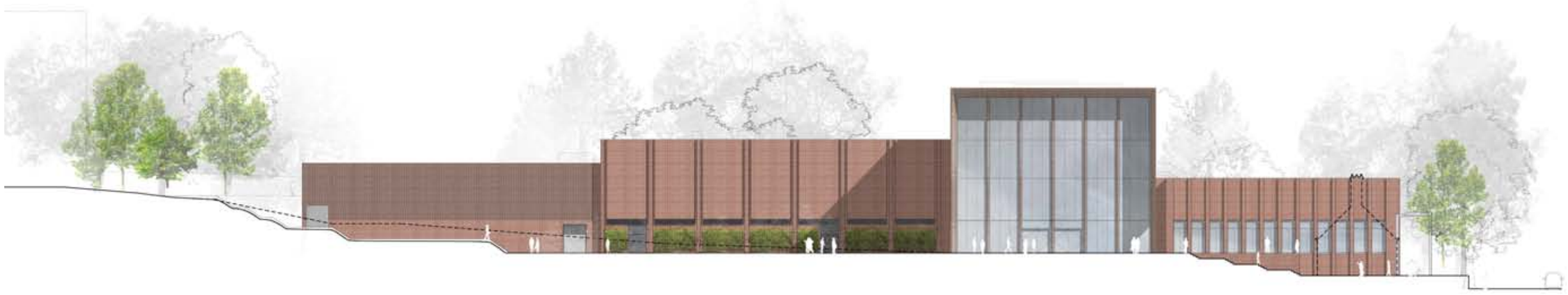
The sports hall elevation is subdivide into seven brick bays creating scale, texture and definition. Such subdivision is expressed below the base datum through fluting of the brickwork. Automatic ventilation louvers are recessed within the base brickwork providing natural for internal comfort.

Core Building

The core building is wrapped in a lightweight metallic skin. The entrance is defined using clear glazing, allowing views into the foyer and the elevated climbing wall beyond.

Café/Pool

The café building sits upon a solid brickwork plinth. The plinth thus creates an outdoor south-west facing terrace with level access to the foyer and café beyond. The brickwork is highly detailed and elegant with reveal linings accentuating both the verticality and elegance of the structure and café glazing.

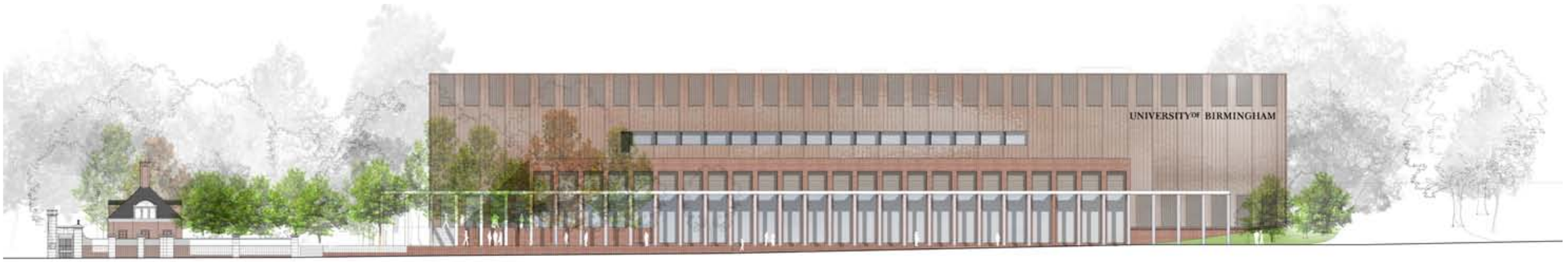


6.0 external envelope

South elevation

The south elevation signifies the University's presence on Bristol Road. A highly detailed colonnade shall draw visitors onto the campus. from a technical perspective the colonnade acts as solar shading to the pool hall beyond.

Maximum transparency is offered at street level, allowing the wider public to observe sporting activities within. The pool hall elevation beyond the colonnade is constructed from highly detailed facing brick. Fluting is applied to creating a highly elegant composition. Above the colonnade the main façade provides daylight to the pool hall without glare through the use of solar shading filigree.
The lightweight metallic façade of the core building shall shimmer beyond.

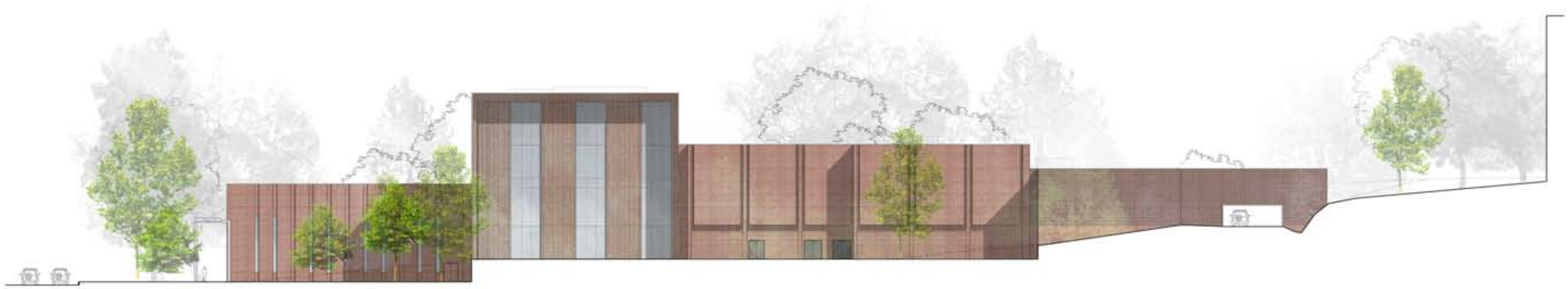


East elevation

As per the west elevation, the east elevation is of predominantly brick composition. Perforated brickwork to the car park not only provides natural ventilation but visibility of the internal stair.

The sports hall elevation is subdivide into six brick bays. Each bay articulates the internal layout of squash court accommodation, at first floor level. Double doors shall provide service access to back of house accommodation at ground floor level.

The core building is wrapped in a lightweight metallic skin. Glazing provides visibility to activity room one and two.
The pool building reflects the architecture of the western (café) façade. The brickwork is highly detailed and elegant, accentuating both the verticality and elegance of the structure. Eight slot windows shall provide glimpses from the pool hall to the external landscape.

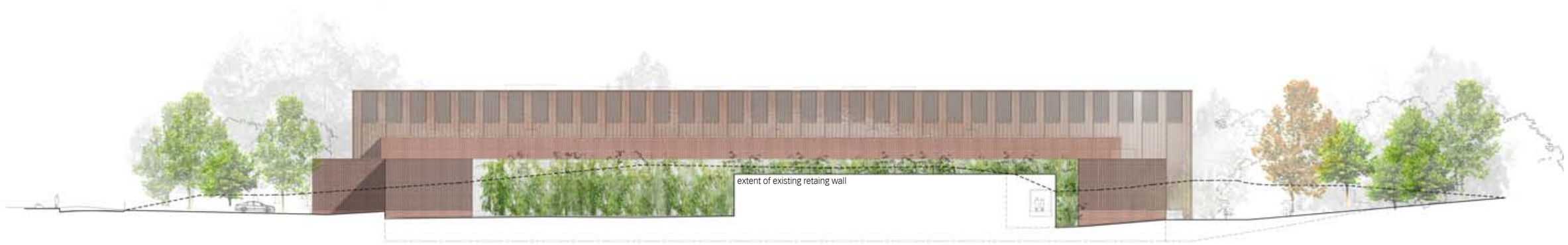


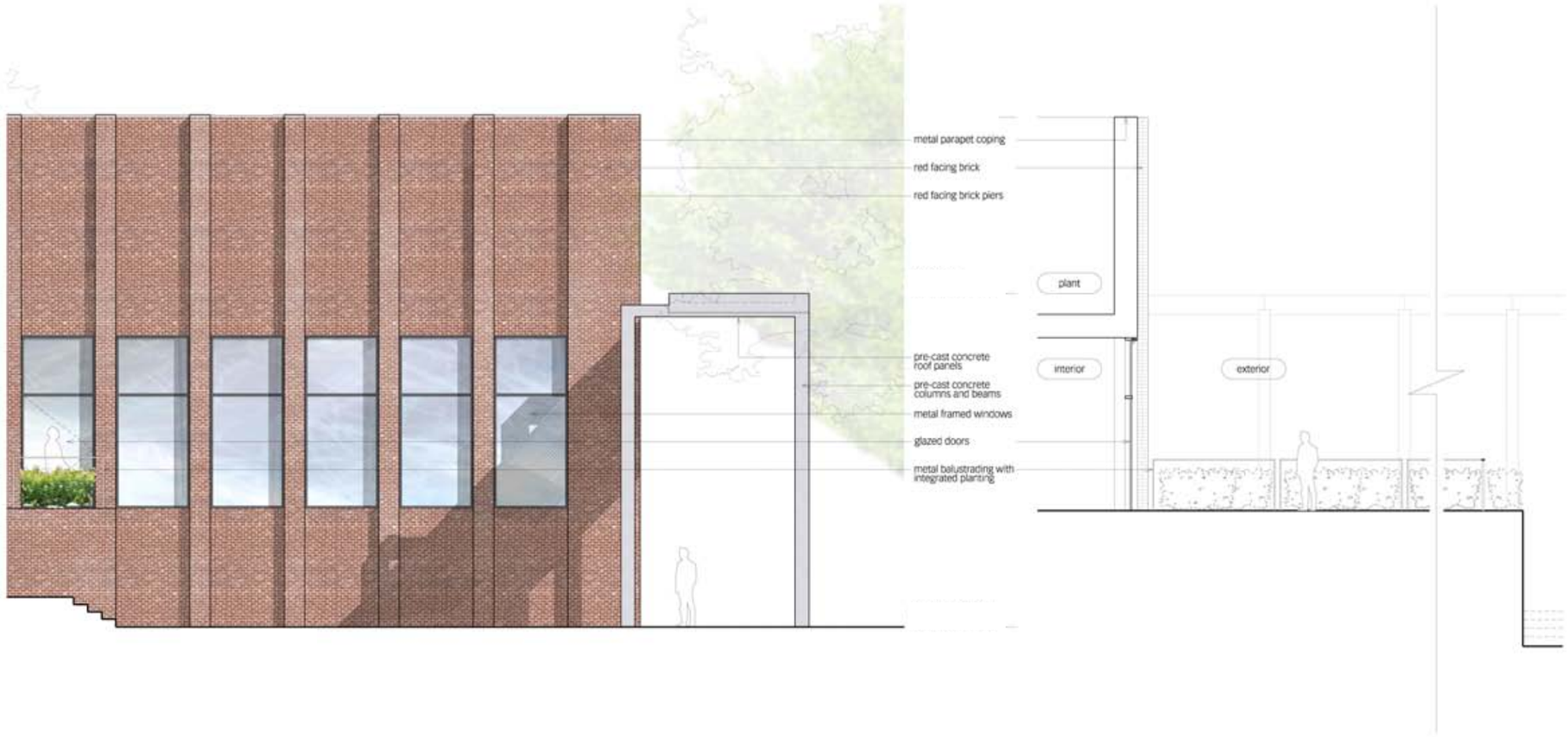
6.0 external envelope

North elevation

The majority of the north elevation is screened by the existing retaining wall and small retaining wall to the east of the site (left). Steep embankments rise to the height of the main retaining wall and shall be densely planted. The existing metal fencing shall be removed above the retaining wall.

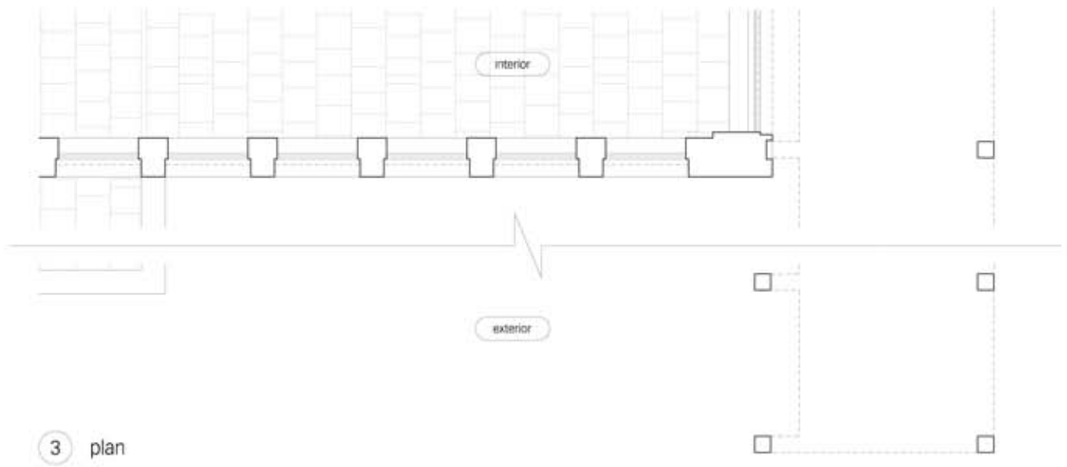
It its imperative for building regulations that the embedded car park is naturally ventilated, as such the east and west elevations, in perforated brickwork, wrap onto the north elevation as indicated in the detailed planning application drawings. The area between the perforated brick returns is of lightweight mesh which will allow climbing plants to grow and green the northern façade of the car park.





1 cafe elevation

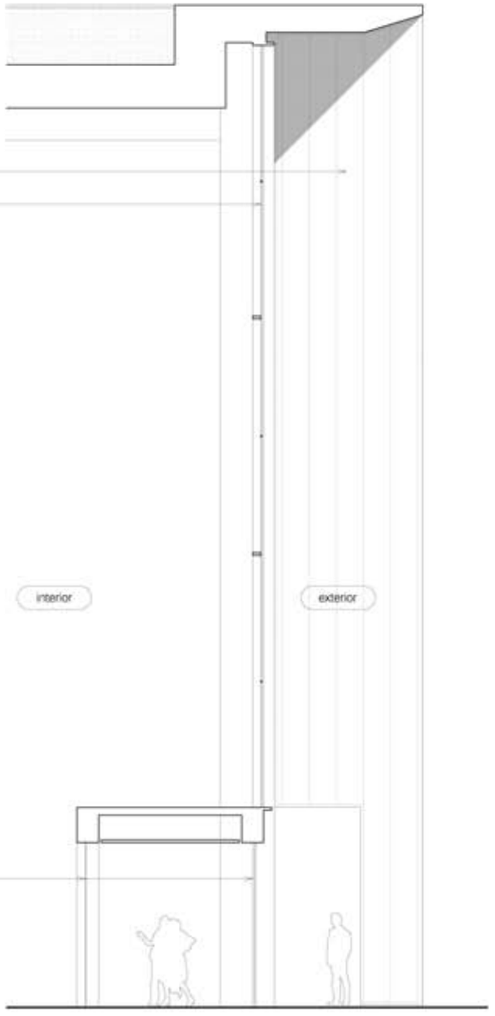
2 section



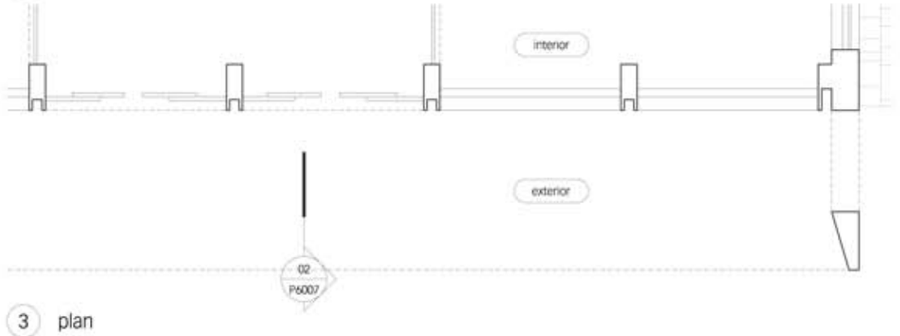
3 plan

key elevation

1 elevation

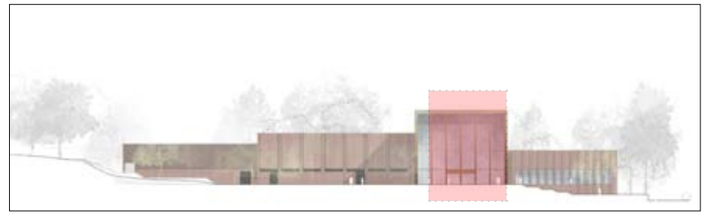


2 section

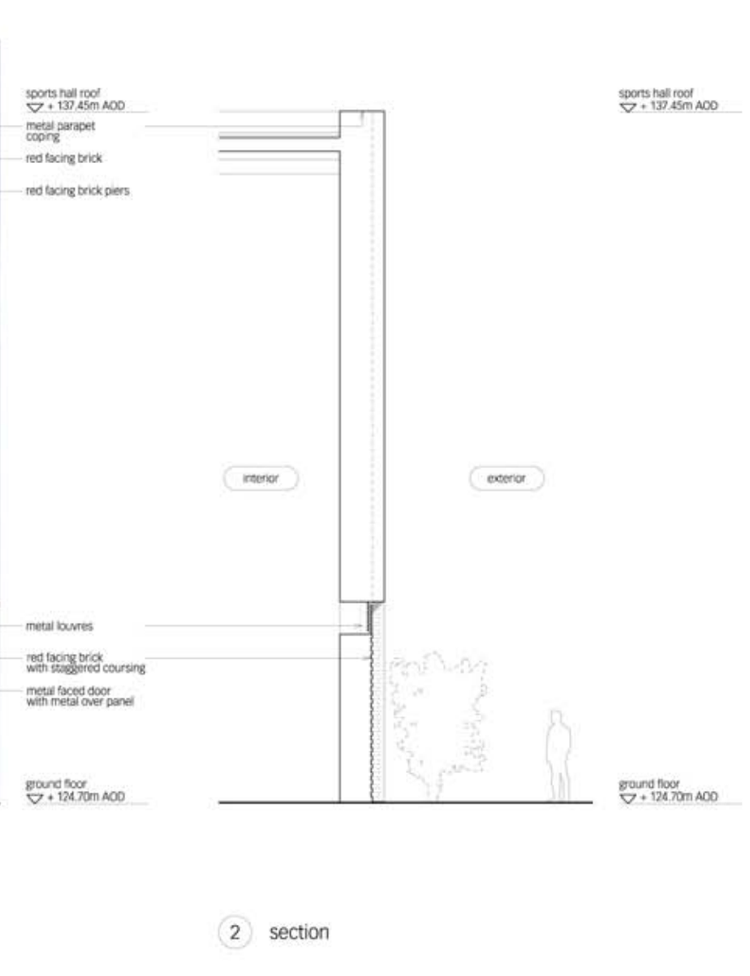


3 plan

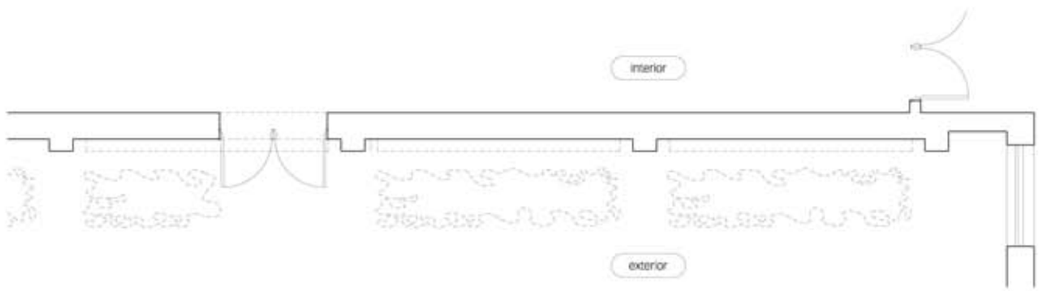
key elevation



1 sports hall elevation

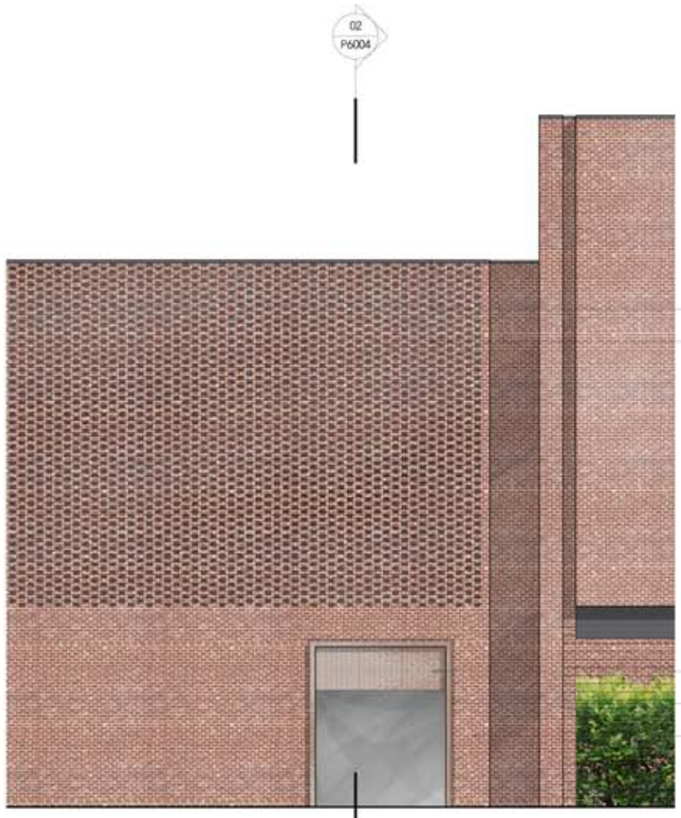


2 section

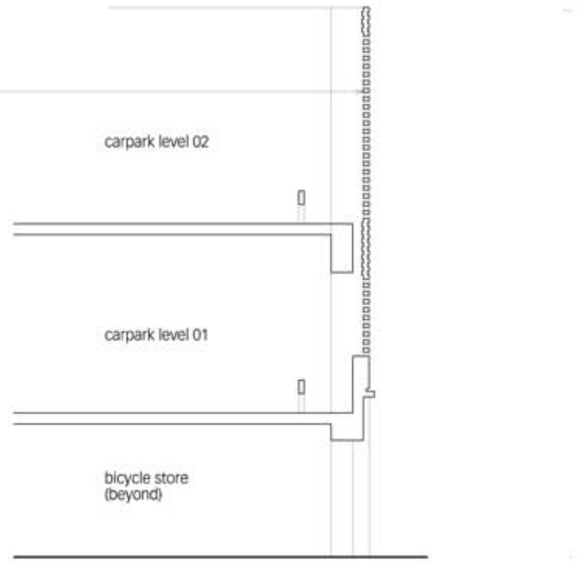


3 plan

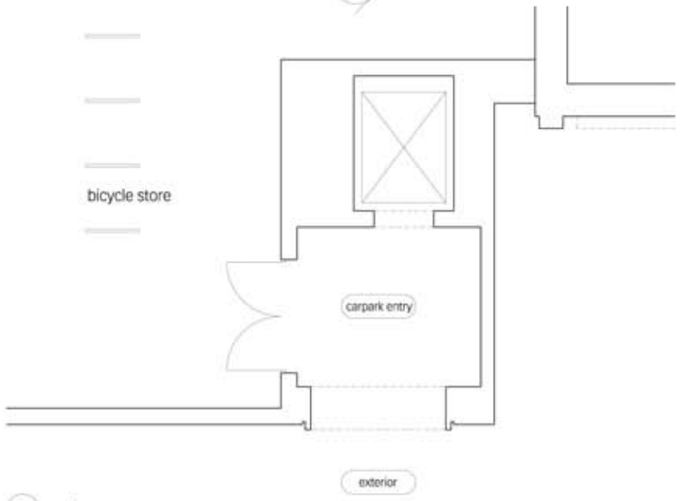
key elevation



1 elevation

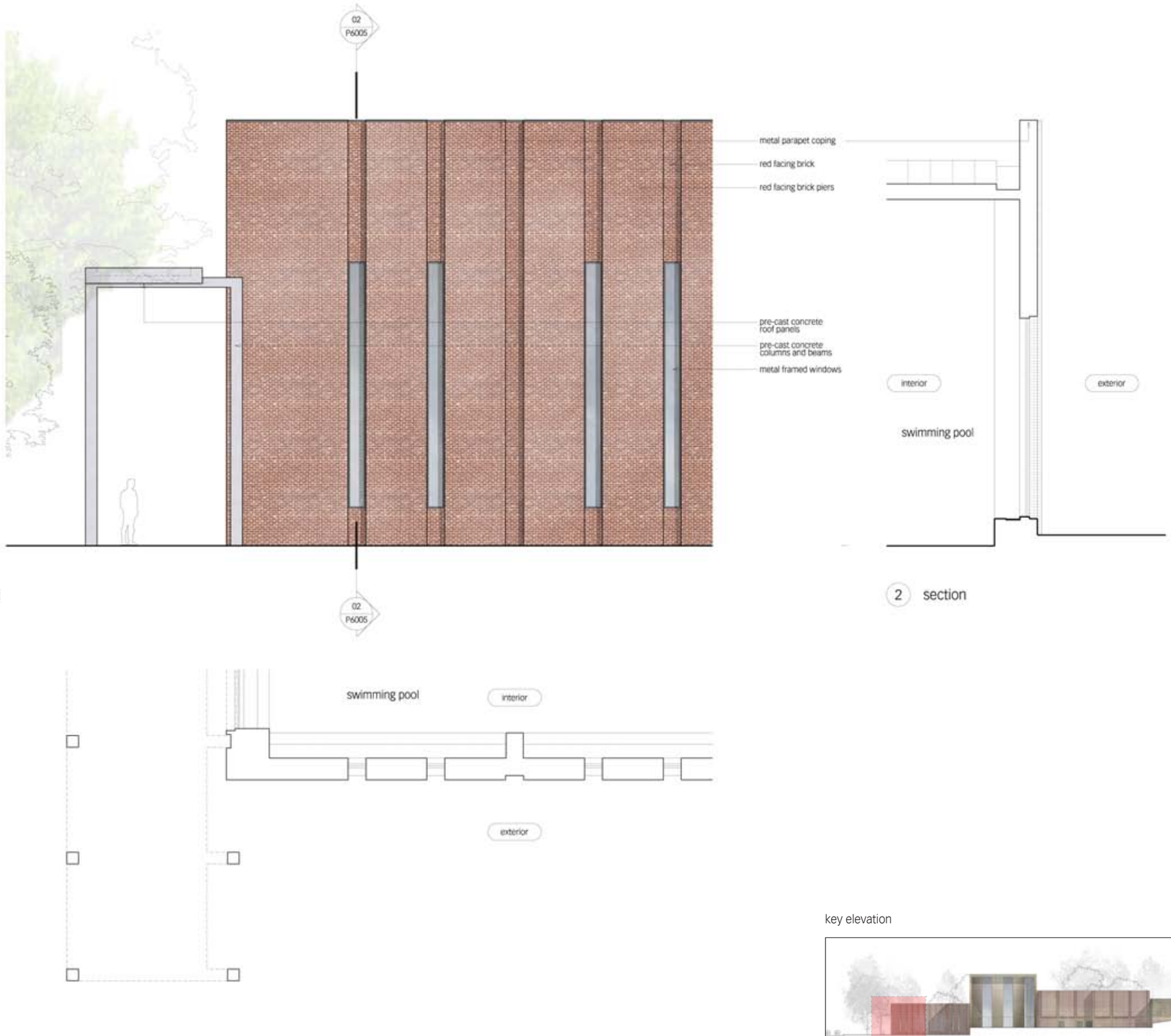


2 section



3 plan

key elevation



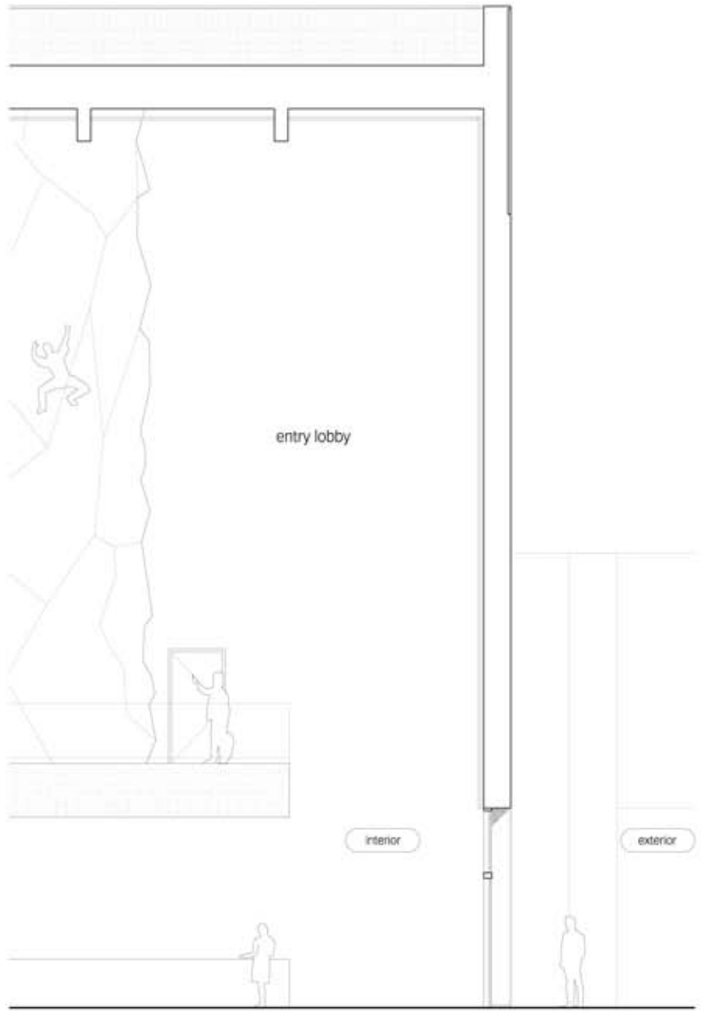
1 elevation

2 section

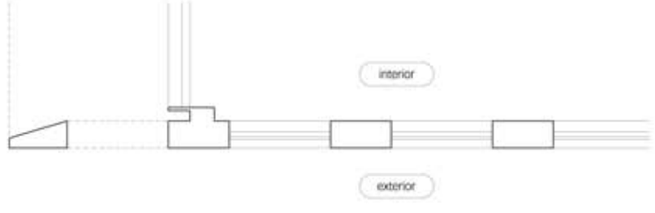
3 plan

key elevation

1 elevation

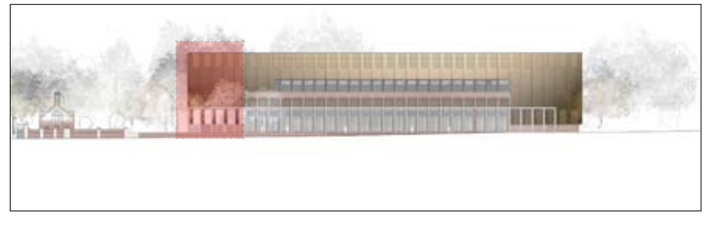


2 section



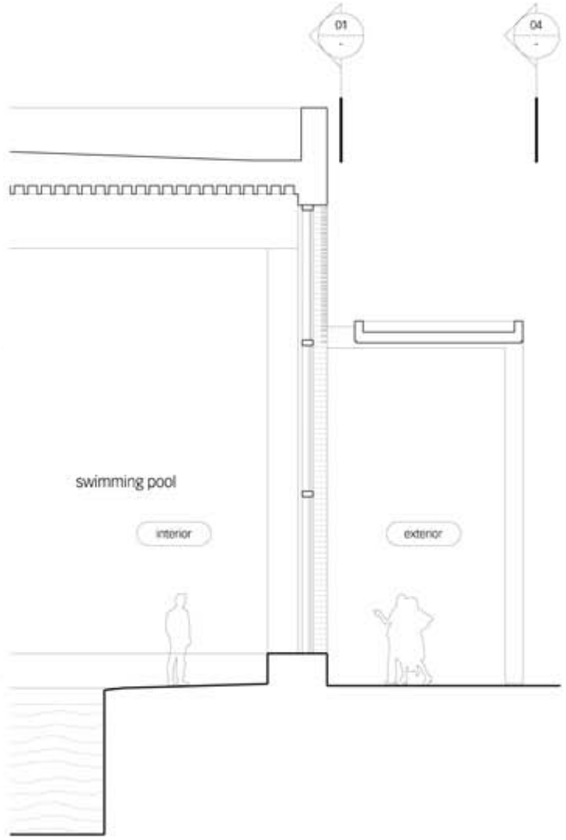
3 plan

key elevation

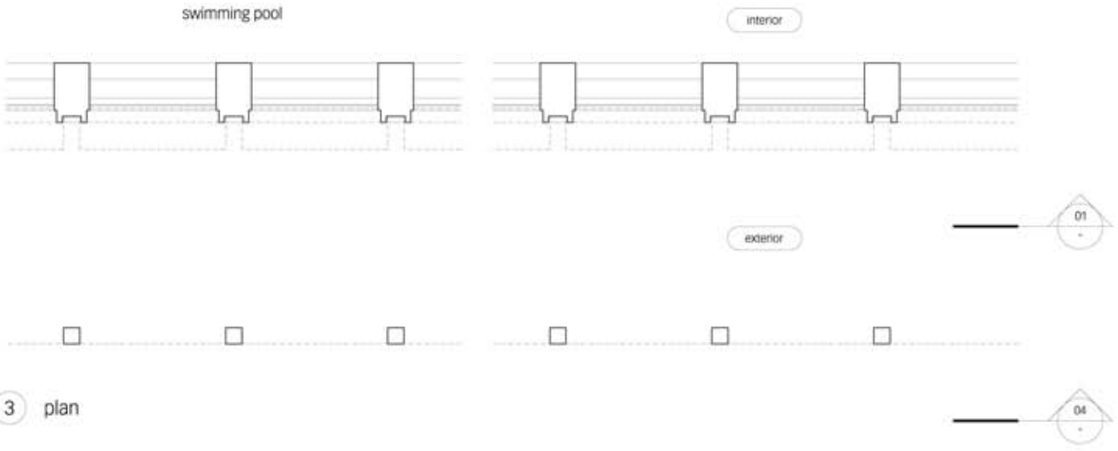


1 elevation (through brise soleil)

4 elevation

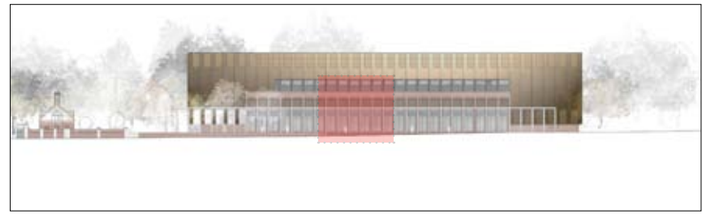


2 section



3 plan

key elevation



7.0 townscape

Townscape

The overall building massing and composition has been broken down into elemental form, reducing any impact on the surrounding townscape, sympathetically responding to the existing topographical context, hugging the existing site plateaus.

Throughout the design process the design team have held a number of pre-application consultations with BCC planning department, as noted in Section 4.2. Furthermore, the University of Birmingham have commissioned an independent and comprehensive verified view assessment to validate the buildings relationship within the surrounding context. All verified views have been approved by BCC planning department, at planning consultation no.04, dated 14.12.2011.

Townscape methodology

The current condition of the site and its context has been ascertained through site investigations, site survey analysis, site visits, historical investigation, satellite and aerial photography.

It is important to note that the Lifschutz Davidson Sandilands are responsible for the resulting design of the exterior building fabric and overall building composition however all verified views have been independently produced by Miller Hare, providing accurate and impartial detailed analysis of the proposed scheme.

Setting / location

The building setting varies greatly from the south-east, to the north-west of the site. As such the building has been designed to sympathetically respond to each condition, as briefly described below.

Building setting to south–east:

The overall building massing decreases to the south east of the site, responding to existing buildings of Edgbaston Park Road and the southern side of Bristol Road. The eastern elevation is pulled away from the Edgbaston Park Road, road line due to an existing below ground gas main and associated easement. At the junction of Edgbaston Park Road and Bristol Road the building creates an informal garden and meeting space whilst responding to the existing topography of the site.

The Bristol Road elevation is fronted by a colonnade. The colonnade acts not only as a civic gesture to the public but defines the edge of the University of Birmingham's Edgbaston campus. The colonnade invites visitors onto the campus and provides solar shading to the south elevation and respective pool hall beyond.

The site's relationship to the adjacent roads, and scale of building required to accommodate the sports brief, offers an opportunity to signpost Birmingham's first 50m swimming to passers by.

Building setting to north-west:

The west elevation of the building signifies the entrance to the New Indoor Sports Facility. The orientation of the entrance is directed into the Campus, making it 'of the campus' and providing a clear relationship with the South Gate entrance/exit road and playing fields beyond. The entrance is centrally aligned and highly transparent, enhancing both visibility and access to the activities within.

The surrounding mature landscape is manipulated to relate to the building form and composition. Hedges appear to slid on the ground plane and fold onto the building elevations to create envelope. Further landscaping information is detailed within this document.

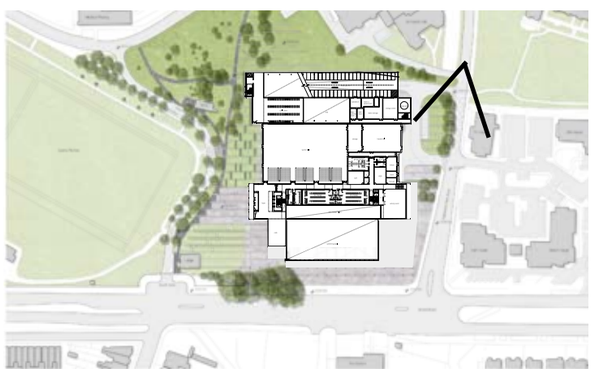
The North of the site edge of the building appears to be embedded into the existing topography, reducing the overall impact on the surrounding context. The northern elevation is heavily planted to screen the proposed multi-storey car park.

The building proposal uses familiar materials of the Edgbaston campus. This will ensure that the building shall weather gracefully, ensuring the building will only improve with time. Our ultimate ambition is to deliver a building that can improve both the built environment and the public realm, lasting the test of time.

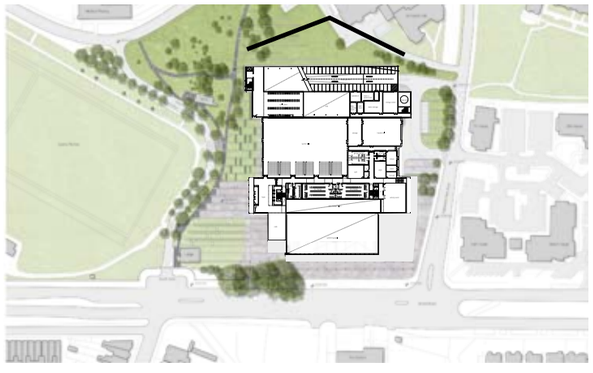
01
Verified view from south-east

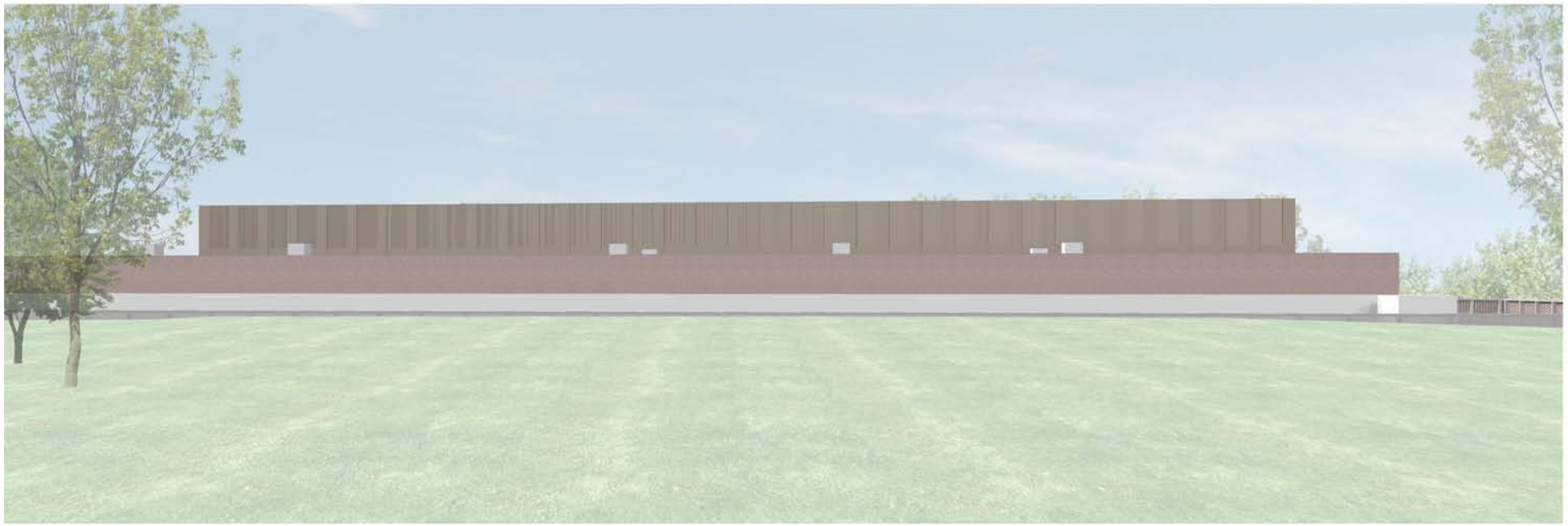
02
Verified view from south-west

03
Verified view from south gate lodge



04
Non-verified massing model from north-east





05
Non-verified massing model from north

1 INTRODUCTION

Scope

1.1 This study tests the visual impact of the Proposed Development by University of Birmingham at University of Birmingham Indoor Sports Centre. It consists of a series of accurately prepared photomontage images or Accurate Visual Representations (AVR) which are designed to show the visibility and appearance of the Proposed Development from a range of publicly accessible locations around the site. The views have been prepared by Miller Hare Limited.

1.2 The views included in the study were selected by the project team and they include, where relevant, standard assessment points defined by Birmingham City Council planning department on 14.12.11. Where requested, view locations have been refined and additional views added. The full list of views is shown in thumbnail form at the beginning of this section, together with a map showing their location. Detailed co-ordinates for the views, together with information about the source photography is shown alongside each view and summarised in the table shown in Appendix A1 "VIEW LOCATIONS AND CO-ORDINATES".

1.3 In preparing each AVR a consistent methodology and approach to rendering has been followed. General notes on the AVRs are given in Appendix A3 "ACCURATE VISUAL REPRESENTATIONS", and the detailed methodology used is described in Appendix A4 "METHODOLOGY FOR THE PRODUCTION OF ACCURATE VISUAL REPRESENTATIONS".

1.4 From each viewpoint a large format photograph has been taken as the basis of the study image. The composition of this photograph has been selected to allow the Proposed Development to be assessed in a meaningful way in relation to relevant elements of the surrounding context. Typically, photographs have been composed with a horizontal axis of view in order to allow vertical elements of the proposals to be shown vertically in the resulting image. If required in order to show the full extent of the proposals in an natural way the horizon line of the image has been allowed to fall above or below the centre of the image. This has been achieved by applying vertical rise at source using a large format camera or by subsequent cropping of the image. In all cases the horizon line and location of the optical axis are clearly shown by red arrow markers at the edges of the image.

1.5 The lenses chosen for the source photography have been selected to provide a useful Field of View given the distance of the viewpoint from the site location. The lenses used for each view are listed in Appendix A1 "VIEW LOCATIONS AND CO-ORDINATES".

1.6 For each AVR image, the precise Field of View, after any cropping or extension has been applied is shown clearly using indexed markings running around the edges of the image. These indicate increments of 1, 5 and 10 degrees marked away from Optical Axis. Using this peripheral annotation it is possible to detect optical distortions in parts of the image away from the Optical Axis . It is also possible to simulate a different field of view by masking off an appropriate area of the image. More detailed information on the border annotation is contained in Appendix A3 "ACCURATE VISUAL REPRESENTATIONS".

Conditions

1.7 From each selected viewpoint a set of accurate images have been created comparing the future view with the current conditions represented by a carefully taken large format photograph. In this study the following conditions are compared:

- Existing – the appearance today as recorded on the specified date and time
- Proposed – the future appearance were the Proposed Development to be constructed

Styles

1.8 For each viewpoint, the Proposed Development is shown in a defined graphical style. These styles comply with the definitions of AVR style . The styles used in the study are:

- AVR 3 – a fully rendered representation of the building showing the likely appearance of the proposed materials under the lighting conditions obtaining in the selected photograph.

1.9 The Proposed Development shown in the study has been defined by drawings and specifications prepared by the client's design team issued to Miller Hare in January 2012. Computer models reflecting the Proposed Development have been assembled and refined by Miller Hare and images from these models have been supplied to the project team to be checked for accuracy against the design intent. An overview of the study model annotated with key heights is illustrated in Appendix A2 "DETAILS OF SCHEMES".

2 THE VIEWS

1 | Bournbrook road: Inside Gates Viewing Lodge

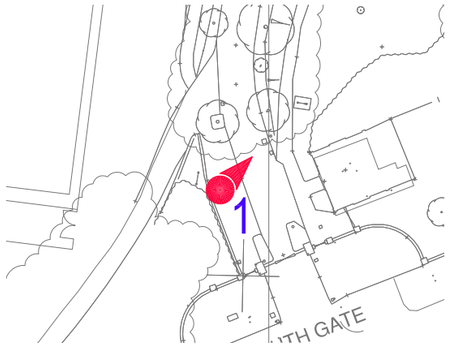
2 | Box Junction looking towards clock tower

3 | Bristol Road Junction Viewing Lodge

/iew location map

1 Bournbrook road: Inside Gates Viewing Lodge

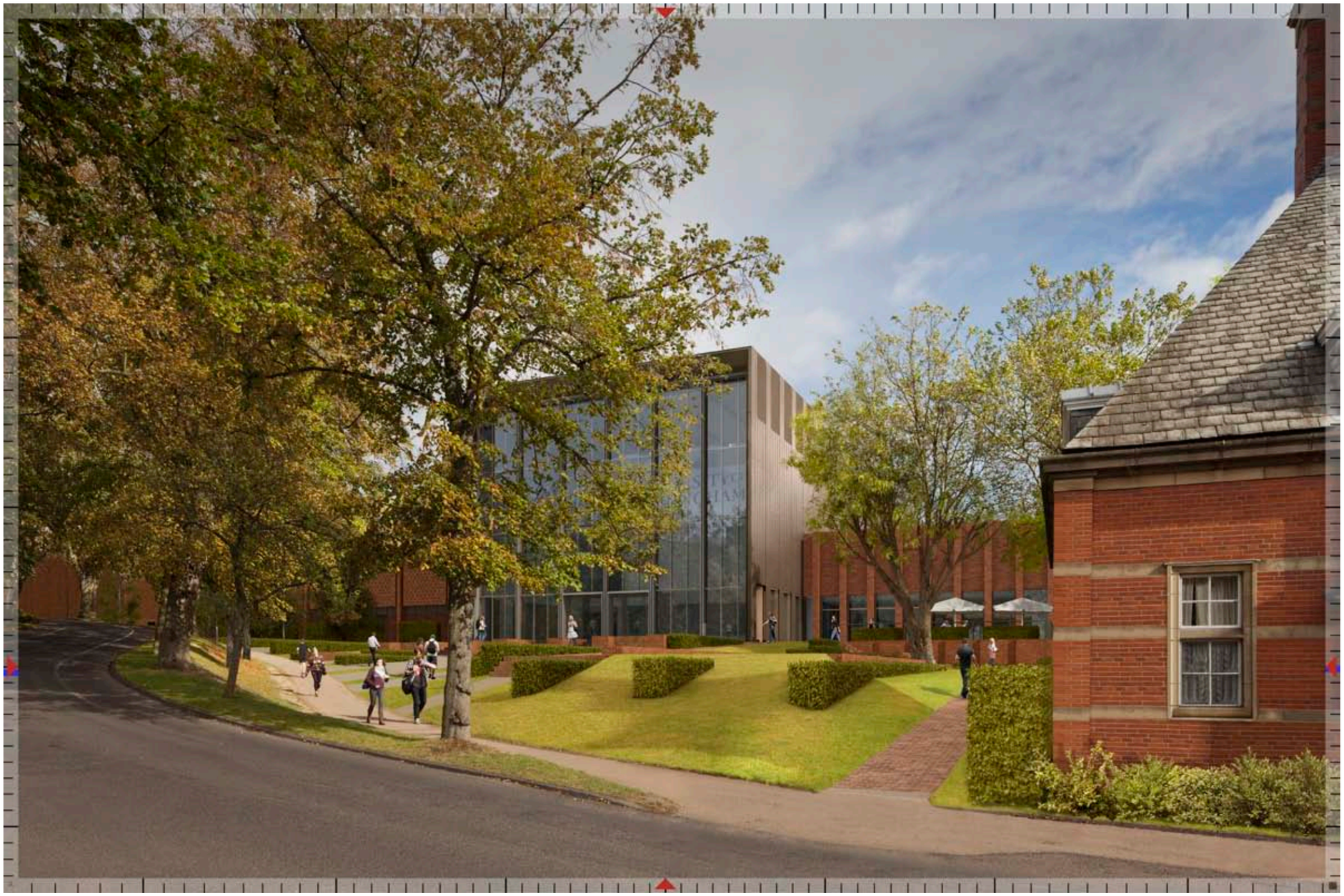
2230_1111



Camera Location
National Grid Reference 404993.3E 283273.6N
Camera height 122.78m AOD
Looking at Centre of Site
Bearing 44.0°, distance 0.1km

Photography Details
Height of camera 1.60m above ground
Date of photograph 12/10/2011
Time of photograph 12:15

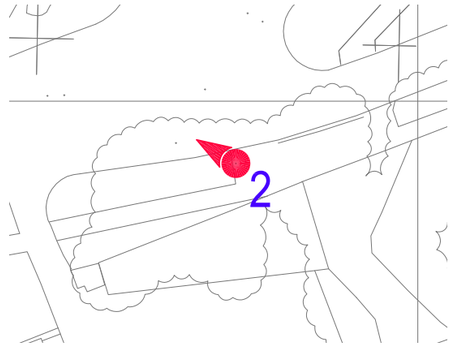
Existing



Proposed

2 Box Junction looking towards clock tower

2230_1511



Camera Location
National Grid Reference 405174.9E 283291.4N
Camera height 124.25m AOD
Looking at Centre of Site
Bearing 301.1°, distance 0.1km

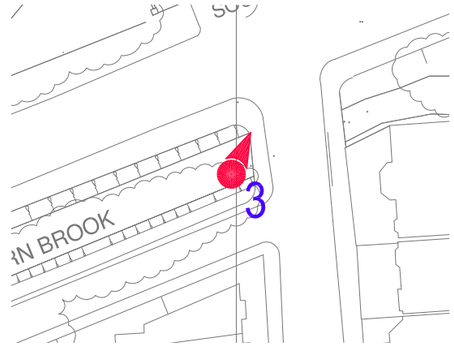
Photography Details
Height of camera 1.60m above ground
Date of photograph 12/10/2011
Time of photograph 11:30

Existing

Proposed

3 Bristol Road Junction Viewing Lodge

2230_1321



Camera Location
National Grid Reference 404999.3E 283227.9N
Camera height 122.25m AOD
Looking at Centre of Site
Bearing 33.5°, distance 0.1km

Photography Details
Height of camera 1.60m above ground

Existing

Proposed

APPENDICES

A1 VIEW LOCATIONS AND CO-ORDINATES

View	Description	MH Reference	Type	Method	Camera Easting	Northing	Height	Target Easting	Northing	Height	Camera	Format	Lens	HFOV Photo	Image	Photo date/time	Bearing	distance (km)
1	Bournbrook road: Inside Gates Viewing Lodge	1110	rendered	Verified	404993.3	283273.6	122.78	405082.8	283366.2	123.34	Canon EOS 5D Mark II DSLR	FX	24mm	77.6	72.9	12/10/2011 12:15	48.6	0.1
2	Box Junction looking towards clock tower	1510	rendered	Verified	405174.9	283291.4	124.25	405079.6	283348.9	124.16	Canon EOS 5D Mark II DSLR	FX	24mm	109.5	104.7	12/10/2011 11:30	301.7	0.1
3	Bristol Road Junction Viewing Lodge	1320	rendered	Verified	404999.3	283227.9	122.37	405056.3	283350.6	122.28	Canon EOS 5D Mark II DSLR	FX	24mm	77.8	73.5	12/10/2011 11:58	33.5	0.2

A2 VIEW LOCATION PHOTOGRAPHY

1 | Bournbrook road: Inside Gates Viewing Lodge

2 | Box Junction looking towards clock tower

3 | Bristol Road Junction Viewing Lodge

index	scheme name	status	source of model data	positioning method	MH reference
1	University of Birmingham	Proposed	Model supplied by Lifschutz Davidson Sandilands	Position relative to O.S. supplied by architect	bham001.detail120125-lds-proposed

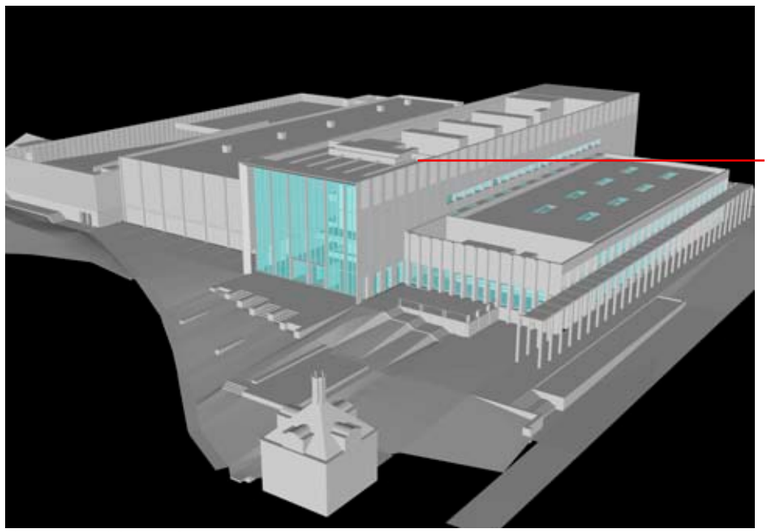


Figure 1 - Aerial view of Proposed Development

A4 ACCURATE VISUAL REPRESENTATIONS

A4.1 Each of the views in this study has been prepared as an Accurate Visual Representation (AVR) following a consistent methodology and approach to rendering.
App D, View Management Framework: Revised Supplementary Planning Guidance (May 2010) defines an AVR as:

> *"An AVR is a static or moving image which shows the location of a proposed development as accurately as possible; it may also illustrate the degree to which the development will be visible, its detailed form or the proposed use of materials. An AVR must be prepared following a well-defined and verifiable procedure and can therefore be relied upon by assessors to represent fairly the selected visual properties of a proposed development. AVRs are produced by accurately combining images of the proposed building (typically created from a three-dimensional computer model) with a representation of its context; this usually being a photograph, a video sequence, or an image created from a second computer model built from survey data. AVRs can be presented in a number of different ways, as either still or moving images, in a variety of digital or printed formats."*

A4.2 In this study the baseline condition is provided by carefully taken large format photography. The proposed condition is represented as an accurate photomontage, which combines a computer generated image with the photographic context. In preparing AVRs of this type certain several key attributes need to be determined, including:

- the Field of View
- the representation of the Proposed Development
- documentation accompanying the AVR

Selection of Field of View

A4.3 The choice of telephoto, standard or wide-angle lens, and consequently the Field of View, is made on the basis of the requirements for assessment which will vary from view to view.

A4.4 In the simple case the lens selection will be that which provides a comfortable Viewing Distance. This would normally entail the use of what most photographers would refer to as a "standard" or "normal" lens, which in practice means the use of a lens with a 35mm equivalent focal length of between about 40 and 58 mm.

A4.5 However in a visual assessment there are three scenarios where constraining the study to this single fixed lens combination would not provide the assessor with the relevant information to properly assess the Proposed Development in its context.

Field Of View

The term 'Field Of View' (FOV) or more specifically Horizontal Field of View (HFOV), refers to the horizontal angle of view visible in a photograph or printed image and is expressed in degrees. It is often generally referred to as 'angle of view', 'included angle' or 'view cone angle'.

Using this measure it becomes practical to make a comparison between photographs taken using lens of various focal lengths captured on to photographic film or digital camera sensors of various size and proportions. It is also possible to compare computer renderings with photographic images.

Studies of this type use a range of camera equipment; in recent times digital cameras have largely superseded the traditional film formats of 35mm, medium format (6cm x 6cm) and large format (5in x 4in). Comparing digital and film formats may be achieved using either the HFOV or the 35mm equivalent lens calculation, however quoting the lens focal length (in mm) is not as consistently applicable as using the HFOV when comparing AVRs.

		Lens focal length (mm)		
Add	HFOV degrees	Large format	High resolution digital	35mm format
Digital wide angle lens	69.9	-	35	-
Large format wide angle lens	67.6	90	-	-
35mm wide angle lens	65.5	-	-	28
35mm medium wide lens	54.4	-	-	35
Large format telephoto lens	42.9	150	-	-
50mm standard lens	39.6	-	-	50
35mm telephoto lens	16.4	-	-	125
Digital telephoto lens	13.2	-	210	-

The FOV of digital cameras is dependent on the physical dimensions of the CCD used in the camera. These depend on the make and model of the camera. The comparison table uses the specifications for a Phase One P45 digital back which has CCD dimensions of 48.9mm x 36.7mm.

A4.6 Firstly, where the relationship being assessed is distant, the observer would tend naturally to focus closely on it. At this point the observer might be studying as little as 5 to 10 degrees in plan. The printing technology and image resolution of a print limit the amount of detail that can be resolved on paper when compared to the real world, hence in this situation it is appropriate to make use of a telephoto lens.

A4.7 Secondly, where the wider context of the view must be considered and in making the assessment a viewer would naturally make use of peripheral vision in order to understand the whole. A print has a fixed extent which constrains the angle of view available to the viewer and hence it is logical to use a wide angle lens in these situations in order to include additional context in the print.

A4.8 Thirdly where the viewing point is studied at rest and the eye is free to roam over a very wide field of view and the whole setting of the view can be examined by turning the head. In these situations it is appropriate to provide a panorama comprising of a number of photographs placed side by side.

A4.9 For some views two of these scenarios might be appropriate, and hence the study will include two versions of the same view with different fields of view.

Representation of the Proposed Development and cumulative schemes

Classification of AVRs

A4.10 AVRs are classified according to their purpose using Levels 0 to 4. The following table is a summary:

AVR level	showing	purpose
AVR 0	Location and size of proposal	Showing Location and size
AVR 1	Location, size and degree of visibility of proposal	Confirming degree of visibility
AVR 2	As level 1 + description of architectural form	Explaining form
AVR 3	As level 2 + use of materials	Confirming the use of materials

A4.11 In practice the majority of photography based AVRs are either AVR 3 (commonly referred to as "fully rendered" or "photo-real") or AVR 1 (commonly referred to as "wire-line"). Model based AVRs are generally AVR 1.

AVR 3 - Photoreal

Example of AVR 3 - confirming the use of materials (in this case using a 'photo-realistic' rendering technique)

A4.12 The purpose of a Level 3 AVR is to represent the likely appearance of the Proposed Development under the lighting conditions found in the photograph. All aspects of the images that are able to be objectively defined have been created directly from a single detailed description of the building. These include the geometry of the building and the size and shape of shadows cast by the sun.

A4.13 Beyond this it is necessary to move into a somewhat more subjective arena where the judgement of the delineator must be used in order to define the final appearance of the building under the specific conditions captured by the photographic and subsequent printing processes. In this area the delineator is primarily guided by the appearance of similar types of buildings at similar distances in the selected photograph. In large scope studies photography is necessarily executed over a long period of time and sometimes at short notice. This will produce a range of lighting conditions and photographic exposures. The treatment of lighting and materials within these images will respond according to those in the photograph.

A4.14 Where the Proposed Development is shown at night-time, the lightness of the scheme and the treatment of the materials was the best judgment of the visualiser as to the likely appearance of the scheme given the intended lighting strategy and the ambient lighting conditions in the background photograph. In particular the exact lighting levels are not based on photometric calculations and therefore the resulting image is assessed by the Architect and Lighting Designer as being a reasonable interpretation of the concept lighting strategy.

AVR 1 - Outline

Exampe of AVR 1 confirming degree of visibility (in this case as an occluded 'wire-line' image)

A4.15 The purpose of a wire-line view is to accurately indicate the location and degree of visibility of the Proposed Development in the context of the existing condition and potentially in the context of other proposed schemes.

A4.16 In AVR1 representation each scheme is represented by a single line profile, sometimes with key edges lines to help understand the massing. The width of the profile line is selected to ensure that the diagram is clear, and is always drawn inside the true profile. The colour of the line is selected to contrast with the background. Different coloured lines may be used in order to distinguish between proposed and consented status, or between different schemes.

A4.17 Where more than one scheme is represented in outline form the outlines will obscure each other as if the schemes where opaque. Trees or other foliage will not obscure the outline of schemes behind them. This is because the transparency of trees varies with the seasons, and the practical difficulties of representing a solid line behind a filigree of branches. Elements of a temporary nature (e.g. cars, tower cranes, people) will similarly not obscure the outlines.

Framing the view

A4.18 Typically AVRs are composed with the camera looking horizontally i.e. with a horizontal Optical Axis. This is in order to avoid converging verticals which, although perspectively correct, appear to many viewers as unnatural in print form. The camera is levelled using mechanical levelling devices to ensure the verticality of the Picture Plane, being the plane on to which the image is projected; the film in the case of large format photography or the CCD in the case of digital photography.

A4.19 For a typical townscape view, a Landscape camera format is usually the most appropriate, giving the maximum horizontal angle of view. Vertical rise may be used in order to reduce the proportion of immediate foreground visible in the photograph. Horizontal shift will not be used. Where the prospect is framed by existing buildings, portrait format photographs may be used if this will result in the proposal being wholly visible in the AVR, and will not entirely exclude any relevant existing buildings.

A4.20 Where the Proposed Development would extend off the top of the photograph, the image may be extended vertically to ensure that the full height of the Proposed Development is show. Typically images will be extended only where this can be achieved by the addition of sky and no built structures are amended. Where it is necessary to extend built elements of the view, the method used to check the accuracy of this will be noted in the text.

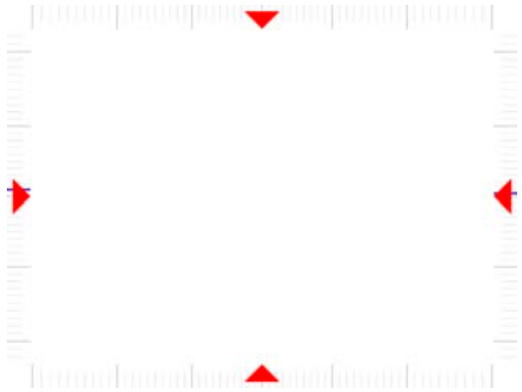
Documenting the AVR

Border annotation

A4.21 A Miller Hare AVR image has an annotated border or 'graticule' which indicates the field of view, the optical axis and the horizon line. This annotation helps the user to understand the characteristics of the lens used for the source photograph, whether the photographer applied tilt, vertical rise or horizontal shift during the taking of the shot and if the final image has been cropped on one or more sides.

A4.22 The four red arrows mark the horizontal and vertical location of the 'optical axis'. The optical axis is a line passing through the eye point normal to the projection plane. In photography this line passes through the centre of the lens, assuming that the film plane has not been tilted relative to the lens mount. In computer rendering it is the viewing vector, i.e the line from the eye point to the target point.

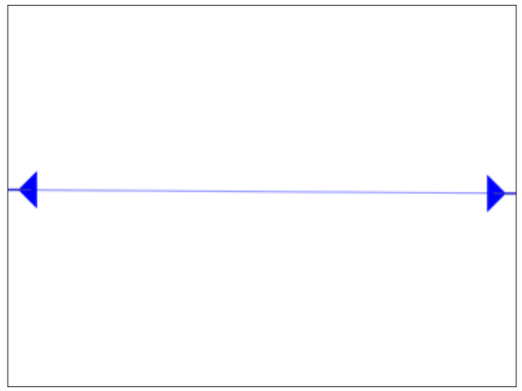
A4.23 If the point indicated by these marks lies above or below the centre of the image, this indicates either that vertical rise was used when taking the photograph or that the image has subsequently been cropped from the top or bottom edge. If it lies to the left or right of the centre of the image then cropping has been applied to one side or the other, or more unusually that horizontal shift was applied to the photograph.



Sample graticule showing optical axis markers

A4.24 The vertical and horizontal field of view of the final image is declared using a graticule consisting of thick lines at ten degree increments and intermediate lines every degree, measured away from the optical axis. Using this graticule it is possible to read off the resultant horizontal and vertical field of view, and thereby to compare the image with others taken using specific lens and camera combinations. Alternatively it can be used to apply precise crops during subsequent analysis.

A4.25 The blue marks on the left and right indicate the calculated location of the horizon line i.e. a plane running horizontally from the location of the camera. Where this line is above or below the optical axis, this indicates that the camera has been tilted; where it is not parallel with the horizontal marking of the optical axis, this indicates that the camera was not exactly horizontal, i.e. that "roll" is present. Note that a small amount of tilt and roll is nearly always present in a photograph, due to the practical limitations of the levelling devices used to align the camera in the field.



Sample graticule showing horizon line markers

Comparing AVRs with different FOVs

A4.26 A key benefit of the index markings is that it becomes practical to crop out a rectangle in order to simulate the effect of an image with a narrower field of view. In order to understand the effect of using a longer lens it is simply necessary to cover up portions of the images using the graticule as a guide.

A5 METHODOLOGY FOR THE PRODUCTION OF ACCURATE VISUAL REPRESENTATIONS

Overview of Methodology

A4.27 The study was carried out by Miller Hare (the Visualiser) by combining computer generated images of the Proposed Development with large format photographs at key / strategic locations around the site as agreed with the project team.

A4.28 The methodology employed by Miller Hare is compliant with Appendix D of the View Managment Framework , Revised Supplementary Planning Guidance (July 2010).

A4.29 The project team defined a series of local site locations where the proposed buildings might have a significant visual effect. At each of these locations Miller Hare carried out a preliminary study to identify specific Assessment Points from which a representative and informative view could be taken. Once the exact location had been agreed by the project team, a photograph was taken which formed the basis of the study. The precise location of the camera was established by the Surveyor using a combination of differential GPS techniques and conventional observations.

A4.30 For views where a photographic context was to be used additional surveying was carried out. A number of features on existing structures visible from the camera location were surveyed. Using these points, Miller Hare has determined the appropriate parameters to permit a view of the computer model to be generated which exactly overlays the appropriate photograph. Each photograph has then been divided into foreground and background elements to determine which parts of the current context should be shown in front of the Proposed Development and which behind. When combined with the computer-generated image these give an accurate impression of the impact of the Proposed Development on the selected view in terms of scale, location and use of materials (AVR Level 3).

Spatial framework and reference database

A4.31 All data was assembled into a consistent spatial framework, expressed in a grid coordinate system with a local plan origin. The vertical datum of this framework is equivalent to Ordnance Survey (OS) Newlyn Datum.

A4.32 By using a transformation between this framework and the OSGB36 (National Grid) reference framework, Miller Hare have been able to use other data sets (such as OS land line maps and ortho-corrected aerial photography) to test and document the resulting photomontages.

A4.33 In addition, surveyed observation points and line work from Miller Hare's Birmingham database are used in conjunction with new data in order to ensure consistency and reliability.

A4.34 The models used to represent consented schemes have been assembled from a variety of sources. Some have been supplied by the original project team, the remainder have been built by Miller Hare from available drawings, generally paper copies of the submitted planning application. While these models have not been checked for detailed accuracy by the relevant architects, Miller Hare has used its best endeavours to ensure that the models are positioned accurately both in plan and in overall height.

Process - photographic context

Reconnaissance

A4.35 At each Study Location the Visualiser conducted a photographic reconnaissance to identify potential Assessment Points. From each candidate position, a digital photograph was taken looking in the direction of the Proposed Development using a wide angle lens. Its position was noted with field observations onto an OS map and recorded by a second digital photograph looking at a marker placed at the Assessment Point.

A4.36 The Visualiser assigned a unique reference to each Assessment Point and Photograph.

Final Photography

A4.37 From each selected Assessment Point a series of large format photographs were taken with a camera height of approximately 1.6m. The camera, lens, format and direction of view are determined in accordance with the policies set out above

A4.38 The centre point of the tripod was marked and a digital photograph showing the camera and tripod in situ was taken to allow the Surveyor to return to its location. Measurements and field notes were also taken to record the camera location, lens used, target point and time of day.

Surveying the Assessment Points

A4.39 For each selected Assessment Point a survey brief was prepared, consisting of the Assessment Point study sheet and a marked up photograph indicating alignment points to be surveyed. Care was taken to ensure that a good spread of alignment points was selected, including points close to the camera and close to the target.

A4.40 Using differential GPS techniques the Surveyor established the location of at least two intervisible stations in the vicinity of the camera location. A photograph of the GPS antenna *in situ* was taken as confirmation of the position.

A4.41 From these the local survey stations, the requested alignment points were surveyed using conventional observation.

A4.42 The resulting survey points were amalgamated into a single data set by the Surveyor. This data set was supplied as a spreadsheet with a set of coordinates transformed and re-projected into OSGB36 (National Grid) coordinates, and with additional interpreted lines to improve the clarity of the surveyed data.

A4.43 From the point set, the Visualiser created a three dimensional alignment model in the visualisation system by placing inverted cones at each surveyed point.

Photo preparation

A4.44 From the set of photographs taken from each Assessment Point, one single photograph was selected for use in the study. This choice was made on the combination of sharpness, exposure and appropriate lighting.

A4.45 The selected photograph was copied into a template image file of predetermined dimensions. The resulting image was then examined and any artefacts related to the digital image capture process were rectified.

A4.46 Where vertical rise has been used the image is analysed and compensation is applied to ensure that the centre of the image corresponds to the location of the camera's optical axis.

Calculating the photographic alignment

A4.47 A preliminary view definition was created within the visualisation system using the surveyed camera location, recorded target point and FOV based on the camera and lens combination selected for the shot

A4.48 A lower resolution version of the annotated photograph was attached as a background to this view, to assist the operator to interpret on-screen displays of the alignment model and other relevant datasets.

A4.49 Using this preliminary view definition, a rendering was created of the alignment model at a resolution to match the scanned photograph. This was overlaid onto the background image to compare the image created by the actual camera and its computer equivalent. Based on the results of this process adjustments were made to the camera definition. When using a wide angle lens observations outside the circle of distortion are given less weighting.

A4.50 This process was iterated until a match had been achieved between the photograph and alignment model. At this stage, a second member of staff verified the judgements made. An A3 print was made of the resulting photograph overlaid with the alignment model as a record of the match. This was annotated to show the extents of the final views to be used in the study.

Example of alignment model overlaid on the photograph

Preparing models of the Proposed Development

A4.51 A CAD model of the Proposed Development was created from 3D CAD models and 2D drawings supplied by the Architect. The level of detail applied to the model is appropriate to the AVR type of the final images.

A4.52 Models of the Proposed Development and other schemes are located within the spatial framework using reference information supplied by the Architect or, when not available, by best fit to other data from the spatial framework reference database . Study renders of the model are supplied back to the Architect for confirmation of the form and the overall height of the Proposed Development. The method used to locate each model is recorded. Each distinct model is assigned a unique reference code by the Visualiser.

Determining occlusion and creating simple renderings

A4.53 A further rendering was created using the aligned camera, which combined the Proposed Development with a computer-generated context. This was used to assist the operator to determine which parts of the source image should appear in front of the Proposed Development and which behind it. Using this image and additional site photography for information, the source file is divided into layers representing foreground and background elements.

A4.54 In cases where the Proposed Development is to be represented in silhouette or massing form (AVR1 or AVR2), final renderings of an accurate massing model were generated and inserted into the background image file between the foreground and background layers.

A4.55 Final graphical treatments were applied to the resulting image as agreed with the Architect and environmental and planning consultants. These included the application of coloured outlines to clarify the reading of the images or the addition of tones to indicate occluded areas.

Creating more sophisticated renderings

A4.56 Where more sophisticated representations of the Proposed Developments were required (AVR3) the initial model is developed to show the building envelope in greater detail. In addition, definitions were applied to the model to illustrate transparency, indicative material properties and inter-reflection with the surrounding buildings.

A4.57 For each final view, lighting was set in the visualisation system to match the theoretical sunlight conditions at the time the source photograph was taken, and additional model lighting placed as required to best approximate the recorded lighting conditions and the representation of its proposed materials.

A4.58 By creating high resolution renderings of the detailed model, using the calculated camera specification and approximated lighting scenario, the operator prepared an image of the building that was indicative of its likely appearance when viewed under the conditions of the study photograph. This rendering was combined with the background and foreground components of the source image to create the final study images.

A4.59 A single CAD model of the Proposed Development has been used for all distant and local views, in which the architectural detail is therefore consistently shown. Similarly a single palette of materials has been applied. In each case the sun angles used for each view are transferred directly from the photography records.

A4.60 Material definitions have been applied to the models assembled as described. The definitions of these materials have been informed by technical notes on the planning drawings and other available visual material, primarily renderings created by others. These resulting models have then been rendered using the lighting conditions of the photographs.

A4.61 Where the Proposed Development is shown at night-time, the lightness of the scheme and the treatment of the materials was the best judgment of the visualiser as to the likely appearance of the scheme given the intended lighting strategy and the ambient lighting conditions in the background photograph.

Documenting the study

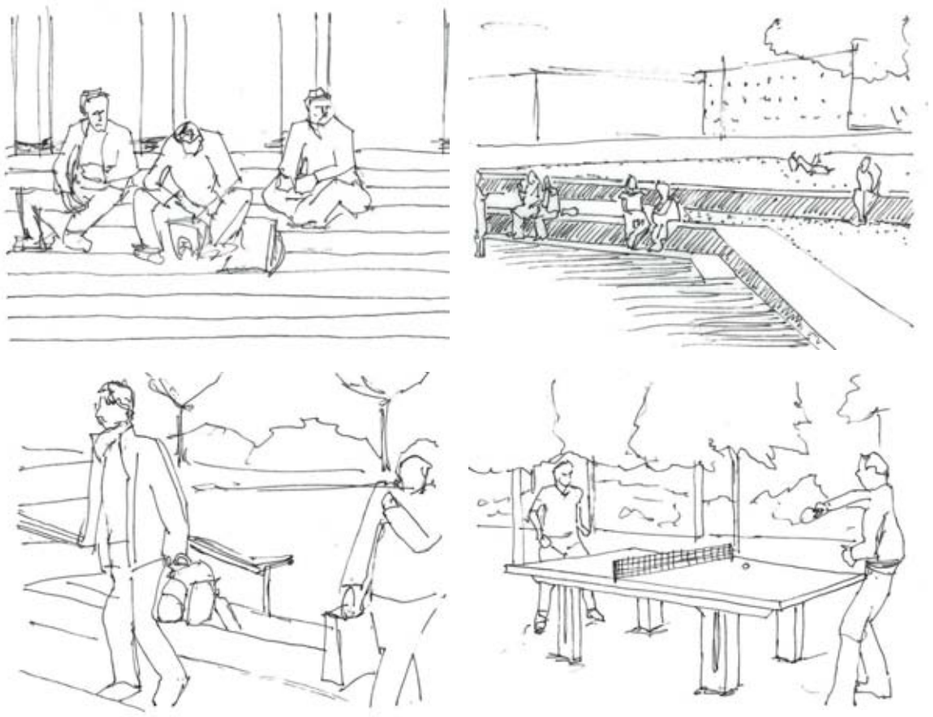
A4.62 For each Assessment Point a CAD location plan was prepared, onto which a symbol was placed using the coordinates of the camera supplied by the Surveyor. Two images of this symbol were created cross-referencing background mapping supplied by Ordnance Survey.

A4.63 The final report on the Study Location was created which shows side by side, the existing and proposed prospect. These were supplemented by images of the location map, a record of the camera location and descriptive text. The AVR level is described.

A4.64 Peripheral annotation was added to the image to clearly indicate the final FOV used in the image, any tilt or rise, and whether any cropping has been applied.

A4.65 Any exceptions to the applied policies or deviations from the methodology were clearly described.

A4.66 Where appropriate, additional images were included in the study report, showing the Proposed Development in the context of other consented schemes.



Introduction

The following landscape statement has been prepared by Townshend Landscape Architects on behalf of the University of Birmingham, to explain the landscape proposals associated with the New Indoor Sports Centre project.

The landscaping proposals are an integral part of the overall proposal, embedding the building into the surrounding natural landscape of the Edgbaston campus.

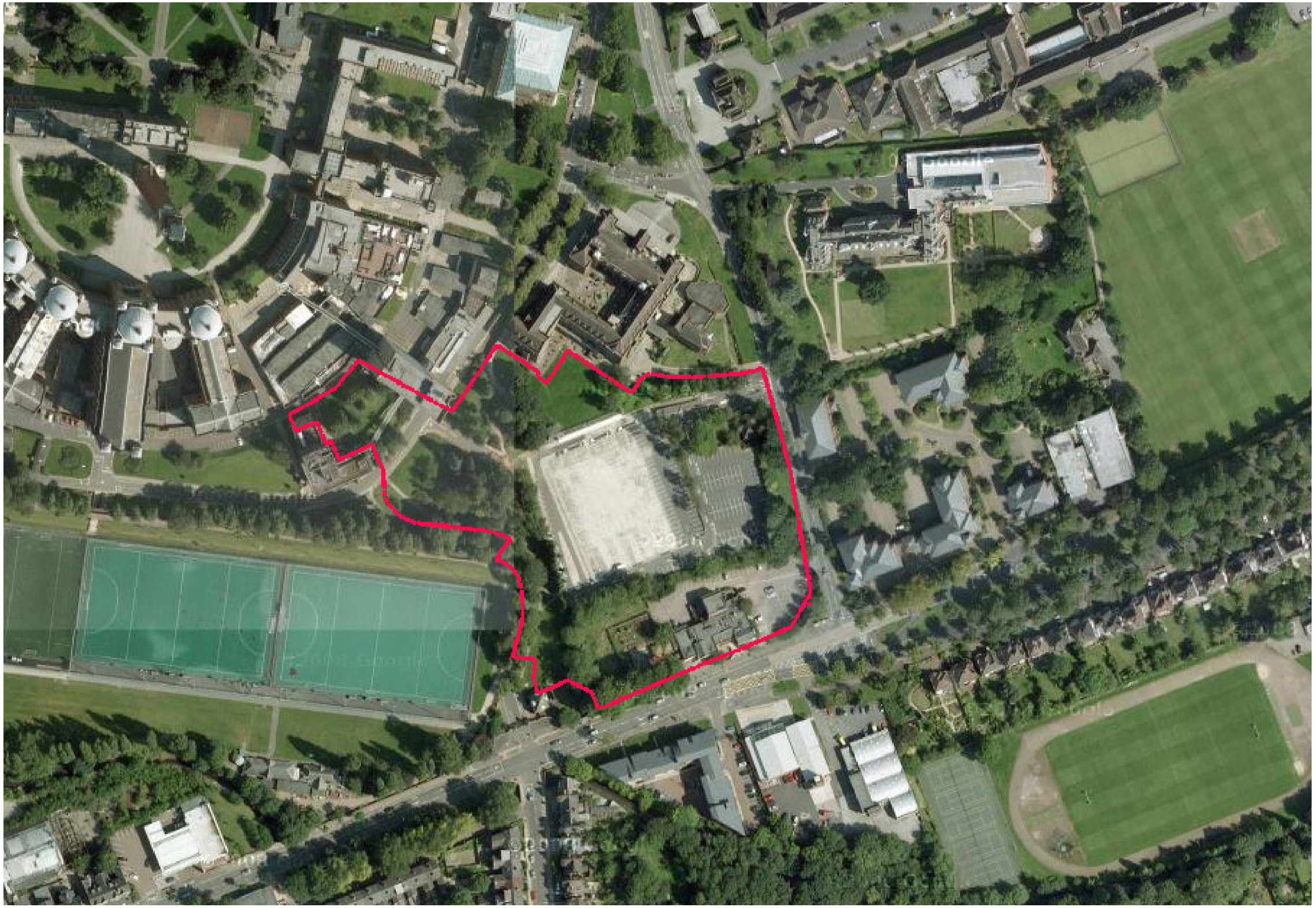
This document will discuss and demonstrate the following:

- site context and analysis to explore and to explain the influences on the design of the public realm;
- design concept for the site which has been developed to ensure that the landscape design helps to unify the site and also to help it tie into its context;
- description of the design proposals and details of the materials proposed for the project.

Aims

The principal aims of the landscape design are to:

- create an attractive and comfortable temporary environment for people to use and enjoy;
- create new spaces which have visual interest;
- ensure that proposals are designed to afford access and enjoyment for everyone, safely and without prejudice improve links to establish new public connections and routes;
- create an identity through the use of high quality materials and an attention to aesthetic details;
- link the proposals to its surroundings



Aerial Photo of Existing Site

CONTEXT

Site Context and Analysis

The proposed Birmingham University Indoor Sports Centre is situated in the south eastern corner of the Birmingham University Edgbaston Campus. The site is surrounded by Edgbaston Park Road to the east, Bristol Road to the south, the Guild of Students to the north and South Gate access road to the west.

In the analysis we have considered:

- pedestrian access,
- vehicular access,
- constraints relating to the level changes across the site,
- constraints related to existing trees and planting,
- links and views, and
- the opportunities to create a variation of spaces and activities on the site.

Photograph view points of existing site


View 1


View 2


View 3


View 4


View 5

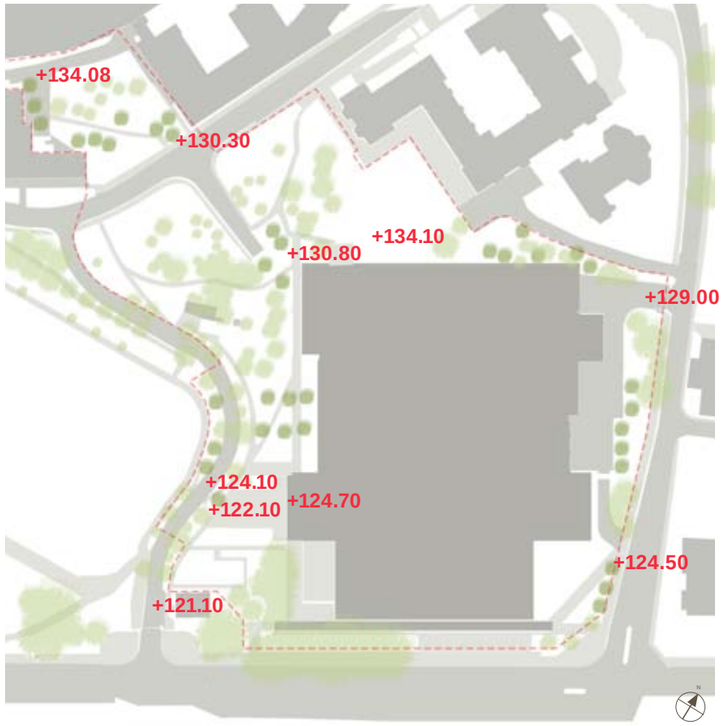

View 6


View 7


View 8

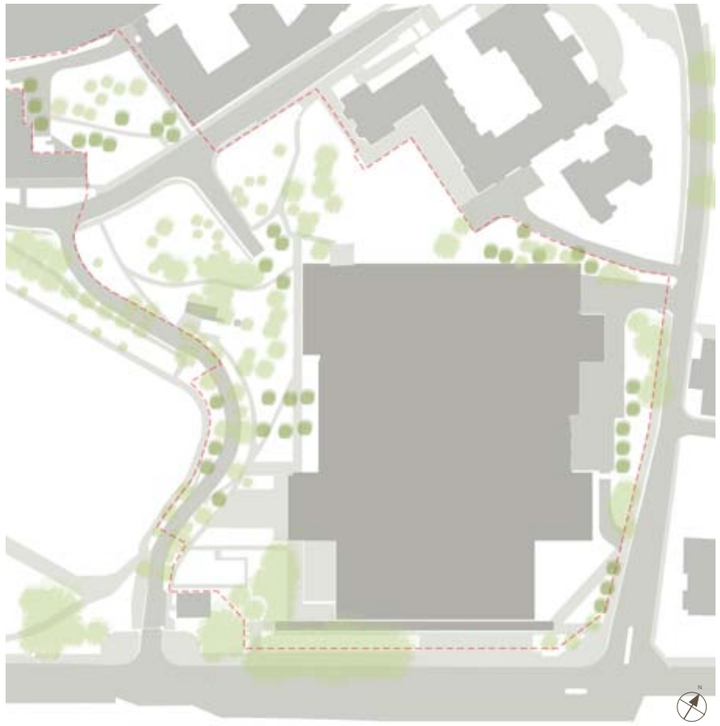

View 9

Site Constraints and Opportunities



Level changes

There are significant level changes across the site which will be addressed in the design proposals to ensure that there is step free access to the building entrances.

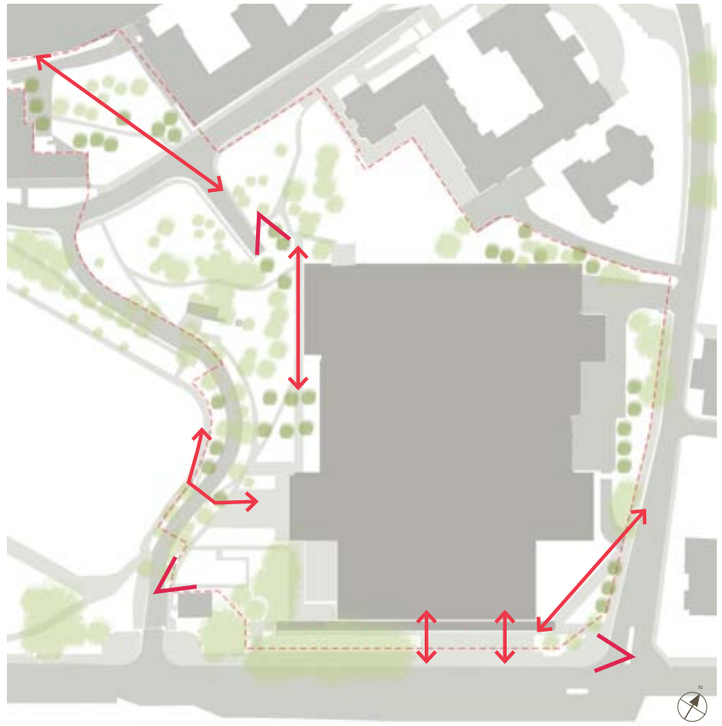


Existing trees and planting

There are currently many trees on the site, 21 of the trees have TPOs. Five trees with TPOs are proposed to be removed due to their close proximity to the building. As part of the landscape proposals, the other TPO'd trees are proposed to be retained and a tree replacement strategy has been developed for the site, please refer to page 39 and to drawing TOWN502(08)3001 R00.

Existing trees

Proposed trees



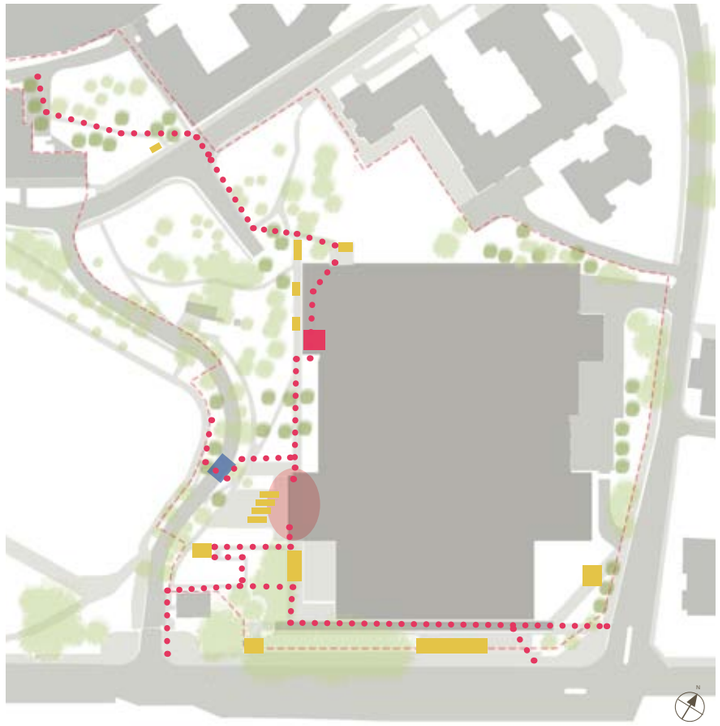
Links and views

There are opportunities to reinforce links and views from the Edgbaston Campus and the surrounding area.

Key views

Opportunity to reinforce links

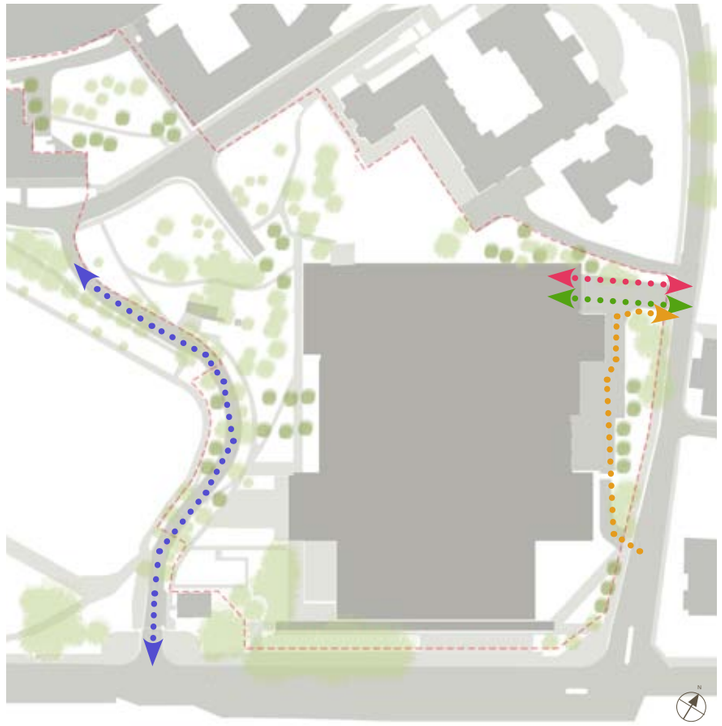
Site Constraints and Opportunities



Pedestrian access

There are opportunities to incorporate the step free access into the landscape proposals.

- Step free access compliant with the current Access Regulations
- Pedestrian road crossing
- Steps
- Main entrance
- Lift access inside building (Open 24h)



Vehicular access

The car parking will be accessed from the north eastern corner of the building and the service vehicle access is from the south eastern corner of the site.

- Access for Blue Badge parking bays in proposed car park
- Service vehicle access
- Existing controlled vehicular access
- Vehicular access to car park

Landscape character areas

There are six landscape character areas across the development.

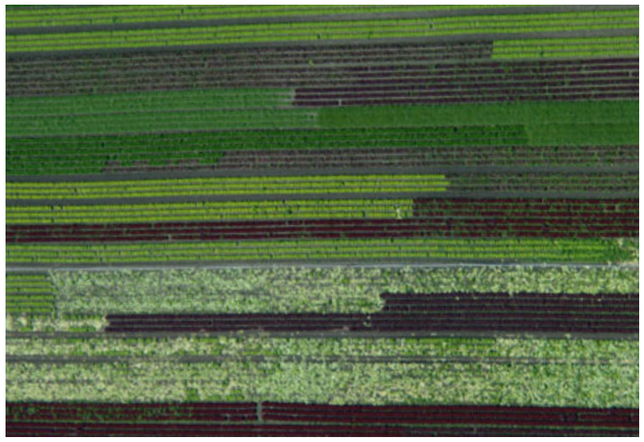
- Entrance area
- Service yard
- Building frontage onto Bristol Road
- Guild lawn
- South eastern courtyard
- Proposed access to the north of the Campus

CONCEPT DEVELOPMENT

Concept

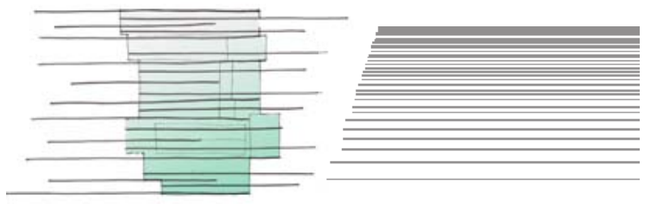
The proposals for the landscape surrounding the proposed Indoor Sport Centre at Birmingham University will incorporate the existing undulating landscape that envelopes the proposed building. The linear language of the building is proposed to manifest itself in the interfacing landscape with lines of paving embedded in the lawn as well as hedges growing around the building and into the surrounding landscape.

The concept of the landscape proposals aims to integrate the proposed building with its linear features into the existing undulating landscape. By reinforcing the linearity of the building with lines of paving and planting extending into the landscape, the landscape proposals create a variation of spaces for the students to use.

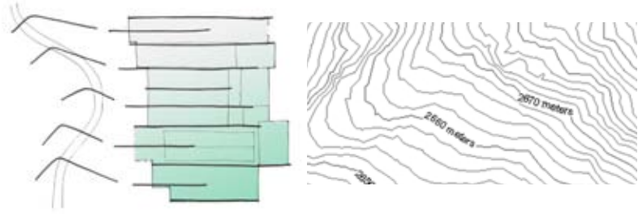


Precedent concept image - Linear landscape

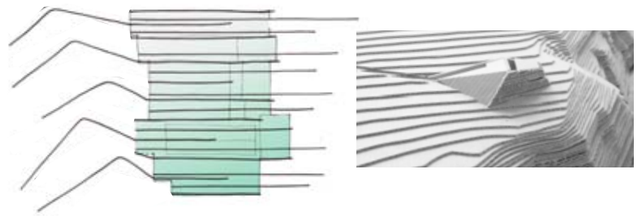
Precedent concept image - Curvy landscape



The linear language of the building design manifests itself in the interfacing landscape.



The lines from the buildings meet the existing contour lines.



The lines from the buildings merge with the contour lines and create a variation of spaces following the topography of the site.

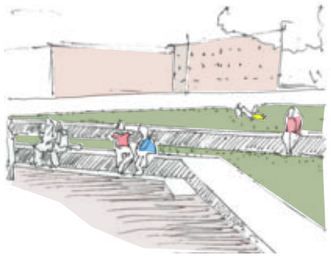
Design Principles: Integrating the building with the landscape

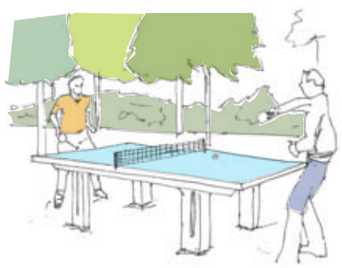
Reinforcing linearity

The linear, geometric form of building is reflected in the design of the landscape which immediately surrounds it. As the landscape moves away from the building, the geometry merges into the surrounding undulating, organic geometry.

The design of the landscape will use the emerging geometry to respond to the existing topography on the site by reflecting the linear form of the building with linear paving and planting extruding from the building. The organic form is reflected in the landform and the two meet around the building.

Surrounding the building, a variety of spaces that follow the topography of the site are proposed, including spaces for sitting, meeting and relaxing as well as spaces for sports and play related uses like badminton and table tennis. Pedestrian links across the site are proposed to be improved and links to the overall Birmingham University Masterplan reinforced. Furthermore an attractive frontage to Bristol Road will be created using steps and hedge planting to demarcate the entrance to the site.



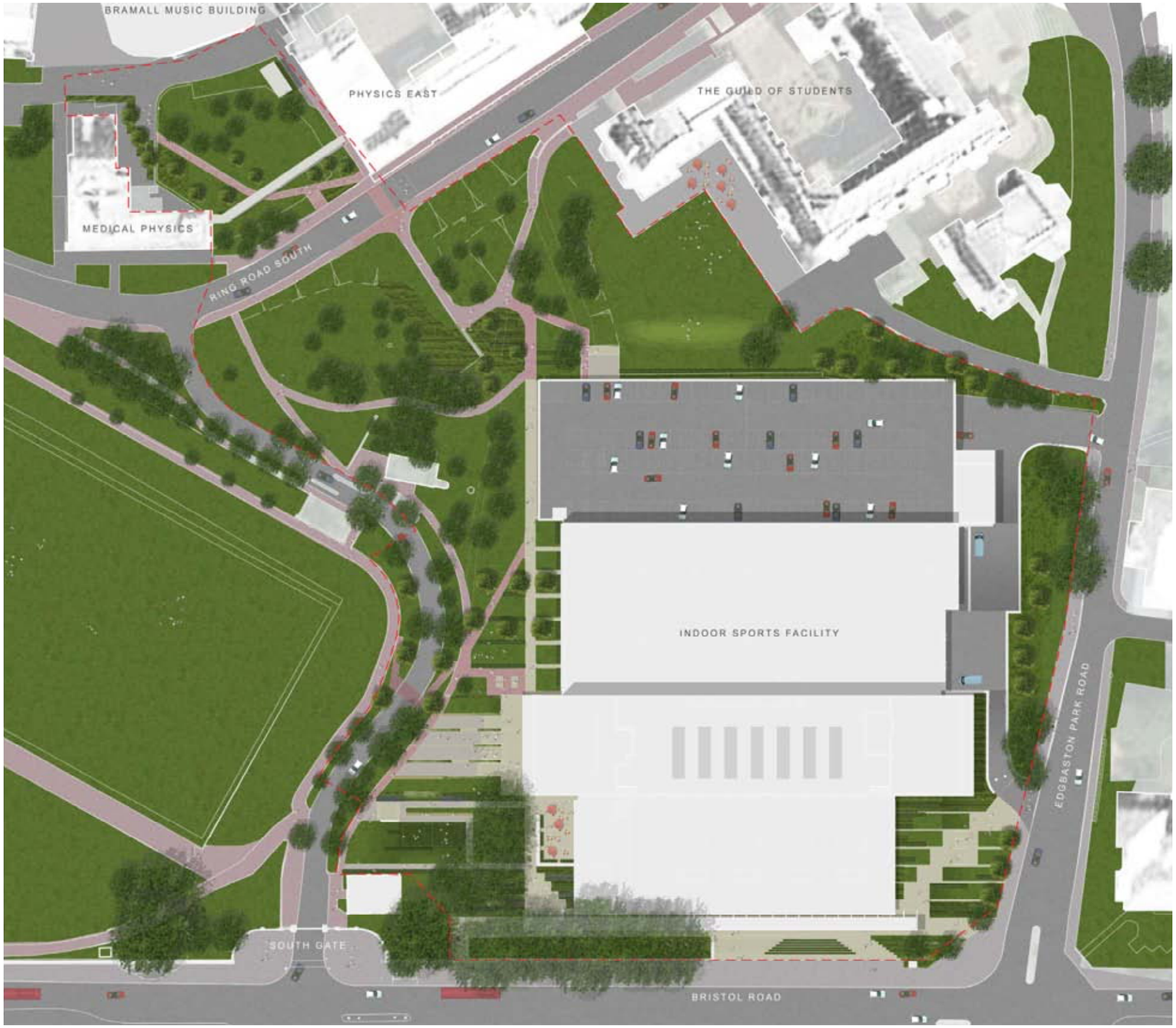


Design Principles: Integrating the building with the landscape

Two character areas

The eastern and southern sides to the site will be predominantly hard landscape to allow for the vehicular access to the building as well as pedestrian access from Edgbaston Park Road and Bristol Road.

The northern and western sides will be predominantly soft landscaping allowing the landscape to flow to the building edge.



Illustrative landscape plan

LANDSCAPE STRATEGY

Landscape Character Areas

The landscape has been divided into distinct character areas which are the following:

1. The entrance area,
2. The building frontage onto Bristol Road,
3. The eastern courtyard,
4. The service yard,
5. The Guild lawn,
6. The new pedestrian link to Edgbaston Campus.

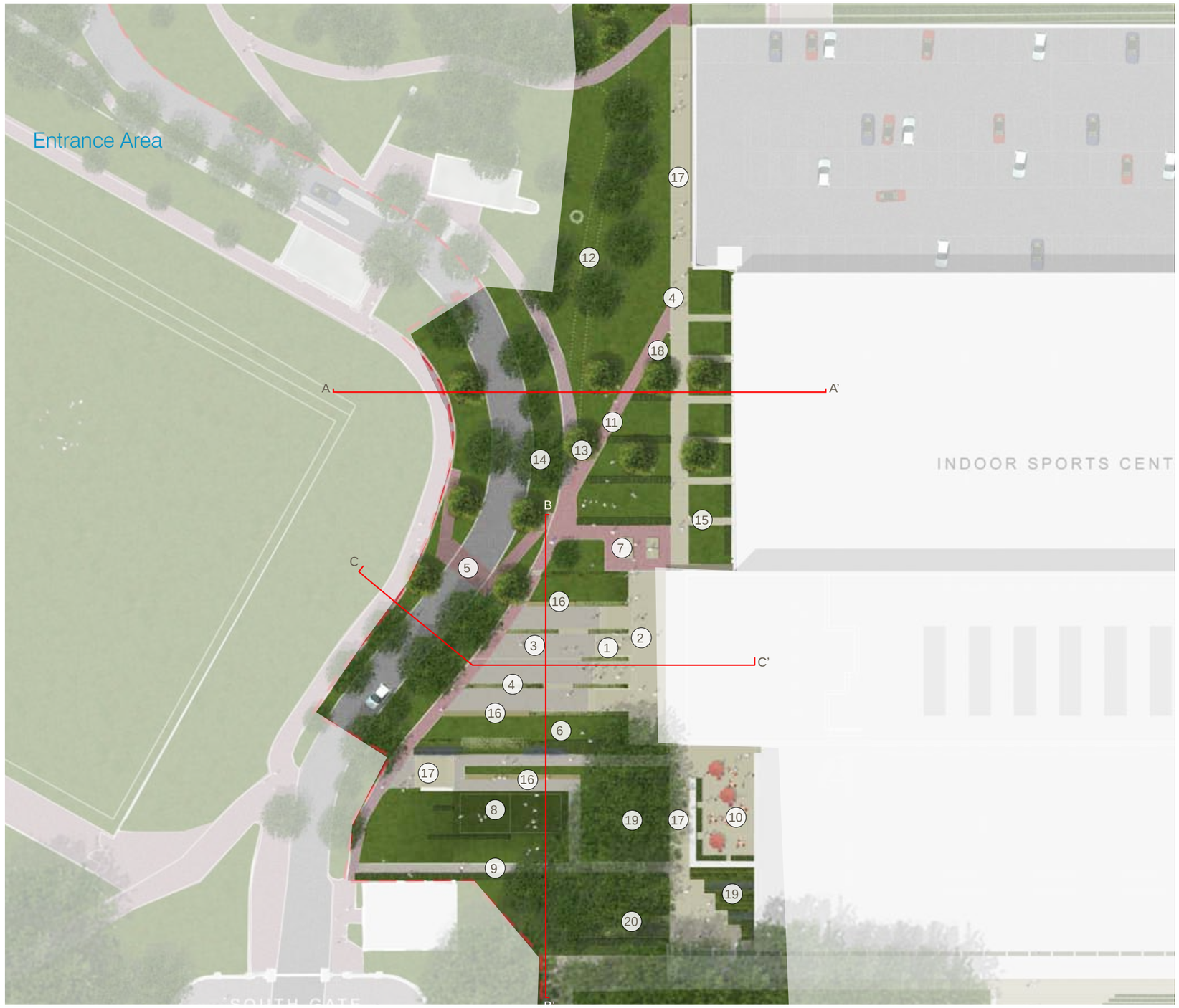
Landscape Areas

- 1. Entrance Area
- 2. Building Frontage onto Bristol Road
- 3. Eastern Courtyard
- 4. Service Yard
- 5. Guild Lawn
- 6. New pedestrian link to Edgbaston Campus

Application boundary

Illustrative Plan of Character Areas

N



Key plan

Entrance Area

1. Stepped access linking the entrance of the Indoor Sports Centre to the University campus
2. Clay pavers
3. Resin bonded gravel
4. Low shrub planting
5. Proposed new crossing
6. Lawn
7. Table tennis tables
8. Badminton court
9. Step free access
10. Cafe spill out onto terrace
11. Realigned path
12. Removed path
13. Proposed trees
14. Existing trees to be retained
15. Lines of paving and planting in the lawn
16. Proposed seating wall
17. Stepped access
18. Proposed asphalt matching existing asphalt
19. Linear shrub and hedge planting
20. Hedge and shrub planting acts as boundary to the Lodge garden

Entrance Area

The linear language of the building manifests itself in the landscape outside the main entrance. Following the topography; benches, lines of paving and planting flow out into the landscape.

There are stepped and ramped accesses from the building and a new crossing is proposed to improve pedestrian connectivity to the campus. The paved area outside the building entrance and the paving alongside the building will be clay pavers; the area below the steps and the step free access is paved with resin bonded gravel. The surrounding paths match the existing asphalt on site.

Seating walls in the lawn frame the spaces where activity takes place and provide an opportunity for students to meet. External table tennis tables are proposed and a court suitable for badminton will be marked out.

As part of the landscape proposals linear hedge and shrub planting will act as a boundary to the Lodge garden.

Precedent Image: Level changes edged with seating

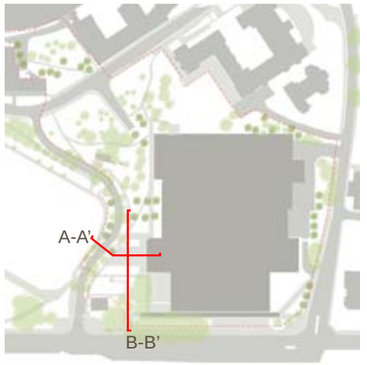
Precedent Image: Open lawn areas for meeting and relaxation framed with shrubs and hedges

Precedent Image: Outdoor table tennis

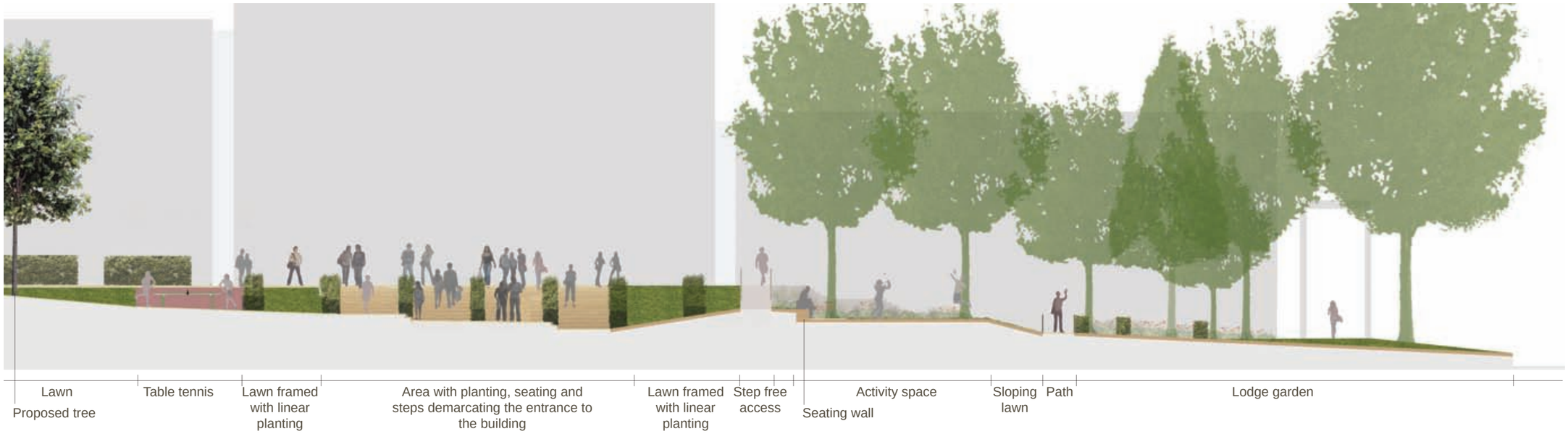
Precedent Image: Outdoor sports activities

Illustrative Sections

Illustrative Section A-A’

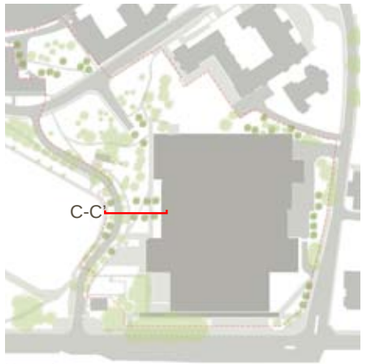


Key plan



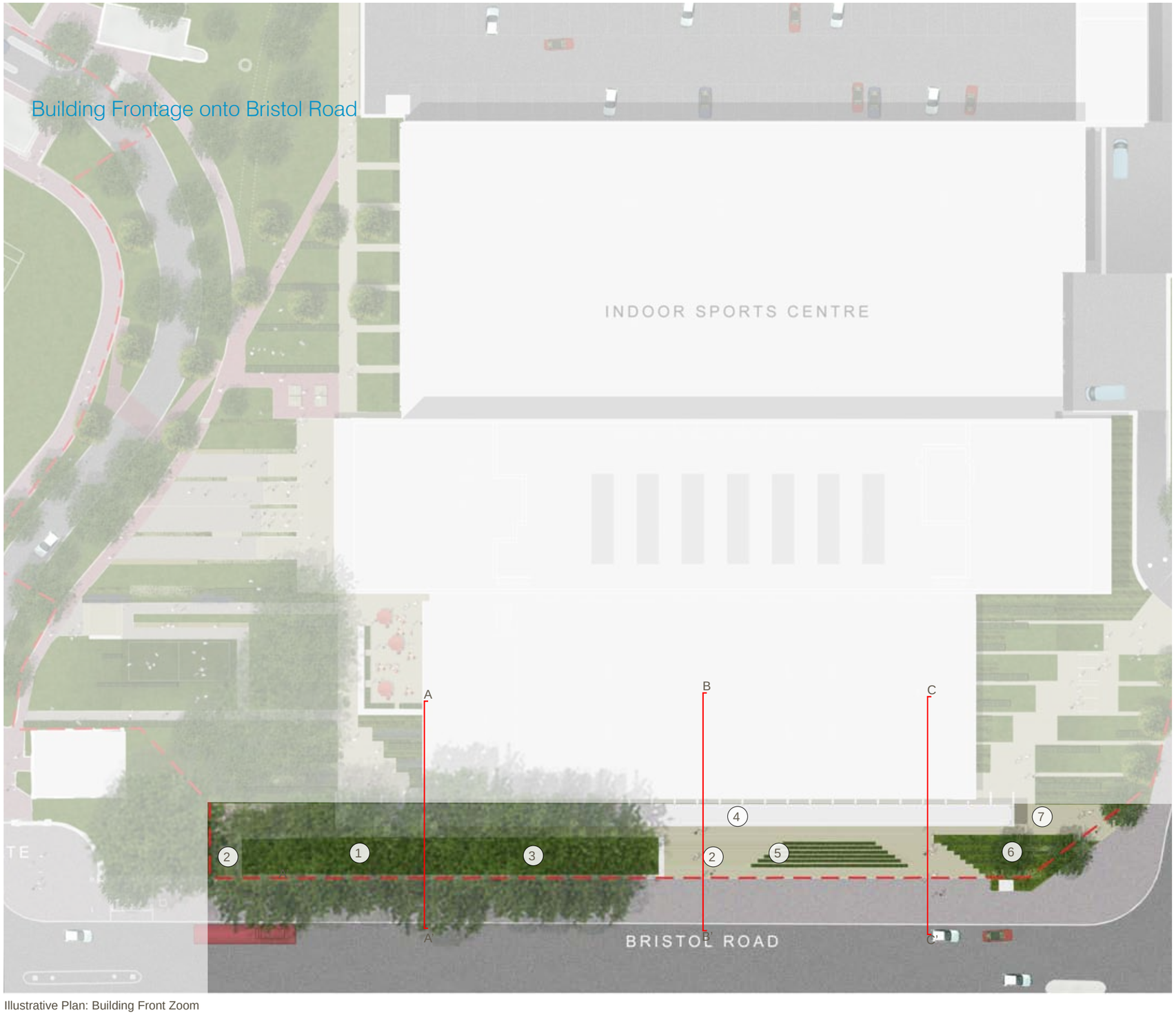
Illustrative Section B-B’

Illustrative Sections

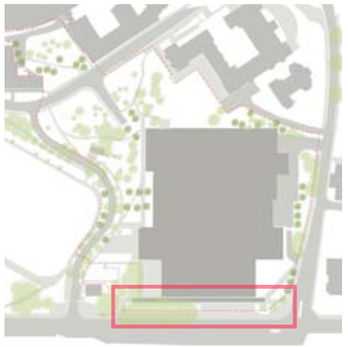


Key plan

Illustrative Section C-C'



Illustrative Plan: Building Front Zoom



Key plan

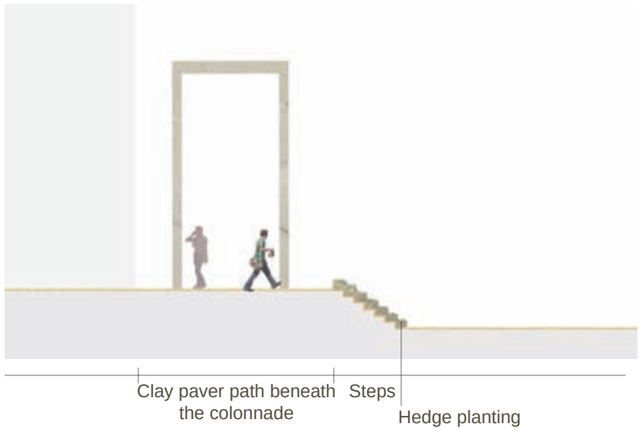
Building Front

1. Proposed low shrub planting
2. Proposed steps
3. Existing beech trees to be retained
4. Proposed colonnade
5. Proposed stepped planting integrated into steps
6. Existing cherry trees
7. Clay pavers

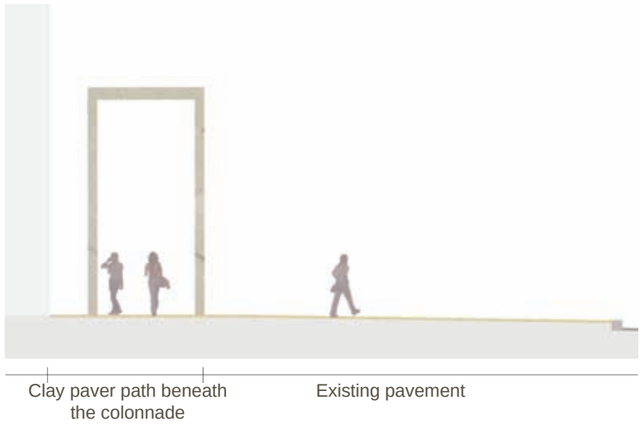
Building Frontage onto Bristol Road

The Bristol Road frontage is demarcated by a colonnade that links to the main entrance of the Indoor Sports Centre. The level changes from Bristol Road and into the scheme are taken up by steps with integrated hedge planting as well as step free access where there is no level change. The existing beech trees are retained and new planting is proposed to reinforce this key entrance to the site.

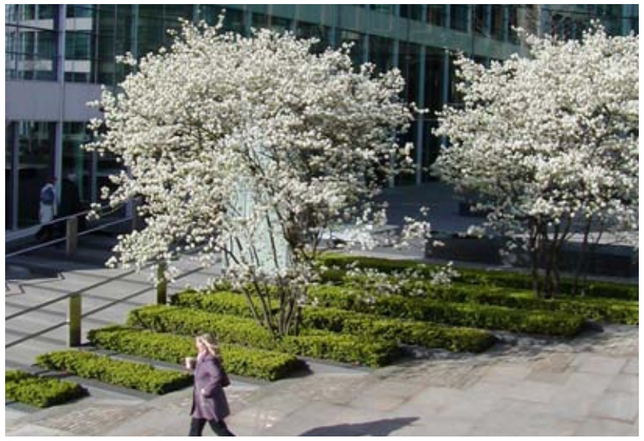
Illustrative Section A-A'



Illustrative Section B-B'



Illustrative Section C-C'



Precedent Image: Stepped planting

Precedent Image: Steps become a positive design feature

Eastern Courtyard

Key plan

Eastern Courtyard

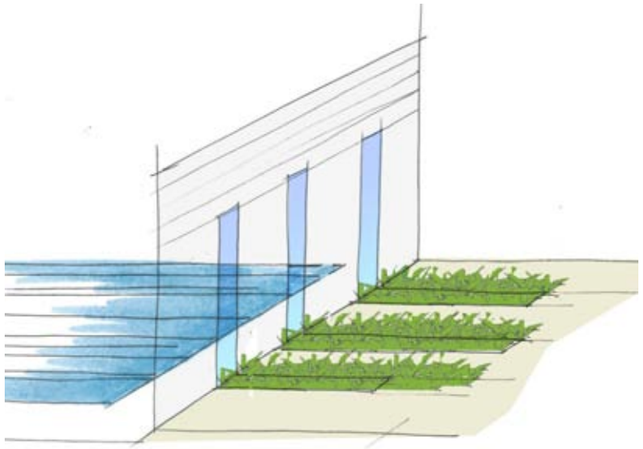
1. Clay paver path
2. Linear hedge and shrub planting
3. Lines of paving in lawn
4. Existing trees to be retained
5. Pedestrian crossing paved with granite setts
6. Proposed trees aligning with Edgbaston Road

Eastern Courtyard

A courtyard lies at the south eastern corner of the building. Linear lawn areas together with shrub and hedge planting ties in with the design of the building whilst also connecting the site to Edgbaston Park Road. The existing cherry trees are incorporated into the space as well as new proposed trees that follow Edgbaston Park Road.

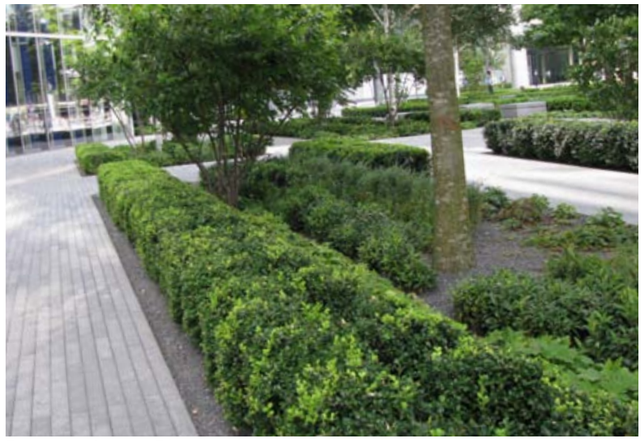
The courtyard is paved with clay pavers linking to the rest of the site.

Illustrative Section A-A'



Illustrative Sketch: Planting reflects the lanes in the indoor swimming pool

Precedent Image: Formal hedges to enhance linearity



Precedent Image: Directional paving and planting enhances linearity

Illustrative Plan: Service Yard Zoom

Key plan

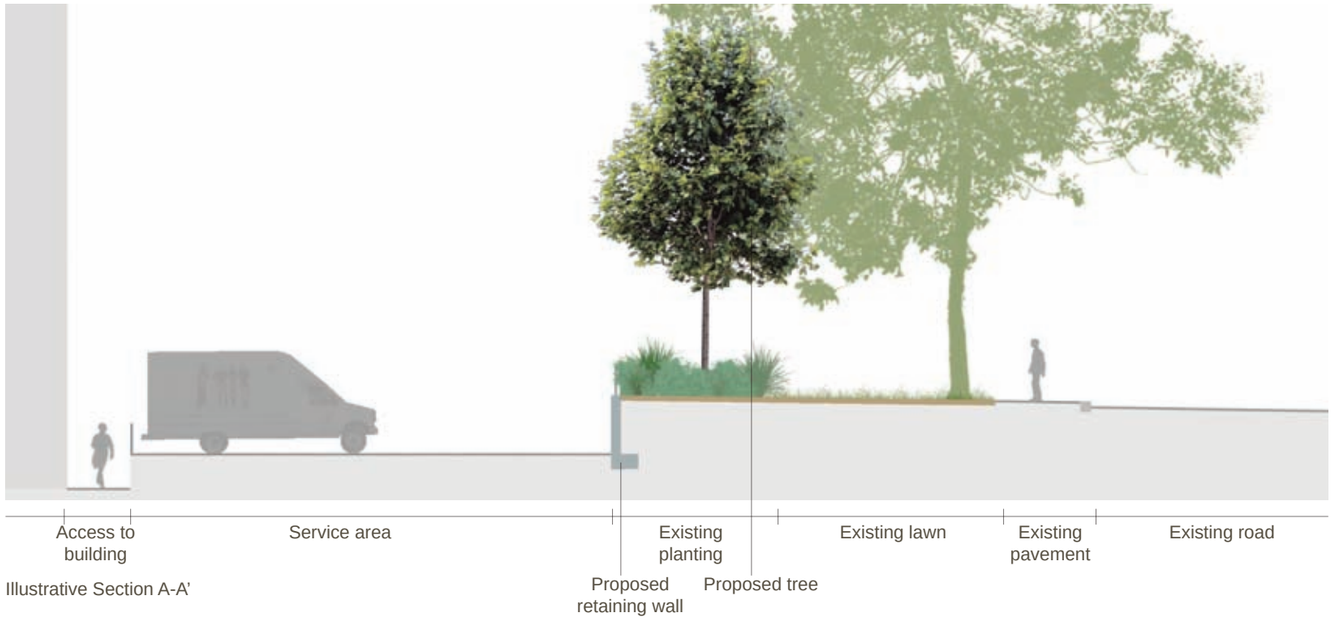
Service Yard

1. Proposed service area paved with asphalt
2. Existing shrub planting to be made good and proposed trees create a green screen to the service area
3. Existing trees to be retained
4. Vehicular entrance to the car park
5. Existing mounded landscape
6. Controlled service vehicle entrance
7. Planting buffer interfacing with the building

Service Yard

The service yard provides an area for the necessary vehicular access to the building and the car park. Existing planting and proposed trees will act as a green screen to the service yard and soften the space.

The service yard is screened by a mixture of existing and new vegetation. The yard shall be used as a secondary entrance for school groups and sports teams. Refuse storage is provided within the building itself and as such no bin storage provision is provided within the yard itself. Both entrance to and exit from the service yard is controlled by a drop bollard and intercom.



Illustrative Section A-A'

Illustrative Plan: Guild Lawn Zoom

Key plan

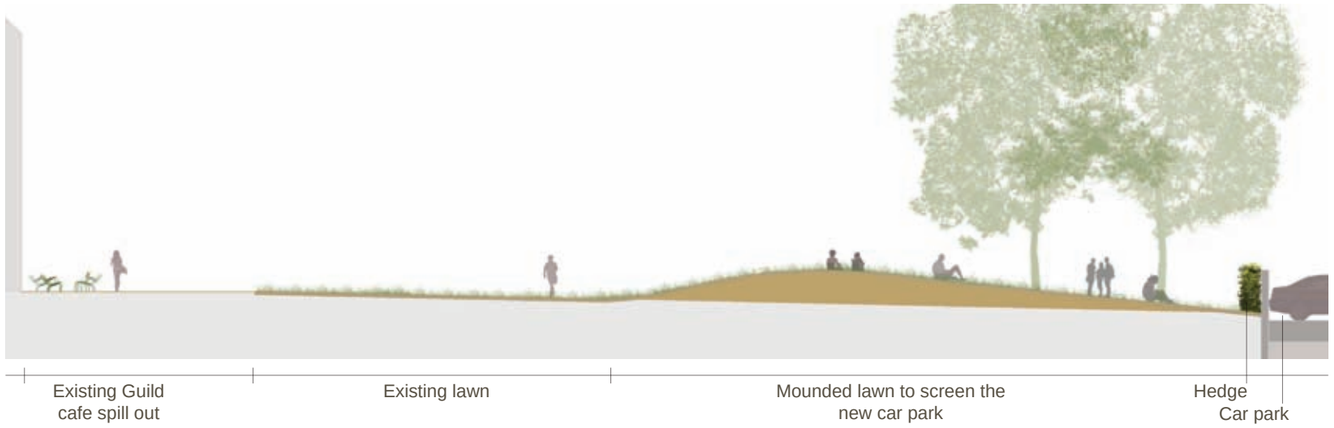
Guild Lawn

1. Proposed mound screen the view towards the car park
2. Proposed hedge planting to screen the car park
3. Proposed trees
4. Existing trees to be retained
5. Proposed shrub planting to encourage biodiversity and linking to the existing green corridor
6. Asphalt path to be removed
7. Existing asphalt path
8. New asphalt path linking to the car park pedestrian entrance
9. Car park pedestrian entrance
10. Lift access
11. Steps
12. Proposed hedge planting

Guild Lawn

A mound encouraging the students to lie in the sun as well as creating an attractive edge treatment to the car park is proposed on the Guild lawn. The boundary will also be improved with hedge planting.

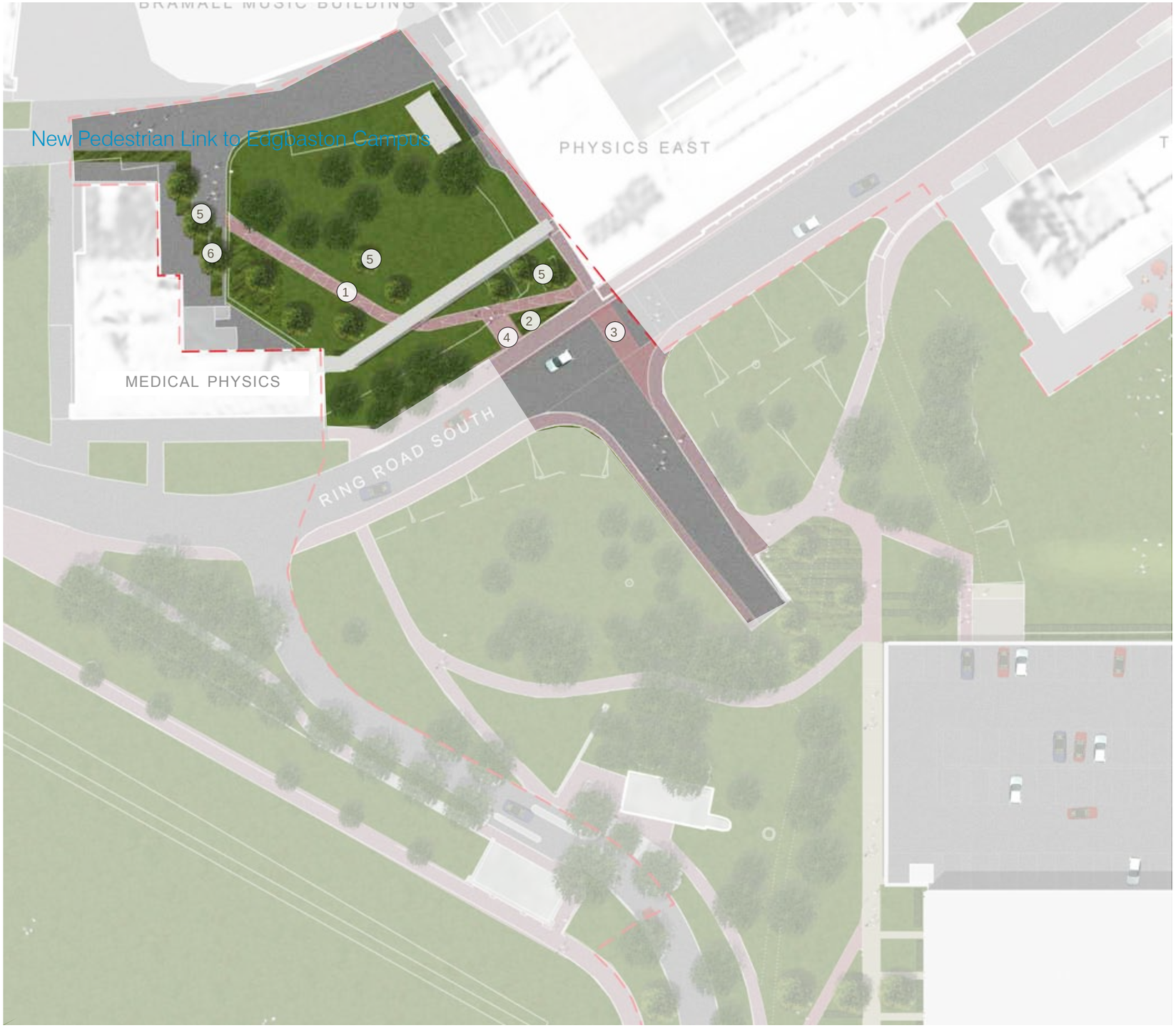
On the embankment to the east of the lawn, the existing poplars will be replaced by crab apple, birch and cherry trees. The embankment will be planted with a variety of native shrubs that encourage biodiveristy and link to the existing green corridor that runs through the university.

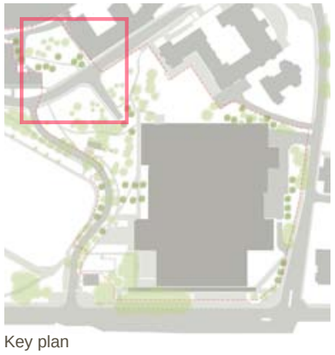


Illustrative Section A-A'

Precedent Image: Students relaxing on a lawn

Precedent Image: Hedge planting framing a lawn





Key plan

Illustrative Plan: New Pedestrian Link to Edgbaston Campus Zoom

New Pedestrian Link to Edgbaston Campus

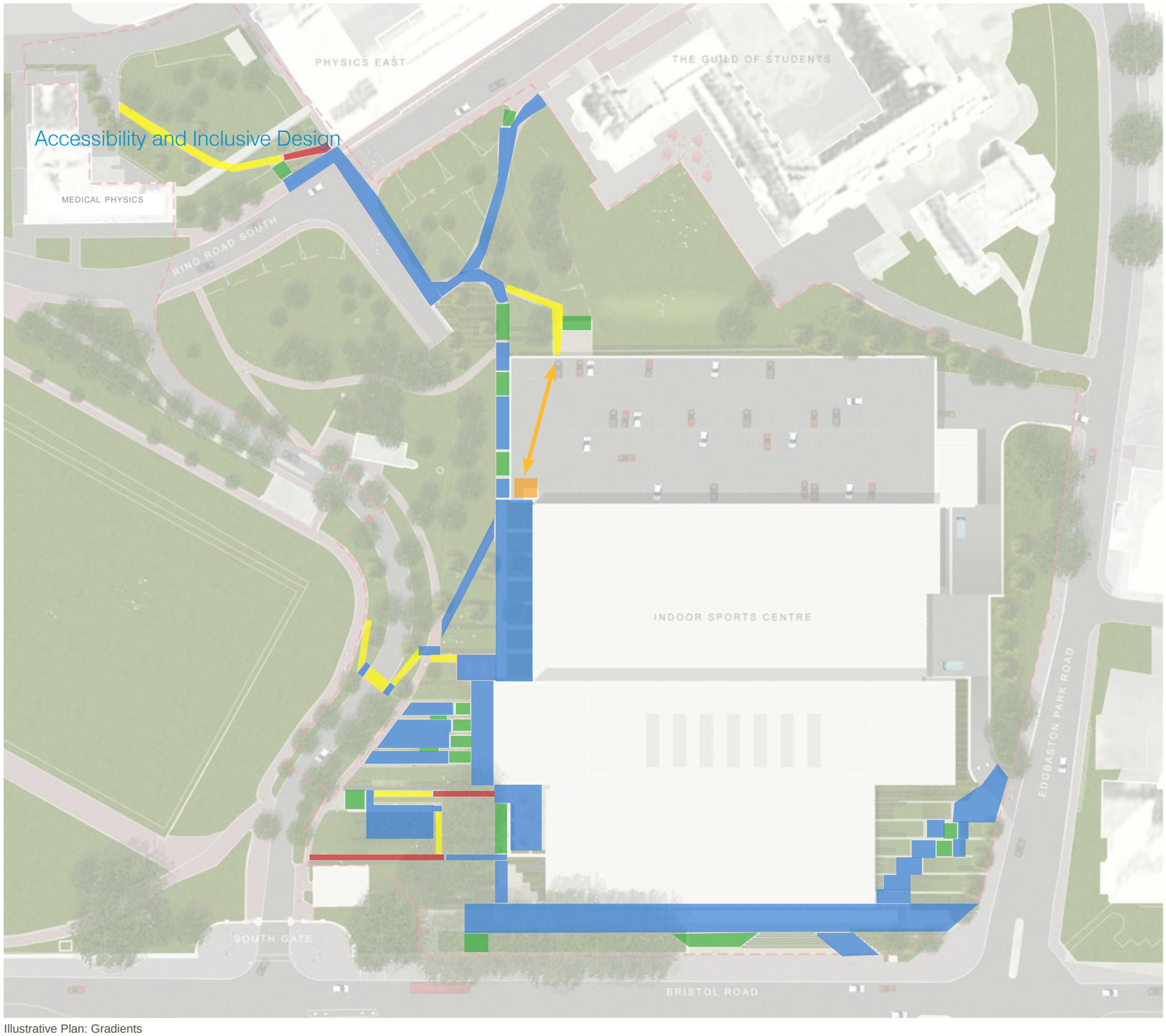
1. Proposed ramped path linking to the north of the Edgbaston Campus
2. Proposed planting integrated with the steps
3. Raised crossing
4. Steps
5. Proposed trees
6. Proposed planting to screen

New Pedestrian Link to Edgbaston Campus

The landscape proposals include a link from the Indoor Sports Centre site to the north west with a new ramped path through the gardens between the Physics East building and the Medical Physics building. New shrub planting and trees are proposed to enhance the route as well as to screen the existing Medical Physics The ramped path will be paved with asphalt matcning tne existing paths on the campus.

The shrubs in the garden will be cleared to enhance views and create a clear route through the garden.

Asphalt on paths on the Edgbaston campus



Illustrative Plan: Gradients

Accessibility and Inclusive Design

Accessibility and Inclusive Design

A well designed public realm can contribute significantly to the quality of the built environment and play a key role in the creation of sustainable and inclusive communities.

The proposals illustrated in this strategy are based on a number of integrated principles which is in accordance with the guidelines set out in The Principles of Inclusive Design (CABE 2006) which:

- places people at the heart of the design process;
- acknowledges diversity and difference;
- offers choice where a single solution cannot accommodate all users;
- provides for flexibility in use, and;
- provides buildings and environments that are convenient and enjoyable for everyone.

The public realm that forms part of the University of Birmingham New Indoor Sports Centre development will provide a clear and inclusive environment, suitable and safe for everyone, including people with disabilities, the elderly and children in pushchairs. The legibility of the proposed scheme will help to orientate people without the need for elaborate signage and the provision of facilities will cater for the needs of all.

There are significant level changes around the site and step free access, compliant with the current Access Regulations, has been designed and incorporated into the proposed landscape design. The diagram on the adjacent page shows the gradients across the site accessing the building entrance. For more detail about the levels refer to levels drawings TOWN502(08)5006 - TOWN502(08)5009.

Level Change

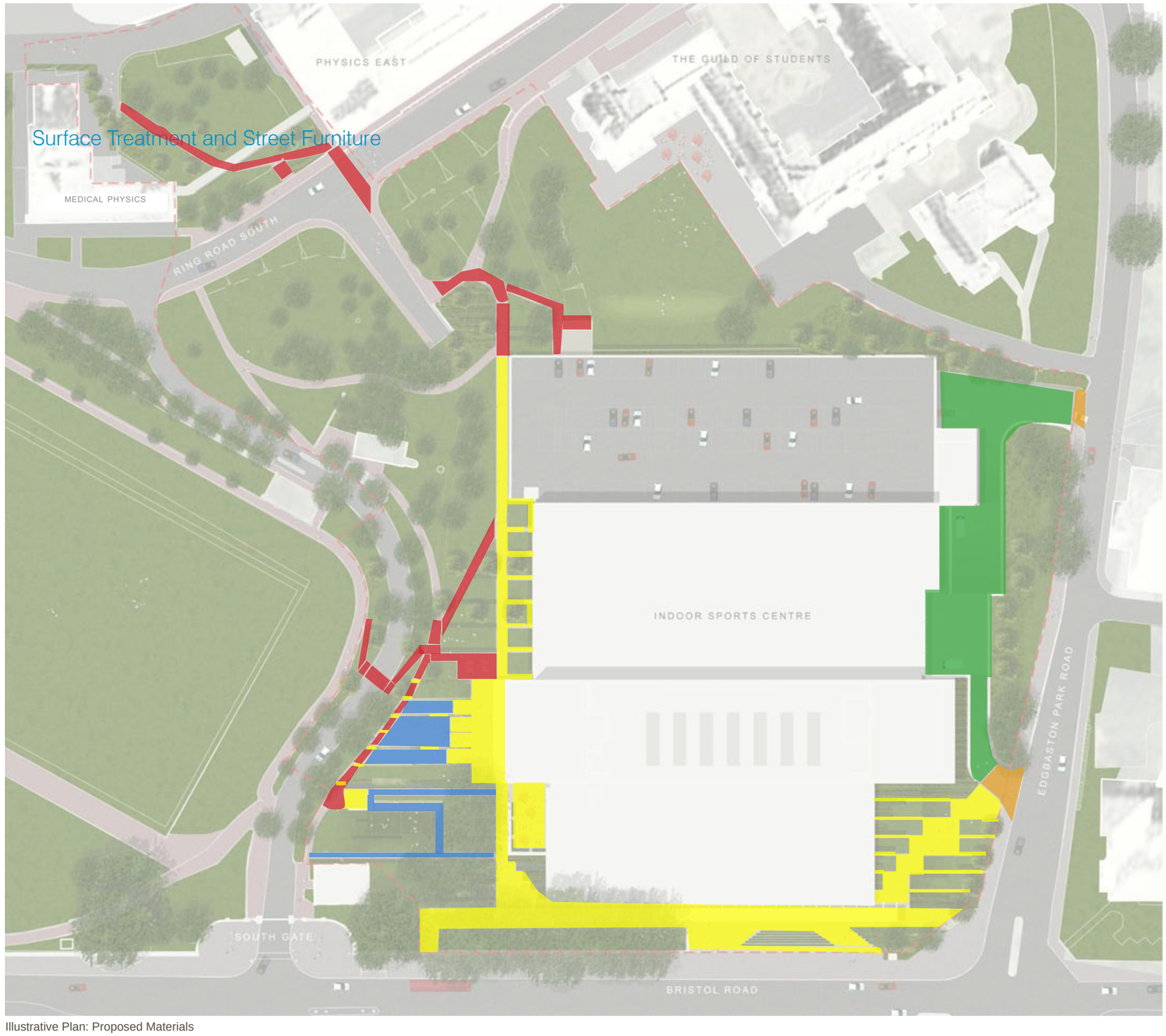
Gradients will be less than 1:21 and have a landing for every 500mm rise where possible, or follow the existing site topography and where practicable slopes will be employed in lieu of steps. Where steps are necessary they will be a positive feature of the design and comply with the Approved Document Part M of the Building Regulations.

The ramps accessing the entrance will have handrails on both sides of the ramp and will have a gradient of 1:12 and a landing every 167mm rise.

Visitors to the new sports facility who wish to gain access to the heart of the campus have the choice to use the lift or external stair associated with the car park. From the uppermost level of the car park, a new route shall run adjacent to Medical Physics, leading directly into the heart of the campus. The entire route has been designed to be fully Part M compliant.

Level Changes - Steps and ramps can be a positive feature of the design.

Steps and crossing points will be demarcated with tactile paving to aid blind and partially sighted people.



Illustrative Plan: Proposed Materials

MATERIALS PALETTE

Surface Treatment and Street Furniture

The quality of the public realm is derived from its simplicity through the selection of a restrained palette of complimentary materials, simple coordinated details and a high quality of workmanship which is essential for the quality of finish and longevity of the landscape. The aim is to create a cohesive, coordinated palette of hard landscape materials which match with the materials on the campus and are easy to use, maintain and controlled.

Four types of paving are being proposed within the site:

- Clay pavers on the entrance space and the spaces interfacing with the building.
- Permeable resin bonded gravel below the entrance steps and on the paths within the lawn areas to the west of the proposed building
- Tarmac in the service area
- Tarmac matching the existing paths on the new paths.
- Silver grey granite setts at the vehicular thresholds from Edgbaston Road to the service/parking area

Asphalt on paths, colour to match existing paths

Clay pavers

Timber topped concrete walls

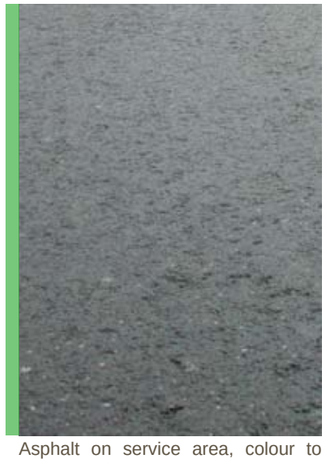
Litter bin

Street Furniture

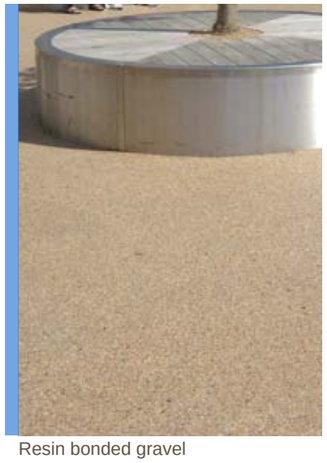
The street furniture can contribute greatly to the character of a place, and at the proposed development it is proposed that a simple, consistent range of benches, seating walls and litter bins will be selected. Benches will be simple, durable, and robust but also comfortable and located at distances of no more than 50 metres apart. All disability requirements will be considered in the selection/design of benches including the need for arm and back rests.

When choosing materials it is essential to:

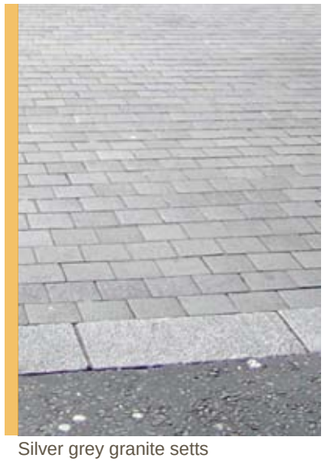
- seek to select materials from sustainable sources where fit for their purpose,
- aim to use locally sourced materials where practicable,
- examine the potential for retaining and reusing site materials,
- consider the use of prefabrication and standardisation techniques to minimise waste,
- examine the use of recycled materials,
- specify Forest Stewardship Council (FSC) certified timber or timber certified under the Pan European Forest Certification Scheme,
- seek to install energy efficient components including lighting.



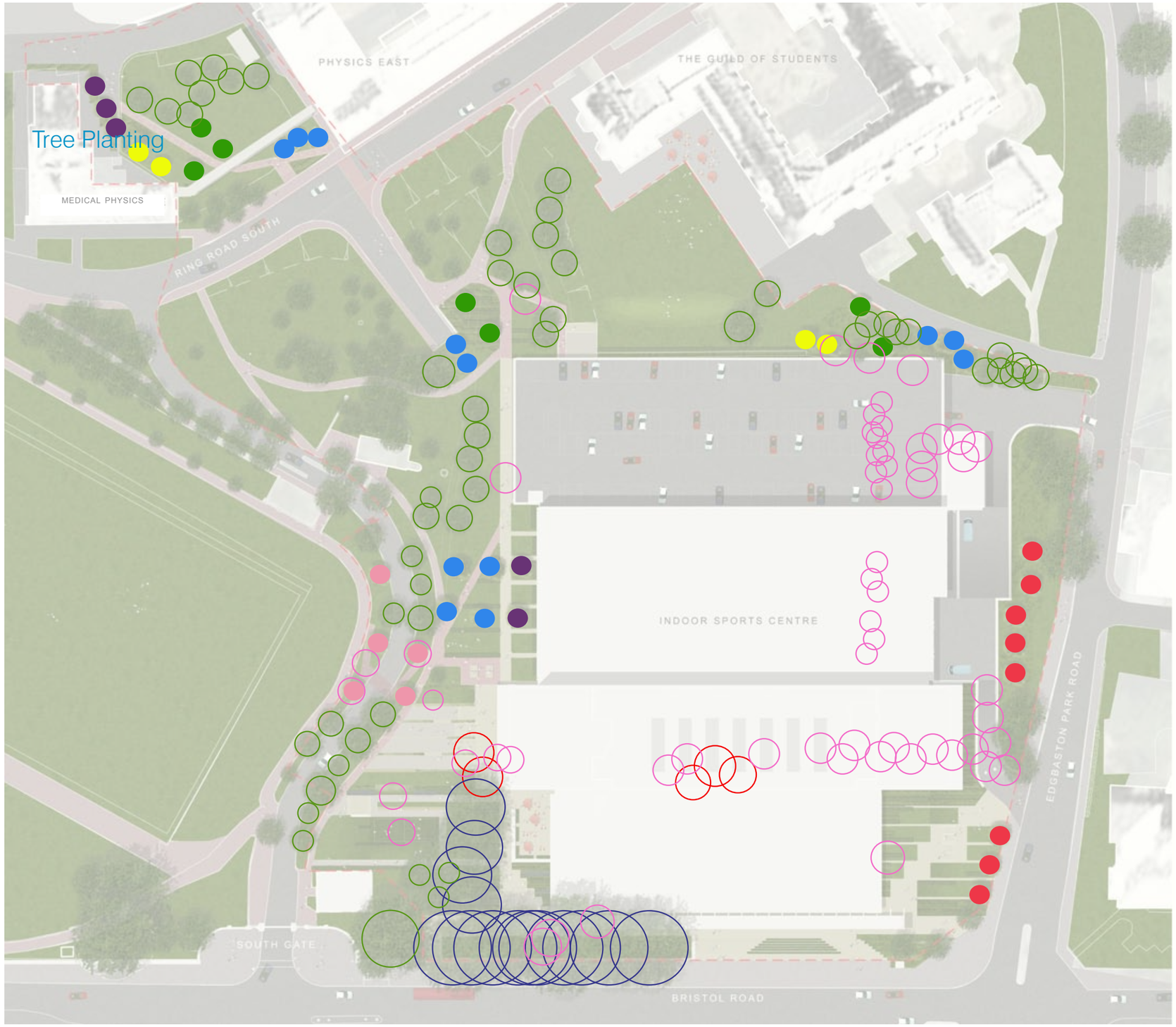
Asphalt on service area, colour to match existing



Resin bonded gravel



Silver grey granite setts



Illustrative Plan: Proposed Trees

PLANTING PALETTE

Tree Planting

The site includes a rich variation of mature trees which are incorporated into the design. The landscape proposals carefully consider which of the trees will have to be removed and replaced due to the proposed development. There are currently 21 trees with TPOs on the site.

About 62 trees of varying quality are proposed to be removed due to the development. Most of these trees are located within the outline of the proposed building. Five of the trees that are proposed to be removed have TPO's.

Replacement of existing trees across the site has been considered when selecting the tree species. The three existing Lime trees that are proposed to being removed along the campus road are being removed to improve access across the road. To mitigate against this, five new Lime trees will be planted alongside the road.

The tree planting design will be prepared in collaboration with the site ecologist. Native species and species that encourage biodiversity are being proposed to link with the existing green corridor for wildlife to the north east of the proposed building.

41 new trees are proposed within the UoB New Indoor Sports Facility site alone.

Malus sylvestris

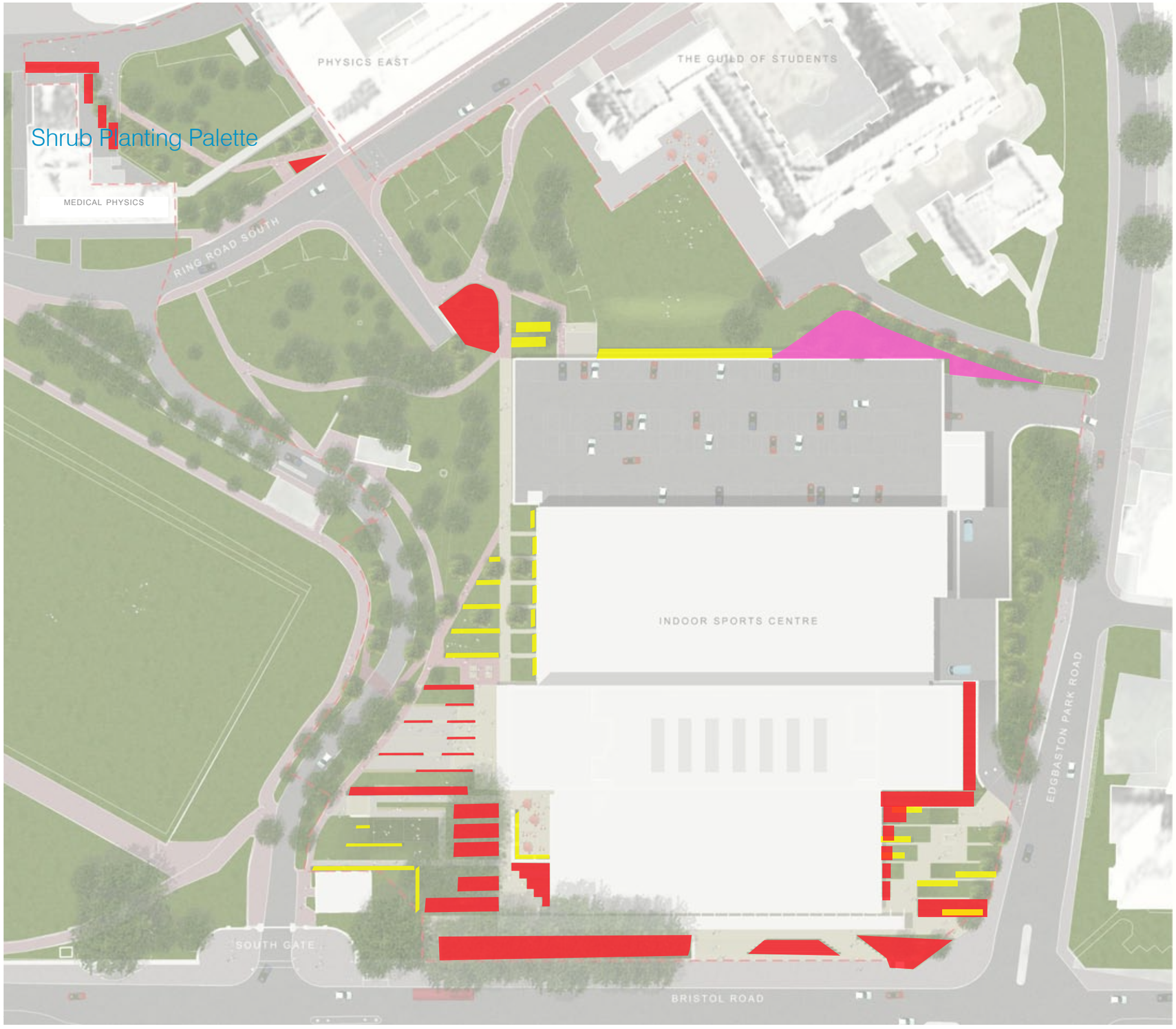
Betula pendula

Tilia cordata

Carpinus betulus

Acer campestre

Prunus avium



Illustrative Plan: Proposed Shrubs

Shrub Planting Palette

The planting proposed will

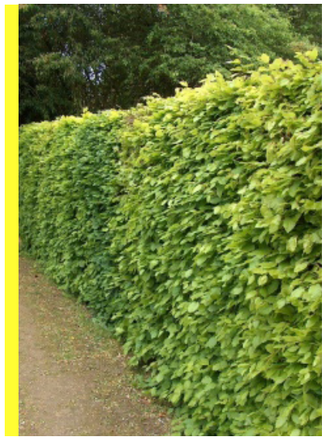
The design will use planting in a variety of ways within the landscape to:

- reflect the linearity of the building with linear hedges and shrub planting extending into the landscape,
- define key routes and desire lines through the use of structure planting,
- create a focal point for a space,
- reinforce the spatial definition of a space,
- reinforce views.

The shrub planting design will be prepared in collaboration with the site ecologist. Native species and species that encourage biodiversity and wildlife will be proposed within the planting scheme.

The planting proposals will:

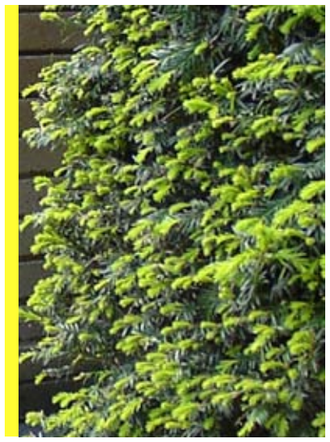
- Provide a network of trees and green spaces which connect to existing trees and green spaces forming a connection to the existing wildlife habitats and green corridors.
- Promote an environment where quality of life and quality of environment are integral to the development.
- Promote sustainable planting by developing planting designs that are appropriate for their location, including the availability of sunlight and water.



Carpinus betulus

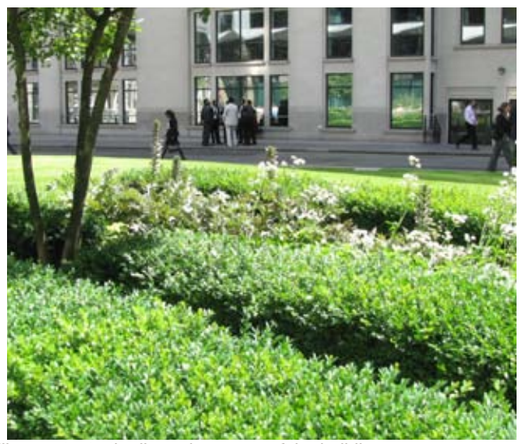
Buxus sempervirens

A mix of shrubs that encourage biodiversity and linking to the existing green corridor is proposed on the embankment north of the car park.



Taxus baccata

Herbaceous planting mixed with evergreen linear hedges will accentuate the linear language of the building



Management and Maintenance

Appropriate public realm management and maintenance is vital to the success of the public realm. Even the best-designed spaces need to be cared for and inappropriate behaviour needs an effective response. The designs should foster perceptions of safety and a degree of self-regulation of behaviour through encouraging active, positive uses by a diverse mix of users.

The management of the public realm will be undertaken by the University of Birmingham maintenance Department as part of general management of the whole estate.

The following key factors will need to be addressed in order to sustain a high quality public realm:

- Safety and Security
- Cleanliness
- Repair and Replacement
- Horticultural Health

Cleanliness

Cleanliness is the principle indication of the quality of management of the public realm. As such, the perceived success of the development will be significantly affected by the effectiveness of the procedures established for regular pavement cleaning, litter picking, and the removal of graffiti, bill posters and chewing gum. The strategy will be applied to all elements of the scheme from roads, pedestrian paving, street furniture, drains and planting beds.

Repair and Replacement

The need for repair and replacement of finishes will be mitigated by the use of appropriate and durable materials. Nevertheless, in the long term a degree of maintenance and replacement is unavoidable. In order to ensure that the public realm remains safe and in good condition, all worn-out, damaged and broken elements will be promptly repaired or replaced. In the short term this will be carried out within the clearly defined defects liability periods of the various contractors who installed the work. The longer term solution will form part of the management plan. Vigilant and regular monitoring of every aspect of the scheme will ensure that all remedial work is carried out in a timely and thorough fashion.

Horticultural Health

The health and general condition of planted areas including trees, shrubs, perennial plants and lawns is clearly indicative of the level of care and attention a place receives. Planting, including any replacements to dead or dying material, will be maintained in accordance with a Landscape Maintenance Specification, the submission and approval of which could be controlled by the imposition of a suitably worded planning condition.

9.0 accessibility

Accessibility scope

This statement has been prepared following consultation with People Friendly Design, accessibility consultants to the New Indoor Sports Facility for the University of Birmingham.

The accessibility statement describes how the architect has developed the proposal with consideration and understanding of the principles of inclusive design. The proposed scheme has been designed with specific regard to disabled people as both visitors to the development and people working in and visiting the commercial spaces.

Approach

Currently changes in level across the site restrict access for many disabled people both in terms of access across the site and access to any buildings built on the site. The design proposals go a long way in addressing a significant proportion of the barriers that the current changes in levels create.

Currently there is a 4m change in level from Bristol Road to entrance level. This is overcome by a number of measures. Firstly; the proposals include improvements to the 2m wide footway associated with the campus road, Secondly; a new landscaped ramp to the east of the site has been developed by Townshend Landscape Architects, and finally; steps shall provide direct access from Bristol Road to foyer level as an alternative, next to the building. Access to the colonnade from the west will be via steps or ramp.

Visitors to the new sports facility, who wish to gain access to the heart of the campus, have the choice to use the lift or external stair associated with the car park. This route has been designed to be fully Part M compliant.

Vehicle access

14no dedicated disabled parking bays are located within the proposed multi-storey car park. The car park can accommodate a total number of 270 cars. Disabled drop off is adjacent to the car park lift area.

Coach drop off for teams and school will be to the west of the building and routes have been established to the changing rooms from this entrance. All access is level.

Internal Spaces

The layout of the building is logical and there is lift access to all levels.

Means of escape

An evacuation lift is provided in core two (eastern core) for the evacuation of less able people in an emergency. Dedicated backup power supplies are provided in the event of power failure. Refuge zones and intercoms shall be provided at all levels.

01
Night time visual from south-east

10.0 lighting concept

Lighting concept

There are a number of primary design intentions that form the basis of the lighting approach to the University of Birmingham's new Indoor Sports Facility. These include the provision of safety and security, the integration of the facility within the broader university campus, the expression of the building arrangement at night and the creation of a new and vibrant external space.

In terms of safety and security, the technical platform for lighting performance will be drawn from relevant statutory documents and codes. These include BS-EN 13201, the Chartered Institute of Building Services Engineers 'Lighting Guide 06 The Outdoor Environment', the Institute of Lighting Engineers Guidance Notes for the Reduction of Obtrusive Light and the Defra Statutory Nuisance from Insects and Artificial Light publications. It should also be noted that the external lighting installation is intended to provide relevant credits as a contribution to a BREEAM Excellence classification.

The broad design intent is to deliver a large part of the ambient lighting requirement of the site from luminaires integrated within the buildings and structures contained within the project, for example the front Colonnade. Where any supplementary ambient lighting is required, the lighting installation will employ lighting fixtures that provide a 'full-cut off' lighting performance, thus minimising any light pollution or light nuisance.

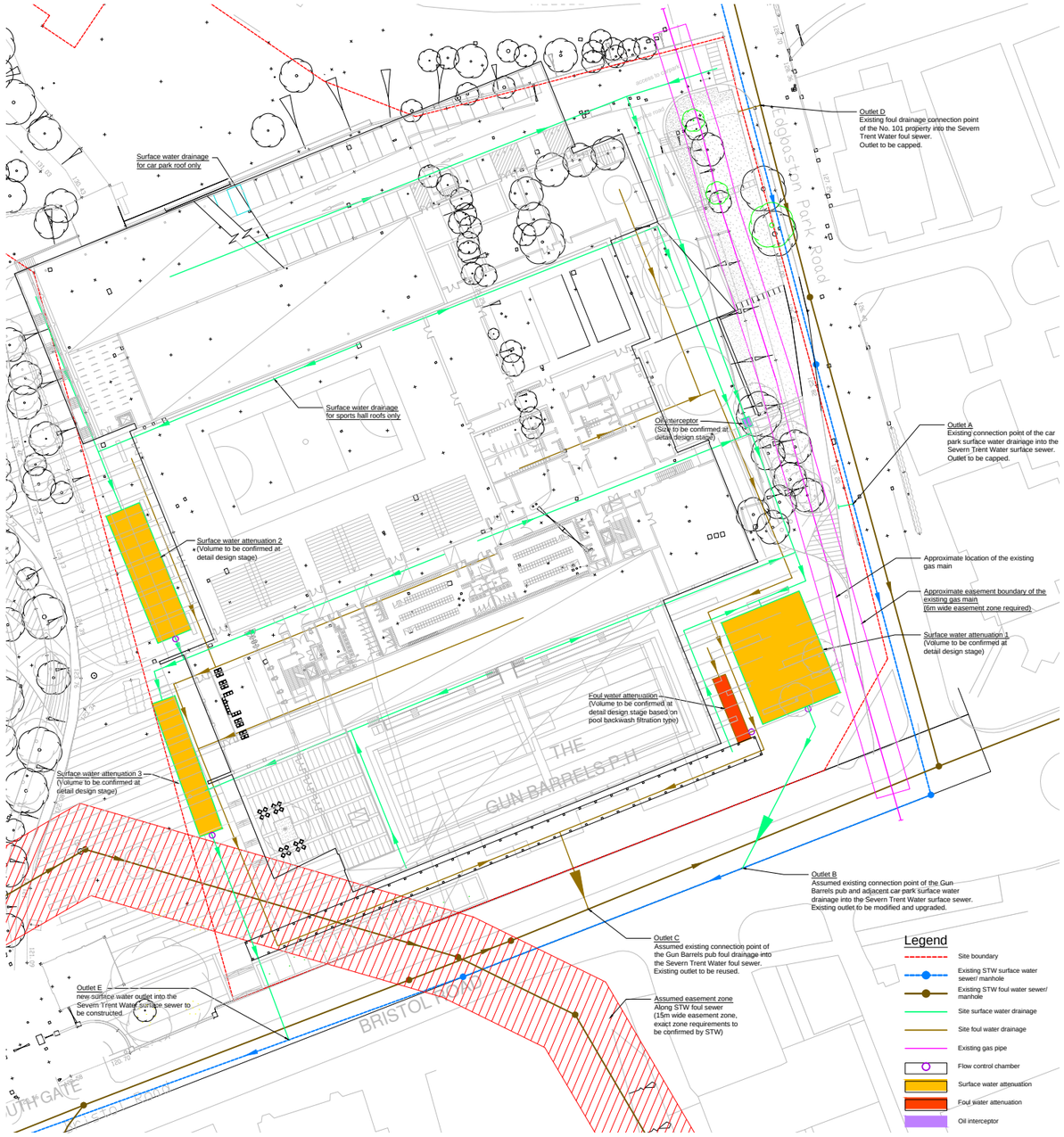
Ambient illumination will be supplemented by feature lighting treatments integrated within the exterior landscaping of the Sports Facility project. The intention in this instance is to add texture and human scale to the exterior areas around the new sports complex and thus provide an enhanced and conducive night time environment. These types of treatment will also provide improved legibility to the exterior of the Sports Facility in both functional and communication contexts.

The lighting arrangements indicated in night time visuals 1-3 will also take cognizance of the broader University of Birmingham campus illumination. It is clear that the sports facility site is a significant access point into the campus and the intent is that the new external lighting installation will knit seamlessly into the old. Landscape feature lighting treatments, such as the tree illumination, are seen as a key part of this particular design aspiration.

A key signature of the new Indoor Sports Facility will of course be the buildings themselves and whilst some external feature lighting is proposed, the primary expression night time building presentation will be determined by the manner and nature of the internal light egress. This approach will provide a strong identity for the project at night and will also clearly communicate the status of the building. The primary function of any external building lighting treatments will be to emphasise the relationships between the various building elements .

02
Night time visual from South Gate Lodge

03
Night time visual from south-west



Site Drainage Design Statement

Purpose

The purpose of this design statement is to describe the below-ground drainage strategy for the New Indoor Sports Facility for the University of Birmingham.

Background

The proposed new Indoor Sports Facility will replace two existing neighbouring sites; university south car park and the Gun Barrels public house site.

The Sports Facility site is bounded by Edgbaston Park Road to the East and Bristol Road to the site. The North of the site is bounded by an existing reinforced concrete retaining wall (part of the previous car park structure) approximately 9m tall. A landscaped area on the North West corner provides a steep change in levels and provides access from the car park to University Road South. The West boundary is immediately adjacent the single lane access road from south gate to University Road South.

The site levels vary between approximately 121.8m AoD to the south and 135.5m AoD to the north of the retaining wall.

Site Drainage

A Flood Risk assessment has been completed for the proposed New Indoor Sports Facility site. The full FRA report, completed by Royal Haskoning, is submitted under this application and forms part of the overall hybrid planning application.

The drawing opposite indicates the proposed location of 3no below ground attenuation tanks. Each attenuation tank is required to control site flow rate as part of the site surface drainage strategies later described.

Existing Surface water drainage

The new proposed development will replace two existing sites. Both existing sites are connected independently to the adjacent Severn Trent Water (STW) surface water sewer, therefore the new site is divided into 2 catchment area, refer to Arup drawing CD 001, below.

- Catchment A includes the existing university car park
- Catchment B includes the existing Gun Barrels public house with the adjacent car park

Catchment A; drainage connects via a 300mm dia. pipe to the STW surface water sewer on the adjacent Edgbaston Park Road. This information is based on the car park utility services survey and labelled Outlet A.

Existing drainage connection to STW sewer from Catchment B has not been yet confirmed by the site surveys however it is assumed that surface water drainage connects to STW surface water sewer in adjacent Bristol Road, labelled Outlet B.

Both Catchment A and Catchment B connect to the same STW surface water sewer via a saddle connection. Catchment A connects further upstream from Catchment B. Refer to Arup drawing CD 001, below, for catchment extents and further details.

Proposed drainage and discharge rates

The new site is classified as a brown-field development and the surface water drainage system will be designed accordingly.

The surface water drainage strategy will be designed to avoid site flooding for a 1in 100 year rainfall event plus 20% for climate change, as per STW guidelines. The final discharge design from the site (the ‘permitted discharge rates’) has been agreed by STW. Furthermore the design team has carried out an initial scheme design, pre-planning, for STW’s review based upon the below design calculations and in coordination with the Facilities proposals.

Calculation principles

The existing discharge rate used for design is calculated from the minimum of:
- The existing impermeable area @ 50mm/hr, plus new impermeable area @ 5 l/s/ha, (green-field runoff rate), or
- The full capacity of existing outfall pipe, with no surcharge.

The discharge rate is further reduced by 20% to allow for future climate change. This provides the permitted discharge rate used for design.

11.0 site drainage

Catchment A:

- Existing impermeable area: 9091 m2
- Discharge rate (rational method): 50 mm/hr x 9091 m2 / 3600 = 126 l/s
- Existing outfall pipe: 300mm Ø @ approx. 1:230 fall = 73 l/s

The proposed permitted discharge off Catchment A will be based on existing outfall pipe capacity and further 20% reduction for future climate change allowance: 73 l/s x 0.8 = 58 l/s
This flow rate has been accepted by STW and will discharge into their existing public sewer system.

Catchment B:

The maximum discharge rate for the Gun Barrels site is to be confirmed by following survey of the existing below ground drainage. However, for the planning we have assumed that at least 40% of the existing hard standings are drained and connect to the STW surface water sewer in Bristol Road. Therefore, the existing calculated discharge rate form Catchment B is:

- Existing impermeable area: 3403 m2
- 40% of the existing impermeable area: 1361 m2
- Discharge rate (rational method): 50 mm/hr x 1361 m2 / 3600 = 19 l/s

The proposed permitted discharge off Catchment B will be based on 50% of the existing hard standings and further 20% reduction for future climate change allowance : 19 l/s x 0.8 = 15 l/s

Proposed maximum discharge rate

Based on the fact that both existing catchments' discharges to the same STW sewer, it is proposed, that the existing discharge rates will be added: 58 l/s + 15 l/s = 73 l/s

Proposed surface water attenuation

The on-site surface water attenuation will be designed not to flood for 1 in 100 year rainfall events plus 20% for climate change, as per STW guidelines. Estimates for the volume of attenuation are base on Windes Quick Storage module and following figures.

Proposed impermeable area:	11 965 m2
Design rainfall event:	1 in 100 year + 20% climate change
Max. discharge rate:	73 l/s
Estimated surface water storage:	350 m3

Foul water drainage

Existing foul water drainage

The new proposed development will replace two existing sites; university south car park and the Gun Barrels public house site. Both existing sites are connected independently to the adjacent STW foul water sewer via two independent connection points:

- Outlet C- assumed foul drainage connection from the existing Gun Barrels public house (position, size and condition to be confirmed through future survey).

- Outlet D - existing foul drainage connection from the existing property No. 101 (located adjacent the existing South car park).

Both existing foul drainage outlets are shown on Arup drawing CD 001. Existing drainage connections drain relatively small buildings, therefore we have assumed a conservative existing peak foul discharge rates of 5l/s for Outlet C and maximum of 2 l/s for Outlet D.
An existing 1.45m diameter foul sewer traverses the south–west corner of the site, as identified on the drawing opposite. This is a major trunk sewer, approximately 5m below ground level and constructed in 1914 in brickwork. The existing flow and condition of the structure are unknown. STW have requested an easement to the sewer for potential future replacement. We are currently negotiating the details of the easement. The easement is straddled by a covered walkway canopy and the south west corner of the main building. Both structures will be supported on piled foundations positioned at an off-set agreed with STW. These will be designed to transfer their load to soil at depth.

New proposed foul drainage

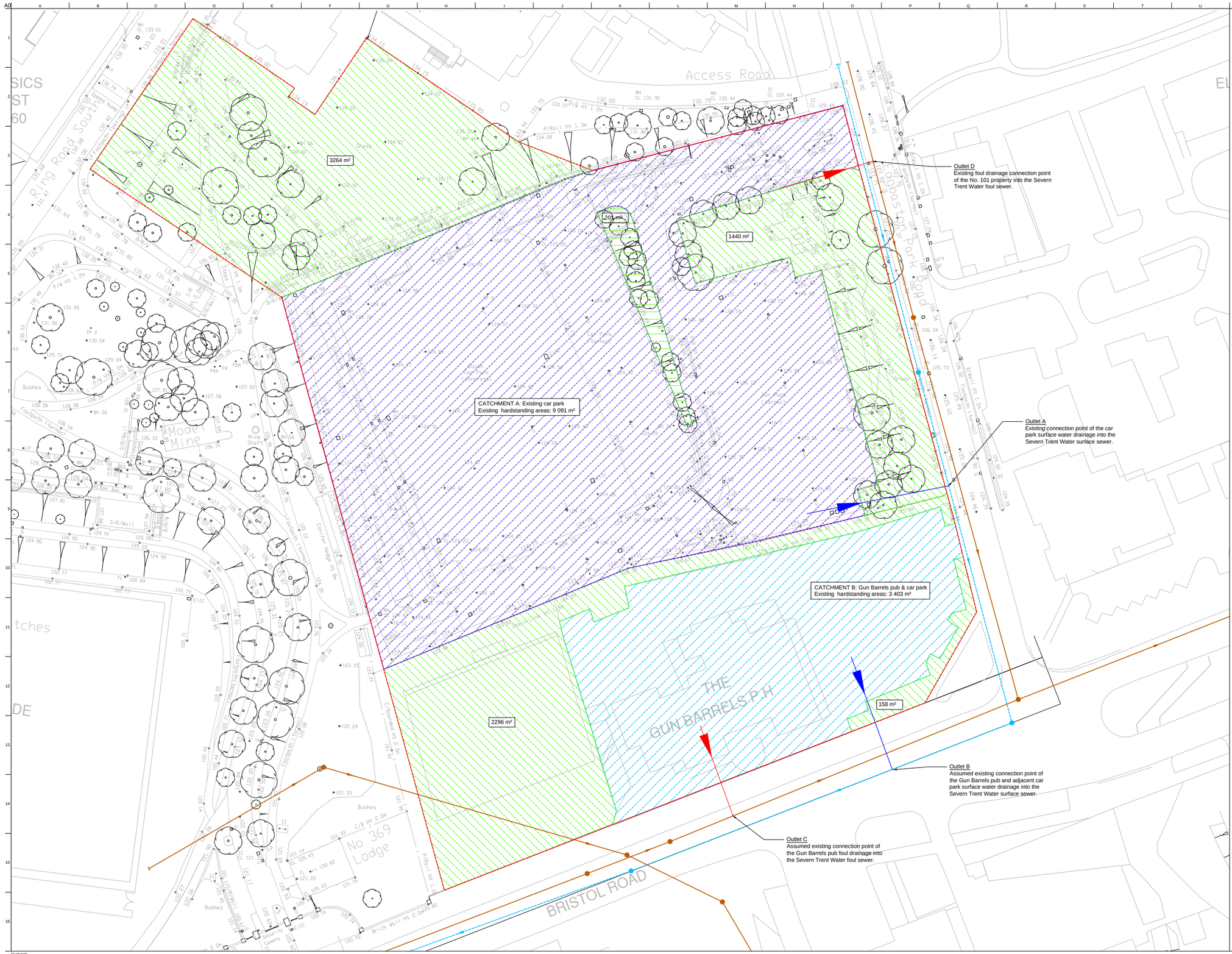
The existing foul discharge rates to the STW are clearly insufficient for proposed Sports Facility.

Based on the water consumption calculation in accordance with The Institute of Plumbing Engineering and Services guide and the proposed building occupancy, we are proposing that the new maximum peak discharge rate will be approximately 45 l/s. This flow rate has been accepted by STW and will discharge into their existing public sewer system.

Effluent discharge from the pool filter backwash

A STW Effluent Discharge Consent Agreement has been submitted for the proposed swimming pool. This is based upon and coordinated with all pool design and operation information and obtained from STW prior to pool facility operation commencement.

The approximate effluent discharge rate is 44.2 litres/sec with one filter taking 6 minutes to backwash. The cleaning process should only take place outside of the pool facility operating hours. There will be a sufficient effluent storage capacity attenuation tank and flow control device provided at the outfall of the pool facility to ensure that the overall maximum discharge rate to the STW public sewer is not exceeded.



Notes

1. Existing hard standing areas are based on survey drg. No. 54176/ICVK/001.
2. Existing STW sewers are shown indicatively only based on STW sewer record. Exact positions of the sewers and related structures to be confirmed.

Legend

- Site boundary
- Existing STW surface water sewer/ manhole
- Existing STW foul water sewer/ manhole
- Existing soft landscaped areas
- Existing car park hard standing areas
- Existing Gun Barrels pub hard standing areas

Issue	Date	By	Chkd	Appd
01	19/05/11	MK	MK	DF

Issued for Preliminary Information and Discussion

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Client
University of Birmingham

Job Title
New Indoors Sport Facility

Drawing Title
Below Ground Drainage
Surface Water
Existing Hard Standings
Layout

Scale at A0 1:250

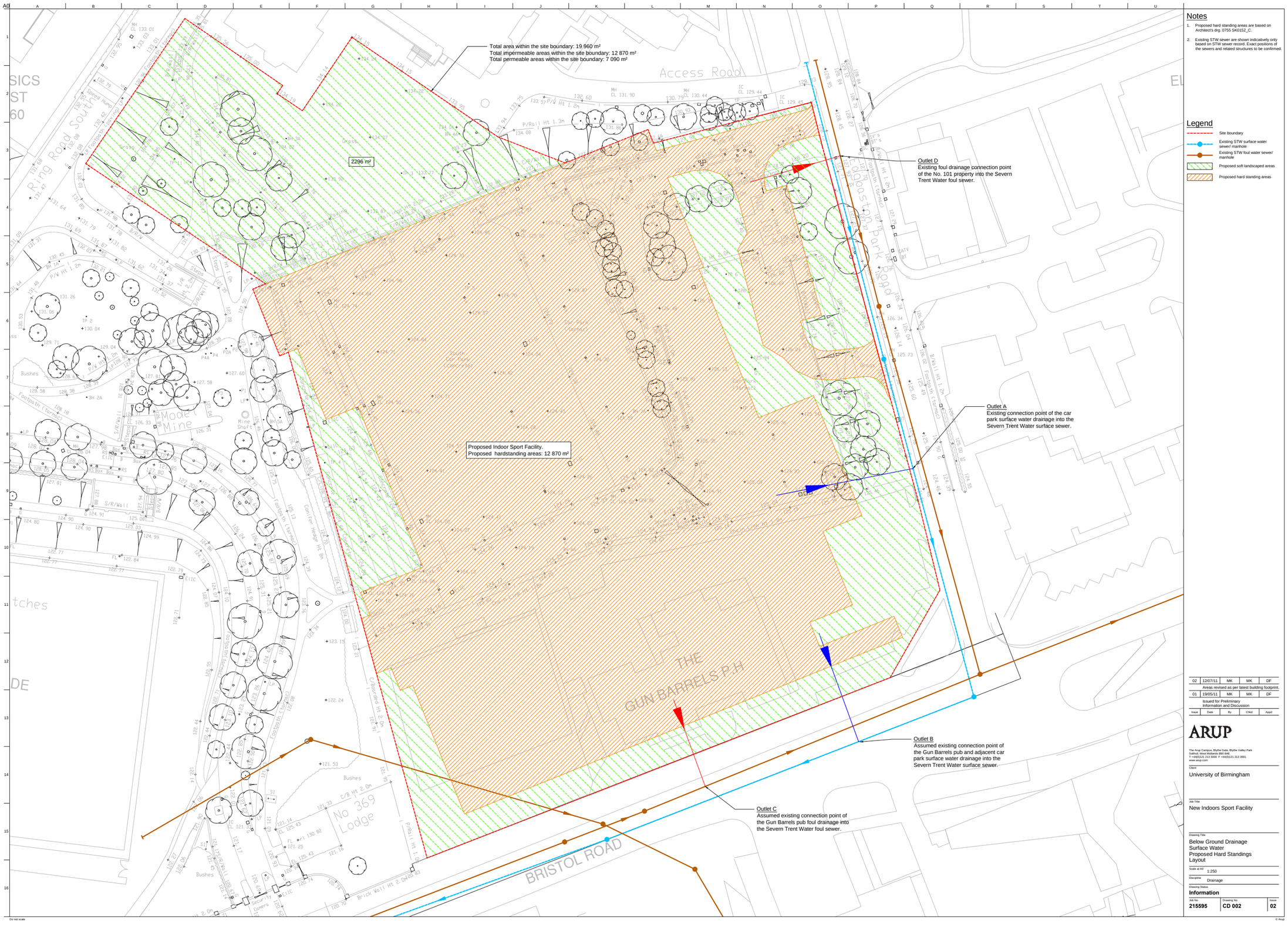
Discipline Drainage

Drawing Status
Information

Job No	Drawing No	Issue
215595	CD 001	01

Do not scale

11.0 site drainage



Issue	Date	By	Chkd	Appd
02	12/07/11	MK	MK	DF
	Areas revised as per latest building footprint.			
01	19/05/11	MK	MK	DF
	Issued for Preliminary Information and Discussion			

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Scale at A0 1:250

Discipline Drainage

Drawing Status
Information

Job No	Drawing No	Issue
215595	CD 002	02

Do not scale

12.0 structural strategy

Structural Overview

Arup structural engineers have developed the structural proposals for New Indoor Sports Facility.
The structural form of the indoor sports centre is generally envisaged to comprise concrete substructure and steel superstructure. These materials lend themselves to the form of the building and architectural intent.

The proposed construction for the swimming pool tank, below ground ducts, pump chambers, balancing tanks and retaining walls will be from reinforced concrete, cast in situ.

Relatively long span roof elements are required over the swimming pool hall and the main sports hall. Both steel and glue laminated timber structures are being considered at this stage. The architectural intent is that all of the roof structures over these spaces will be exposed.

The following information has been prepared by Arup structural engineers to describe the structure and construction in greater detail for planning purposes.

Foundations

Based on the findings of the ground investigations, ground conditions vary across the site, with Weathered Sandstone north of the Birmingham fault line (south car park site) and the Mercia Mudstone south of the fault (Gun Barrels public house site). As a result, the foundation design needs to take into account the different ground conditions and both shallow and deep foundations can be adopted. We have reviewed the building footprint in relation to the assumed fault location, and propose the following foundation solutions:

Piled Foundations

Piled foundations are the most suitable solution for the comparatively high foundation loads
for the central core and pool hall. They have the advantage that large open excavations are not required, there is less excavated material compared to shallow foundations, and de-watering is unlikely to be necessary.

For both the Weathered Sandstone north of the fault and the Mercia Mudstone south of the fault, preliminary assessment suggests that piles would be rock socketed into rock.

South of the fault, where the Mercia Mudstone is present, piles would be taken down to the less weathered mudstone, at around 116m AoD.

Piled foundations shall be used to support the colonnade onto Bristol Road. This construction method shall ensure the least disruption possible shall occur to mature trees within close proximity. Further information on the piling strategy is provided within this document.

Shallow Foundations

North of the fault the Weak Sandstone is relatively near to the existing surface. Shallow pad foundations to the car park and the northern side of the sports halls are therefore proposed.

Due to the low allowable bearing capacity and depth of the Weathered Mudstone to the south of the fault, shallow foundations are not a practical solution for the central core and pool hall.

Retaining Walls

Significant areas of accommodation are planned below the existing and proposed external ground levels. These will require new perimeter retaining walls around the wet change areas at lower ground floor level, and the pool filtration plantroom. The height of the walls will vary between approximately 2.5m to 4.0m high.

Control of Moisture Ingress

Groundwater levels are believed to fall gradually across the site, from south to north.

The top of the proposed swimming pool base slab is at 119.655m AOD at its lowest point, and the filtration plant room slab is at approximately 117.86m AOD. As a result, in some locations excavations of between 3m and 4m below ground water level. The filtration plant space adjacent to the pool and the wet change area at pool level are effectively in a basement condition. The perimeter retaining walls are designed to control moisture ingress.

Earthworks

Ground and lower ground floors are at a similar level to those currently on the site. The volume of cut and fill is therefore limited.

Pool Tank & Surround

The design has been developed on the basis that a reinforced concrete pool tank will be adopted.

Ground Floor Slab

The applied building loads and ground conditions are such that is it appropriate to adopt a ground bearing ground floor slab. Uneven or excessive settlements are not anticipated. Insulation and DPM shall be applied to the underside of the ground bearing slab.

Pool Hall Roof

The overriding strategy for the pool hall roof is to achieve a structure that is suitable for the aggressive internal pool environment, is economic and elegant. Currently both steel and glue laminated timber are being consider by the architect. The roof covering over the swimming pool is anticipated to be a lightweight standing seam roof, with a span of approximately 27 metres. Corrosion protection to all steelwork, including stainless steel, within swimming pool environments shall require careful consideration and specification.

Sport Hall(s) Roof

Long span construction is necessary to for the main sports hall, with the primary roof structure spanning approximately 38m over the hall. Loading on the sports hall roofs will be greater than for the pool hall, due to more suspended services and other items such as dividing curtains, basket ball hoops, etc requiring suspension from the roof.

Central Core Superstructure

Our strategy for the central core balances structural depth with the need for simple integration of services whilst taking advantage of the inherent thermal mass of the structure. The proposal therefore incorporates two lines of internal columns, resulting in three bays of structure, with grid spacing in the range of 6 to 9m.

Suspended Floor Slabs

There are a number of areas where long clear spans are required, including Activity and Dojo Rooms therefore considering the superstructure as a whole, a steel frame solution would seem to be most appropriate for the Central Core as concrete frame solution cannot economically cater for these longer spans.

Central Core Roof Structure

The roof over the central core supports a majority of the air handling plant for the building, therefore a similar construction to that proposed for the lower floors is proposed; i.e. precast planks with a structural topping, spanning acres the building on to steel beams.

Over the reception there are no roof top services and the roof is expected to be a lightweight standing-seam build up. The roof over and activity room 2 shall support photovoltaic panels, as later discussed within the mechanical engineering strategy.

Structural stability

Wind loading applied to the building envelope will be transferred to the floor and roof planes by the arrangements of steelwork within the building facades. In plane wind girders within the roof structures and the diaphragm action of the upper floor slabs in the Central Core will distribute all lateral loads from the facades (and any notional loads) horizontally to vertical stability elements located within the building walls.

In the Pool Hall and Sports Halls, vertical stability elements will transfer the lateral loads applied from the roofs to the foundations. These may be either exposed and expressed, or hidden within wall cavities.

The pool hall, central core and sports hall are structurally interconnected and can be considered as a single structure for the purposes of determining the extent and locations of vertical stability elements.

Stability of the car park will also take the form of precast concrete walls around stair and lift cores or cross braced steel bays. The car park will be structurally independent from the rest of the building.

12.1 piling strategy

Piling strategy design statement

This design statement highlights generic piling techniques that could be used for constructing piled foundation below the existing trees bordering Bristol Road. It outlines the structures to be supported, the ground conditions and alternative foundation options.

Structures

The Pool Hall and Entrance Colonnade are position along the southern edge of the site, immediately adjacent Bristol Road and an existing tree line. The Pool Hall consists of a steel and timber frame supporting a lightweight roof. The Colonnade will consist of precast concrete columns and roof slab. The roof slab will be supported on the Pool Hall columns where possible. To transfer super structure loads to solid founding material and to limit total and differential deflection, piled foundations are proposed.

Ground Conditions

Available site investigations and geological records have identified that the site is dissected by a geological fault running south-west to north-east across the existing Gun Barrels site and the southern section of existing car park. North of the fault the ground generally consists of Sandstone and Mercia Mudstone under sands and gravels to the south of the fault. Below is a general table summary.

Stratum	Depth of Top of Stratum (m.bgl)	Thickness (m)
Made Ground	0	0.4 - 3.7
Glaciofluvial Deposits	0.4 - 3.8	0.2 -3.2
Weathered Mercia Mudstone (Clay: Grades IVb to III)	2.3 - 19.5	0.16 - 4.1
Mercia Mudstone (Grade II)	7.1 - 27.62	3.7 - 19.2
Passage Beds (see notes below) (not encountered in Gun Barrels Investigation)	3.8 - 5.2	10.2 - 22.76
Weathered Bromsgrove Sandstone (Sand) (not encountered in Gun Barrels Investigation)	1.2 - 4.4	0.4-1.1

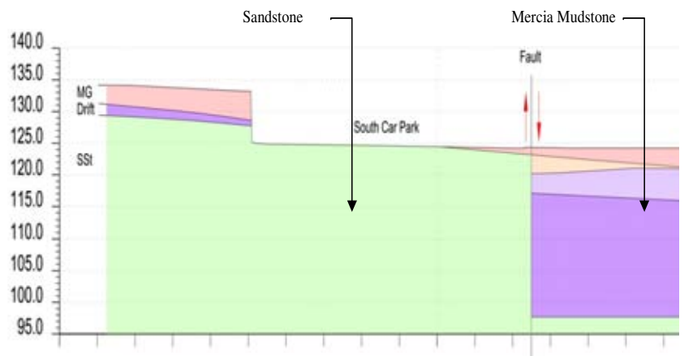


Figure 1: North – South Section through ground Conditions

North of the fault the Sandstone would provide a good stratum for shallow foundations supporting the anticipated foundation loads. South of the fault the upper levels of Sands and Gravels and Mercia Mudstone, whilst suitable for supporting lightly loaded spread footings, are likely to have different settlement characteristics to shallow foundations in the Sandstone. Deep piled foundations into the stiff Mudstone would provide more similar settlements.
Deep piled foundations are also less susceptible than shallow spread footings to changes in moisture content of the upper layers of clay. With an anticipated high water table that could fluctuate, and be drawn down by tree routes, shallow foundations near to the trees could be subject to cyclical settlement and heave. So, although the Pool Hall and Colonnade have relatively light foundation loads, piled foundations are currently proposed.

Piling Techniques

Augured or Continuous Flight Auger (CFA) piles would typically be the most efficient and economic piling technique for the anticipated ground conditions. However, they require relatively large piling rigs that stand over 20m above the piling position. These would clash with the existing tree canopy along Bristol Road and therefore alternative 'mini' or 'tripod' piling methods are required.

Tripod Piling

Tripod piling consists of a low height tripod and a percussive shell and auger. It does not require a high piling rig and so is suitable where headroom is limited. Tripod piling generally takes longer and the pile shaft is left 'open' for a longer period and temporary casing is often used to prevent the shaft collapsing.

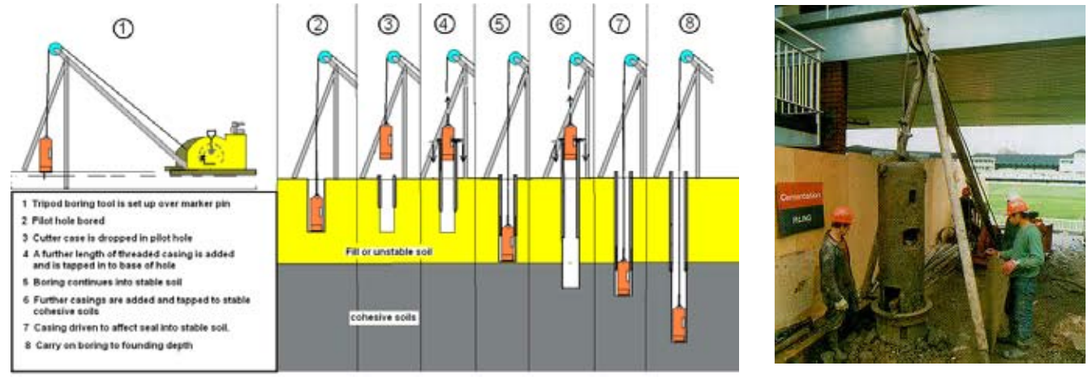


Figure 2: Typical piling sequence (courteous of A J H Piling)

Mini piling

A typical mini piling rig

Minipiling uses a compact piling rig with a limited height auger or driving hammer. They are designed specifically for small piles and where space is limited.

13.0 mechanical & electrical engineering

Introduction

The following section outlines the design proposals for Mechanical and Electrical building services within the proposed New Sports Facility. In particular, it outlines the measures that will be incorporated within the design to achieving an EPC (Energy Performance Certificate) rating A and BREEAM Excellent.

Sustainability

Our aim is to design the most energy efficient building and services that meet the needs of occupants, are responsive to the external climate, and have minimal carbon footprint. Following the introduction of the 2010 Edition of the Part L of the Building Regulations it is now a requirement that all new buildings will meet enhanced targets on carbon dioxide (CO2). It is the intention of the Sports Facility to design the new building to surpass the current building regulation requirements with excellent thermal properties and performance. The thermal performance of the building fabric will be developed in conjunction with the Architect to provide a comfortable internal environment throughout the year, with a specific emphasis upon the prevention of summertime overheating and heat loss. However, the new building will also need to meet the statutory requirements of Part L2a of the Building Regulations 2010.

The key items to be achieved for Part L2a are as follows:

· Criterion 1 – Achieving an acceptable CO2 Emission Rate (BER)
· Criterion 2 – Reducing the need for renewable energy systems by improving passive building performance
· Criterion 3 - Optimising the effect of solar gains (reducing cooling and heating loads)
· Criterion 4 – Verification of as built performance against design aspirations
· Criterion 5 - Efficient management and operation of the building.

Thermal modelling software will assist in producing results for Criterion 1, 2 and 3 above and the results will need to be submitted to the Building Control Body.

The Mechanical and Electrical Services approach by CPW is depicted above within our Roadmap to Zero Carbon Design. The philosophy adopted within this approach is to develop as many passive techniques as possible to reduce the need for renewable technologies. Only when the building site, fabric and services strategy have been optimised are the first level LZC technologies considered. Further, only when the clean renewable sources have been optimised, are the second level LZCs considered.

Solar Protection

The importance of limiting solar gain into the building has been discussed within the design team and the limitations on glass specification and area are being discussed. In essence, high quality glazing specification can now offer solar control whilst optimising daylight without the need for extensive brise soleil / external shading.

Building Insulation

The building fabric will be developed in conjunction with the Architect to provide a comfortable internal environment throughout the year, with a specific emphasis upon the prevention of heat loss and also limiting undesirable solar heat gains. All of the actual building elements' U-values will be much lower than those listed in the Building Regulations Part L2A: 2010 which lists threshold or maximum U-Values for building elements and controlled fittings (glazing).

Air Tightness

With the improved U-values, air tightness of the building has a much greater impact on the energy consumption of any building and hence its CO2 emission. The more air tight the building, the less energy is required to heat the building in winter. Part L2 of the Building Regulations states that air permeability must be less than 10m3/h/m2@50Pa. Experience working with the new regulations has shown that it is usually necessary to make improvements on this figure to actually achieve Building Regulations compliance. However, this development is targeting a much higher standard in terms of carbon emissions (EPC A) making a vast improvement on the statutory limit in order to achieve it.

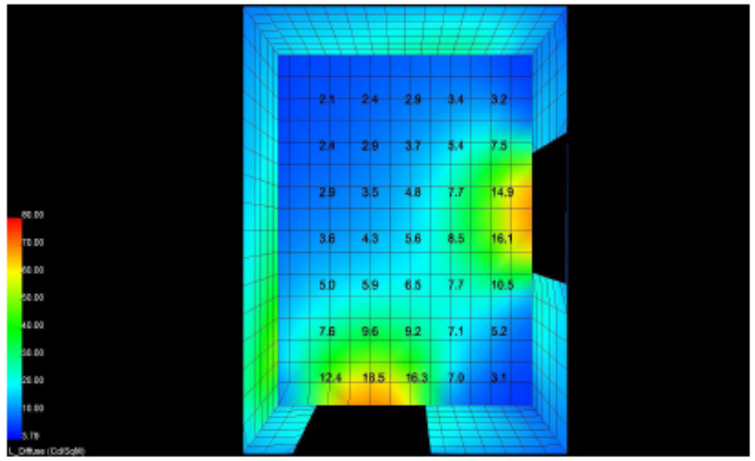
Following detailed thermal modelling, we would recommend that the project targets a value of 3m3/h/m2 @ 50Pa. In order to achieve this, the design team will need to have a robust design in terms of air tightness and we would advise that the architectural design and subsequent construction incorporate the advice from an air-tightness consultant throughout the design and construction process.

Daylighting

The provision of good day lighting is essential to the environment and for human physiology and well being. The CO2 emissions associated with artificial lighting installations in public buildings are often between 25 and 30% of the total CO2 emissions. Providing good day lighting penetration into the core of the building significantly reduces the CO2 emissions for the scheme and will greatly enhance the quality of the internal environment in the areas served.

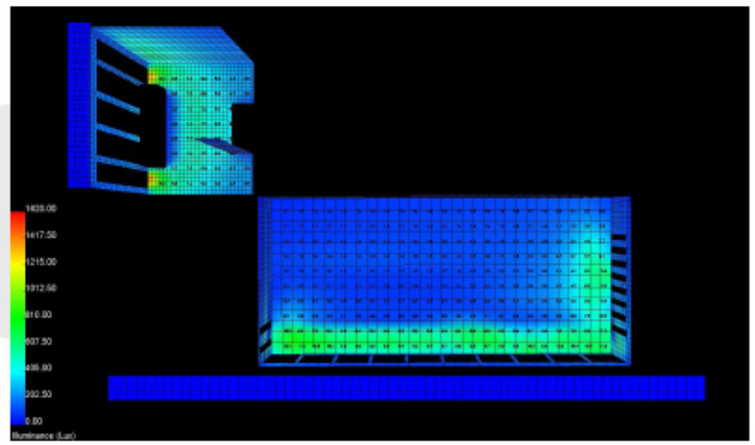
Thus lighting systems would adopt the strategy of providing the desired illumination when, where and how it is required. This means reducing output of artificial lighting during the hours when daylight is present. To enhance the penetration of daylight available, high efficiency glazing will be employed throughout to ensure that the balance between limiting external heat gains whilst allowing penetration of natural daylight is maximised.

Internal surface reflectance has a significant impact on the penetration of daylight into rooms and also energy efficiency of Lighting designs. As a result the design team have completed preliminary proposed reflectance values, as shown below.



Activity Room 2

The swimming pool has been modelled taking into account the external canopy which provides an obstruction / shading device against daylight penetration. With the current design the average daylight factor is calculated to be in the order of >3%.



The swimming pool

Ventilation and Heat Recovery

Adopting the correct ventilation principle is critical to the success of the project for a number of reasons including:

- Minimum ventilation rates are required for occupant comfort. These levels are dictated by Building Regulations, Sport England and Industry Design Guidelines.
- The provision of mechanical ventilation is a significant consumer of electrical energy within the building.
- Carefully designed ventilation systems combined with high thermal mass construction can significantly reduce summertime temperatures while minimising reliance on mechanical cooling, especially during midseason.
- Ventilation prevents occupants being exposed to air borne contaminants from processes.
- Statutory Regulations require some areas to achieve minimum air change rates, for example changing rooms and toilets.
- Achieving good air quality in spaces is key to providing an optimum environment.
- For a low energy building, heat recovery ventilation facilities in winter are essential.
- Mechanical ventilation will be needed within any spaces which have a sealed fenestration system to reduce or negate external noise and pollution from traffic or other sources. This is a particular consideration given the traffic that occurs on A38 Bristol Road South so the swimming pool which has to be mechanically anyway is located on this orientation
- Mechanical ventilation is a definite requirement to all rooms which are subject to high occupancy densities and high internal equipment gains from IT equipment, etc as they will otherwise overheat.
- Mechanical ventilation will be provided to rooms that are acoustically sensitive, i.e. require a very quiet internal environment due to the activities being carried out or to prevent noise transmission between adjacent spaces.

Natural Ventilation

Natural ventilation provides a very cost effective solution to ventilating shallow plan buildings. However, such a ventilation strategy, predominantly provided by opening windows for fresh air, can pose a number of concerns for some of the rooms on this project, specific concerns are:

- High activity, densely occupied rooms, such as gyms, exceed that which can normally be satisfactorily naturally ventilated and maintain comfortable internal temperatures.
- The swimming pool area requires mechanical ventilation for humidity and energy control and also for the spectator area due to high occupancy.
- Rooms that require mechanical ventilation for odour control, specifically both wet and dry changing rooms and toilet facilities
- Potential security issues associated with opening windows, especially on the ground floor, as naturally ventilated buildings often require greater window opening areas than is acceptable from a security perspective.
- Uncontrolled natural ventilation leads to increased heating loads in the winter time as the warm room air is constantly replaced with cold fresh air that must be heated.
- Rooms that require some mechanical cooling, due to high occupancy, high activity or heat generating equipment, should not be naturally ventilated when the cooling is required to operate as the natural air change rate is often greater than required which increases cooling plant capital and running cost.

A combination of natural ventilation for some of the year and mechanical ventilation in the winter and peak summer time offers the optimum in minimising energy consumption and improved indoor temperature control but the opportunities for this are fairly limited due to the rooms types and location of this new building. It is intended to provide the new Sports Halls will natural ventilation 'boost' facility to improve the summer time comfort, other opportunities will be investigated as the building design develops.

Heat Recovery

The mechanical ventilation systems within the new build element of the scheme will incorporate high efficiency heat recovery as a means of utilising the waste heat from the building generated by the occupants, equipment and lighting which would otherwise be lost to atmosphere and its associated energy wasted. In heat recovery ventilation systems, the warm outgoing 'exhaust' air stream passes through a heat exchanger (typically a thermal wheel or plate heat exchanger) where most of the thermal energy is transferred to the cold incoming 'supply' air. This reduces the amount of heat needed to be added to the supply air, often to the point where minimal or at times no additional heat is required at all and is especially important in reducing the building carbon footprint during the winter months.

Passivhaus quality efficiencies will be required i.e. in excess of 84% using specifically designed heat exchangers (Thermal wheel).

Plant and Control Efficiency

The provision of an effective control and metering philosophy is fundamental to the efficient operation of building's environmental services. The following provides an overview of the plant efficiency and control measures that are proposed for the development:

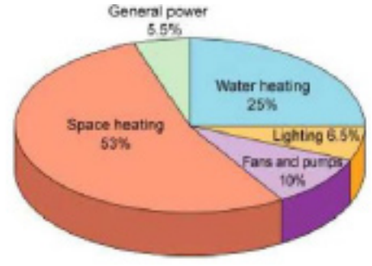
- Low pressure hot water heating flow and return temperatures will be considered –greater than traditional temperature differences shall be considered, especially regarding the pool heating circuit to minimise both distribution losses and pump electrical consumption.
- Zoning of HVAC systems, including the zoning of mechanical ventilation systems.
- Individual room occupancy detection control strategies to be linked to mechanical ventilation systems wherever practical, resulting in 'on-demand' zoned ventilation control, lower delivered fan power and increased flexibility in building usage.
- Campus linked building management control network.
- Individual room occupancy detection control strategies to be linked to heating systems with unoccupied set-back temperature provision such that heating is provided 'on-demand' where relevant.
- Highly efficient Heat recovery devices to be used on all supply air mechanical ventilation systems.
- Mechanical ventilation systems to include automatic control strategies to maximise 'free cooling' and allow ventilation systems to be switched off when the ambient allows.
- Automatic control routines to ensure HVAC systems are enabled/disabled at optimum times (i.e. Latest possible start-up time and earliest shut-down time) using intelligent 'self learning' controls.
- Lighting solutions to employ low energy lamps, high light output ratios and high frequency control gear.
- Lighting installations to be provided with automatic control systems for occupancy detection and daylight linking.
- High efficiency low energy motors to be used to drive mechanical ventilation systems.
- Variable speed pumps and fans to be used to promote lower operating costs and help match energy usage with the operating profile and occupancy of the building.
- Sub-metering to be provided such that a minimum of 90% of the input energy from each utility service may be accounted for at end use. The Campus Energy Management System will be interfaced to provide automatic monitoring and targeting of all sub-meters to promote energy management and deliver lower consumption.
- In addition to the above, the BMS will also raise an identifiable alarm in the event that out of normal range values or end use energy consumption is detected as a result of out of ordinary building use, failure of automatic control systems or inefficient plant operation.

The above enhancements are proposed for the buildings systems in order to increase the efficiency of the installation and its component building systems. However, a large percentage of buildings energy is often consumed by small power. The Client may wish to consider the following items to further assist in reducing their electrical consumption, energy costs and subsequently a good quality display energy certificate:

- Provide staff with guidance on how to reduce energy usage within the workplace via an Intranet building user guide.
- Maintain equipment in line with manufacturers' recommendations.
- Initiate a planned maintenance contract from date of handover to keep equipment and systems at optimum performance. Detailed incorporation of the University of Birmingham Maintenance Department to ensure all systems operate at optimum performance.
- Undertake scheduled commissioning checks to ensure systems remain operating as designed throughout the buildings life.
- Meter, monitor and set performance levels for each system, address any subsequent deviation from expected targets.
- Purchase A++ energy rated equipment e.g. PC's, LCD screens, sports machines and white goods.

A very significant amount of energy will be consumed by the new sports centre shall be consumed by the energy required to heat the swimming pool as detailed below in the Pie Chart produced by Sport England.

There is significant energy saving advantages if the client will consider the use of a pool cover to be in place whenever the pool is not in use although it is acknowledged this may present management difficulties.



Extract from Sport England Design Guidance Note indicating a Typical Swimming Pool Energy Consumption Breakdown

13.0 mechanical & electrical engineering

BREEAM
The design team are dedicated to targeting a BREEAM rating of 'Excellent'. In order to ensure that the base scheme design is progressing in accordance with this target, two early Pre-assessments have been carried out on the Project.

In order to achieve the BREEAM excellent rating, a rainwater harvesting system is also to be provided to recover water that can be used for flushing devices (Urinals & WC's). This will have mains fed back-up system, should there be no rainwater available.

The Pre-assessment was informal, and has been based on the revised BREEAM Bespoke/Other Buildings 2008.

The credit criteria has been developed by the BRE for the University of Birmingham Sports Facility and the project has been registered with the BRE registration CPWP-BES-DF15-1/ BREEAM-0040-2057.

PRIMARY SERVICES (ELECTRIC, WATER, GAS, DISTRICT HEATING)

Existing Underground Services

Other than a 21" Transco gas main that runs through the east side of the site parallel to Edgbaston Park Road, it is not believed that the proposed site has significant existing services on the majority of the site due to the site already having been constructed on previously.

There is an easement agreement on this gas main which does not allow any structure to be constructed within 3 metres either side of this gas pipe, which currently is under review with the gas board trying to obtain formal approval of works in line with their requirements.

Minor infrastructure services that belong to the utility companies that are required to be isolated and stripped out are:

- BT telecom to the Gun Barrels Public House.
- LV electrical supply to the Gun Barrels Public House.
- STWA water supply to the Gun Barrels Public House (not shown on record drawings but presumably exists).
- STWA water supply to the No. 101 Bungalow.
- LV electrical supply to the No. 101 Bungalow – it is not known at this stage if this is a utility or UOB supply.
- Natural gas supply to the No. 101 Bungalow – not shown but it is assumed at this stage this building was heated by a gas boiler.
- LV cables and CCTV cables serving the 'South Car Park' – these belong to the client.

The Transco gas main has been taken into account while positioning the new building however a comprehensive subtronic survey and a number of slit trenches will be carried out to both accurately determine the precise location of the gas main and determine the location of other known services and determine if there are any other unknown services within the site boundaries.

There is no reason that the subtronic survey cannot be commissioned as soon as possible as, apart from the Transco gas main, they should all be redundant services and shall be required to be removed prior to construction starting.

Existing services enquires has been carried out to the Utility Companies which has concluded that the existing underground services listed below will be affected:

- E-ON Central Networks
- National Grid Gas Networks.
- Fulcrum Gas Networks
- Severn Trent Water.
- British Telecom.
- Virgin Media

Record information received from the Utility Companies is included in the appendices of this report, as an existing combined services drawing.

To meet the Employers obligations of the CDM Regulations, the Sports facility have employed a Specialist Survey Company to carry out a subtronic underground survey which may highlight that other services will need to be diverted. The final survey information will be reviewed during the next stage of the project.

New Natural Gas Supply

The requirement for new incoming natural gas infrastructure is mainly dependant on whether the new facility is heated by stand alone heating plant within the facility itself, or from the campus infrastructure.

Following substantial discussions with the client and completed feasibility studies it is currently proposed that the new building will be heated by the client's heating infrastructure and therefore there will be no requirement to feed natural gas to the project for heating purposes (unless back up boilers or small scale CHP are agreed as being necessary as the design develops although at this stage it is thought these are unnecessary). Irrespective it may still be necessary to feed a small new gas supply to the building if the kitchen appliances serving the new Café are proposed to be gas fed rather than all electric. If the equipment is gas fed then this would be the only requirement for natural gas with this option. Following with the discussion with the client we believe the kitchen appliances will be electrically fed.

New Mains Cold Water Supply

Mains cold water shall be derived from a new connection off the Severn Trent Water infrastructure local to the development. This new connection shall be extended as a branch to the new building. CPW currently liaising with UoB utilities manager to determine whether a new water supply will be more appropriate for this application - due to the high water demand.

It is not known currently if the soil is classified as contaminated where the new water main shall be routed, this is still to be determined. Subject to the soil analysis that will be carried out the new water main shall be installed in the most appropriate material – MDPE for uncontaminated or either Protecto-line or ductile iron if the site is classified as contaminated.

New Incoming Electrical Supply

A new 11,000v/400v substation will be provided in the Sports Facility building and will be known as Substation No.4. The substation will be cut into the University Inner 11kV ring main between existing Substation Nos. 2 (Barber) and 3 (Library). The existing feeder from Substation No.2 to Substation No.3 will be pulled back to the draw pit outside Substation No.2 and jointed through onto new cables to Substation No.4. A new feeder will be run from Substation No.4 and connected onto the switchgear in Substation No.2

The cable route from Substation no.2 to Substation No.4 will be via the ducts that have been laid to the front of the Guild of Students and hence be extended around the side of St Francis Hall.

Due to the framework agreement with Hawker Siddeley Switchgear, the 11kV switchgear, protection and Bay Controller would be ordered by the University and 'free issued' to the Contractor, as per the arrangement that has been undertaken on each of the phases of the main electrical network upgrade.

A dedicated 12 core single mode fibre optic cable will be run from the Sports Facility building to the Barber Building substation for the HV switching, tripping & monitoring. A dedicated 12 core single mode fibre optic cable will be run from the Sports Facility building to the Library Building substation for the HV switching, tripping & monitoring.

New Voice and Data Connections

2 x 24c fibre optic backbone cables will run from the main communications room in Aston Webb C Block to serve the new Sports Facility Building. The data transmission will be voice and data. Alternative IT cable duct route to be established into a local communication room. Additional 50 pair telephone cabling will run alongside the fibre optic backbone cabling for additional resilience if the fibre cabling network fails.

4 x 150mm cable ducts will be provided from the main communication room in the Sports Facility building to the site boundary Edgbaston Park Road pavement for future use. The spare ducts will be provided opposite Fir House & Beech House for future use.

1 x 24c fibre optic backbone cabling will run from the main communication room in Aston Webb C Block to the new Sports Facility Building. The data transmission will be BMS, metering & emergency lighting. Additional 50 pair telephone cabling will run alongside the fibre optic backbone cabling for additional resilience if the fibre cabling network fails. Due consideration will be given to the provision of a second secure fibre optic cable link to the main communications room in the mechanical engineering building to offer greater network resilience.

New District Heating Connections

The heating required in the new sports centre shall be fed by a new dedicated flow and return circuit from the South West Campus CHP system. The heating would be distributed by buried pipes from a new heat exchanger circuit in the South West Campus building. The new heat exchangers shall be steam to LTHW type to ensure that heating is available throughout the year to the new Sports Centre (as the existing MTHW infrastructure is switched off in the summer months and is known to have capacity issues at the part of the campus where the new building will be located). The new plate heat exchangers will also provide hydraulic separation of the primary and secondary circuits. At this stage two options are consider: a) Solar Collectors and (b) PV panels. While solar collectors are considered more appropriate for this option due to the campus infrastructure being derived from a main CHP system for much of the year, PV panels will potentially

provide equal energy savings and comply with client Energy Saving requirementand budget cost. This will be further investigated at the next stage, with an updated Part L model to investigate compliance.

The low and zero carbon technology currently considered most appropriate for use with the campus infrastructure are evacuated solar collectors or PV panels and connection to UoB CHP steam main infrastructure.

External lighting

External lighting will be provided to the building and associated roadways and pathways leading to the building. All external lighting will be in accordance with CIBSE Lighting Guide LG6 & ILE guidance. Lighting levels are varied and have the base criteria of providing a safe passage of pedestrians and building users generally. Target lighting levels are to be developed from BS 5489 and BS EN 13201 classifications. However, the overriding factors will be those developed in conjunction with the UoB.

All external lighting will be designed for maximum energy efficiency using luminaries that will accentuate the building finishes and external landscaping. The lighting design will enable a low energy in use strategy and consider night time reduction of light level, possibility of dimming and long life for reduced maintenance.

External lighting will be operated through photoelectric controls and time switches and a manual override facility will be provided internal to the building for maintenance purposes. Due consideration will be made to integrating the external lighting scheme into the general security functions of the building. Timed control and the possibility of reduced night time illumination are requirements for the BREEAM assessment and so these facilities would need considering. The control of external lighting will further be informed by the movement and control of the users of the building and the times of occupancy.

The external lighting for the project will be required to fit within the UoB new campus regeneration scheme. This scheme utilises LED mounted lighting for various lighting levels which are prescribed by the UoB technical departments.

Environmental noise survey

It is proposed to build a new UoB Sports Facility shall include new mechanical services items, some of which may operate for 24hrs a day. As such Cole Jarman, acoustic consultants, were instructed to complete a noise survey, in relation to the nearest residential façades to the site. This survey records existing noise levels during the evening and night time periods. Cole Jarman have also undertaken a day time survey in order to establish the existing noise levels which will be incident on the nearest proposed façade of the development, to the A38 Bristol Road.

The following information has been prepared by Cole Jarman to support the planning application of the proposed development. The following information provides report details of both noise surveys along with the calculated plant noise limits at the nearest noise sensitive receptors and the existing noise levels at the nearest proposed façade to the A38, Bristol Road.

Site Description

The site is located on the corner of the A38, Bristol Road and Edgbaston Park Road. Running along the southern boundary of the site is the A38, Bristol Road. Beyond this are 3-4 storey residential flats, an ambulance station and a fire station.
Running along the eastern boundary of the site is Edgbaston Park Road. Beyond this are 3 storey buildings with commercial office space on all floors.

To the north of the site are buildings belonging to the University of Birmingham. To the west of the site are existing sports pitches and South Gate Lodge which belong to the University of Birmingham.

Noise Survey Methodology and Instrumentation

An attended noise survey was undertaken at the site between 1800 Thursday 8th and 0300 Friday 9th September 2011. This survey was conducted in order to establish the quietest background noise levels at the nearest noise sensitive façades.
Measurements were taken at 4 locations as shown on the below key plan and described below, all measurements during this noise survey were taken at a height of 1.5m above ground level;

MP1, free field measurement position located in front of the existing flats on A38, Bristol Road. The position was located 4m from the kerb of the A38. This position was chosen to be best representative of the noise levels experienced at the nearest residential properties to the south of the site.

MP2, free field measurement position located to the north of the "Lodge", to the west of the site. This position was chosen to be best representative of the noise levels experienced at the windows on the rear façade of the "Lodge".

MP3, free field measurement position located to the north of the site near to the existing buildings belonging to the University of Birmingham. This position was chosen to be best representative of the noise levels experienced at the closest windows to the north of the site.

MP4, free field measurement position located 5m from the kerb of Edgbaston Park Road in front of the existing offices. This position was chosen to be best representative of the noise levels experienced at the nearest offices on Edgbaston Park Road.

Measurements at MP1-MP3 were taken between 1900-0300. As the office blocks will only be in use during the day associated measurements were only taken between 1800-2000 at these locations.

A second attended noise survey was conducted between 0900-1300 on Friday 16th September 2011. This noise survey was conducted in accordance with CRTN shortened measurement procedure in order to establish the existing noise levels at the proposed A38, Bristol Road façade of the development. Noise measurements were taken at MP1 location as indicated on the adjacent key plan.

During both surveys measurements of the LAmax, LAeq, LA10 and LA90 indices were made over sequential 10 minute periods.

Noise measurements, during both surveys, were made using the following equipment;

Equipment Item	*Manufacturer*	*Type*
Sound Level Analyser	Norsonic	118
Acoustic Calibrator	Norsonic	1251
Outdoor Weather-proof Windshield	Norsonic	1212

Microphones were fitted with weatherproof windshields and were calibrated before and after both surveys to ensure a consistent and acceptable level of accuracy was maintained throughout. No significant drift in levels was noted.

The weather conditions both noise surveys were dry, cool and overcast with a slight breeze.

Background Noise Survey Results

The minimum measured background and ambient noise level recorded at the nearest residential properties are listed below:

Location	*Minimum Measured Noise Levels, dB*					
	Daytime (0700-1900 Only)		Evening (1900-2300)		Night time (24-hour)	
	LAeq	LA90	LAeq	LA90	LAeq	LA90
MP1	69	57	68	54	64	44
MP2	53	49	50	46	44	36
MP3	58	49	54	45	48	43
MP4	66	53	65	50	N/A	N/A

During the noise survey it was noted that road traffic noise from A38, Bristol road was clearly audible at all measurement positions this included sirens from emergency vehicles on the road. Noise levels at MP3 and MP4 were also affected by road traffic on Edgbaston Park Road.

Noise from the people using the university sports pitches was audible at MP2 during the 1st two hours of the attended survey.

An existing extract fan located on the southern façade of a university building, located to the north of the site, was audible at MP3 throughout the night time survey.

CRTN Shortened Measurement Noise Survey

The noise levels measured at MP5 were dominated by road traffic noise from vehicles on the A38, Bristol Road. Sirens from emergency services vehicles were also audible over the survey period along with the occasional plane flying over the site.
The LAmax,F noise levels measured during the survey ranged between 76-98 dB(A).

Plant Noise Limits

Guidance for the plant noise limits has been taken from Birmingham City Councils Planning Consultation Guidance No.1 Noise and Vibration (PGN1). The relevant guidance is noted below;

"For most general noise sources an assessment should be carried out at the façade of noise sensitive premises to demonstrate that the following three criteria would be met:

- *The rating level (calculated in accordance with BS 4142) is at least 10 dB below the existing ambient noise levels (LAeq)*
- *The rating level (calculated in accordance with BS 4142) is at least 5 dB below the existing background noise levels (LA90)*
- *Between the hours of 19:00 and 07:00 the maximum noise levels (LAFmax) from the development shall not exceed the LA90 by more than 10 dB, however where the existing background noise level is 45 dB LA90 or less, the maximum noise levels shall not exceed 55 dB LAFmax*

The noise level of the source shall be reported as LAeq,T ¬where T shall normally follow the guidance in BS 4142 (1 hour daytime and 5 minutes for night time). Where a single cycle of a night time operation exceeds 5 minutes the LAeq¬ for a complete cycle shall be measured.
Noise characteristics and levels can vary substantially according to their source and the type of activity involve. In the case of industrial development for example, the character of the noise should be taken into account as well as its level. Sudden impulses, irregular noise or noise which contains a distinguishable continuous tone will require special consideration."

Using BCC guidance, as above, and the data collected during the background noise survey plant noise limits at the nearest noise sensitive facades have been calculated and are shown in the table below.

Plant noise emission limits at the nearest residential properties:

Location	*Noise Limit, dB*				
	Daytime (0700-1900 Only)	Evening (1900-2300)		Night time (24-hour)	
	LAeq1hr	LAeq, 1hr	LAmax	LAeq, 5min	LAmax (1900-0700)
Residential properties on A38	52	49	59	39	55
Rear façade of the "Lodge"	43	40	55	31	55
Façade of UoB buildings to north	44	40	55	38	55
Façade of office buildings to east	48	45	55	N/A	N/A

Any plant items which has notable noise characteristics, such as sudden impulses, irregular noise or tonality, as described in BS 4142 will be subject to a 5 dB penalty.

Conclusion

It is proposed to build a new sports facility for the University of Birmingham on the corner of A38, Bristol Road and Edgbaston Park Road. The development will include the addition of new mechanical services items, some of which may operate for 24hrs a day.

This design statement and reported survey information provides details noise survey locations, representative of the nearest noise sensitive receivers and has provided evening and night time plant noise limits which meet the requirements of Birmingham City Council.

This statement also provided details of a CRTN shortened measurement procedure noise survey at the nearest proposed façade to the A38, Bristol Road. L10, 18hr noise levels have been calculated and an average Leq spectra has been provided to aid the design of the building façade.

From the environmental noise survey information obtained, mechanical and electrical engineers, Couch Perry & Wilkes (CPW) have developed an air handing strategy which can achieve noise reduction rates imposed by both the National Building Regulations and Birmingham City Council. Criteria have been set relating to noise emissions from both emergency and non-emergency building services plant associated with the development. All plant shall be designed as such that these criteria are met in order to comply with Birmingham's planning requirements. Further information on air handing units is included within the mechanical and electrical engineering strategy, contained within this document.

14.1 transport and refuse

General refuse collection from the New Indoor Sports Facility shall be collected by an appointed third party contractor to a waste transfer station for processing. Separate medical waste from the Wellbeing Centre, on the second floor, shall be removed from the facility via an appointed medical waste contractor.

Mixed recycling collection from the New Indoor Sports Facility shall be every 48hours by UoB on-site waste collection and stored centrally for onward processing by a third party contractor at a Mixed Recycling Facility (MRF).

Dedicated recycling bins shall be located around the building for visitors to use. The refuse storage room at ground floor level has been sized in excess of design guidance and the Universities requirements. The refuse store is designed to be naturally ventilated.

A dedicated Tansport Assessment for the New Indoor Sports Facility has been submitted as part of this application. This is an appendix document to the overall Hybrid Application Transport Assessment, completed by WSP.

14.2 facade maintenance & roof access

It is imperative that cleaning and maintenance of the proposed New Indoor Sports Facility meets the Universities health and safety requirements. As designers it is imperative that the CDM regulations are met with regards to the design of the building, as such all flat roof areas are fully accessible and provide protection from falling, to a height of 1.1m. No mansafe systems are proposed.

The majority of the building façade is of facing brick construction, thus requiring minimal cleaning. Glazing to all other facades shall be by pole. The core building entrance and east façade shall be cleaned by a specialist cleaning contractor.

14.3 archaeology and built heritage

It is understood that the New Indoor Sport Facility site is of no archaeological interest. A detailed archaeological assessment for the University of Birmingham Edgbaston Campus is included within the overall hybrid application.

14.4 fire engineering strategy

The fire engineering strategy of the New Indoor Sports Facility has been developed by fire consultants Jeremy Gardner Associates and the design team named in Section A1 of this document.
A number of fire engineering solutions are proposed and the design team have undertaken initial review with both the University's fire officer(s) and BCC building control. It should be noted that the building generally presents relatively low fire risk. The proposals include:

- provide a fire-fighting core with dry riser outlets in the lobbies, to the eastern core
- Provide an evacuation lift within the eastern core for the evacuation of disabled users
- Fire Brigade vehicle access will be provided to within 18m and within sight of the dry riser inlet
- An existing hydrant is within 100m of the development therefore no hydrant is required
- Sports Hall is designed for 1000 occupants
- Occupancies of up to 500 and up to 300 are anticipated at Levels 1 and 2 respectively
- Travel distances shall not exceed 18m in a single direction or 45m in two directions
- Ground Floor Exits
- Stair Capacity is based upon 1500mm width stairs
- All doors on the exit routes shall open in the direction of escape
- Disabled refuges with communication facilities shall be provided within stair lobbies
- No sprinklers are proposed
- Compartments shall not 2000sq.m
- Plant rooms are separated by at least 30 minutes fire resisting construction

14.5 Crime prevention & security / Secure by Design

Crime prevention & security within the New Sports Facility is imperative to both the University of Birmingham and the users of the centre, as such Lifschutz Davidson Sandilands have undertaken consultation with the West Midland Police service to develop the design and ensure that the development will achieve a Secure by Design award.
Following initial consultation with SBD Case officer Gareth Pemberton, a number of security recommendations have been incorporated:

- Provision of secure cycle storage for 70no bicycles, to achieve BREEAM status
- Provide a highly visible access route to the multi-storey car park
- Video and audio access control to service access doors
- Provide controlled access to the service yard
- Provision of external lighting and CCTV, to discourage unsocial behaviour

The design team, named in Section A1 of this report, shall continue to develop the design with SBD officers.

14.6 Sport England Consultation

Statutory consultation has been undertaken with Sport England throughout the design process to ensure the scheme is beneficial to the University of Birmingham and the local community. The design team have held a pre-planning scheme overview with Bob Sharples of Sport England on Tuesday 10th January 2012, who confirmed that Sport England had no issues with the Sports Centre proposals as it had no direct impact with regard to loss of existing external pitches.

Sport England fully supports the proposal New Indoor Sports Facility and a comparative analysis for campus wide sporting facilities is addressed within the Hybrid Application.

15.0 closing statement

Closing statement

The proposals outlined within this document offer the City of Birmingham a world-class sports facility and iconic civic gesture. The facility shall enhance the ability of the University to attract the best students, achieve sporting excellence and enhance user experience in line with its vision of becoming a premier global University. The facility shall also become a significant destination for the wider public and encourage the public to enter the University's Edgbaston Campus.

The design team named in section A1 of this report, has worked closely with Birmingham City Council's Planning; Landscape; Conservation and Arboriculture officers to achieve a design that not only responds to the University's brief but national and local planning policy, and the ambition of the City itself.

The strategic composition of the building and landscape strategy sympathetically responds to the existing site, context and topography, connecting the City of Birmingham to the heart of the historic university campus.

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