GREATER**LONDON**AUTHORITY

[redacted]
(By email)

Our Ref: MGLA250319-8616

13 May 2019

Dear [redacted]

Thank you for your request for information which the GLA received on 25 March 2019. Your request has been dealt with under the Environmental Information Regulations (EIR) 2004.

You asked for;

> *I would like to request the following information in relation to the Gurnell Leisure Centre Redevelopment and the proposed housing development:*
>
> *a) A list of correspondence between the GLA and Ealing Council from 1 February 2018 up until the present (relating to the Gurnell redevelopment.)*
> *b) A list of correspondence between the GLA and EcoWorld or Be Living or Wilmott Dixon between February 2018 and the present (relating to the Gurnell redevelopment.)*
> *c) A copy of each of those correspondence and any attachments or documents for the same time frame.*

Please find below a list of correspondence within scope of your request and attached to this response [Part 1]

Part A correspondence	
Page 1	24/01/2019 Email: *FW: EcoWorld and Gurnell Leisure Centre - Ealing*
Page 2	29/03/2018 Email: F*wd: Gurnell Leisure Centre*
Page 3 - 4	29/03/2018 Email chain: *RE: Gurnell Leisure centre*
Page 5 - 6	26/03/2018 Email chain: *GLA/4287 Gurnell leisure centre - GLA pre-application advice*
Page 7	23/02/2018 Email: *Gurnell Lesiure Centre*
Page 8	08/02/2018 Email: *Cancelled: Gurnell Leisure Centre & enabling development - viability meeting*
Page 9	02/02/2018 Email: *Gurnell & Kellogg Tower*
Part B correspondence	
Page 1 – 14	15/02/2019 GLA Assessment
Page 15 - 17	20/04/2018 Email chain: *GLA/4287 Gurnell leisure centre - GLA pre-application advice*
Page 18 - 20	17/04/2018 Email chain: *RE: GLA/4287 Gurnell leisure centre - GLA pre-application advice*
Page 21 - 22	26/04/2018 Email chain: *RE: GLA/4287 Gurnell leisure centre - GLA pre-application advice*
Page 23 - 36	23/03/2018 GLA Assessment

Page 36 - 38	20/03/2018 Email chain: *Gurnell Leisure Centre: Report*
Page 39	09/03/2018 Email: *Gurnell Leisure Centre*
Attachments	
	2018.04.09_Massing_Options_presentation [File ref: MGLA250319-8616 Part 2]
	2018.08.29_Gurnell Leisure Presentation [File ref: MGLA250319-8616 Part 2]
	2018.10.10_Gurnell Leisure Presentation_GLA [File ref: MGLA250319-8616 Part 4]
	140192_Site Plan_Site Boundary [File ref: MGLA250319-8616 Part 2]
	181109 Gurnell Leisure Centre Crib Sheet [File ref: MGLA250319-8616 Part 2]
	Accommodation Schedule [File ref: MGLA250319-8616 Part 2]
	Block Level Architectural Drawing Pack [File ref: MGLA250319-8616 Part 3]
	copy_of_gla_carbon_emission_reporting_spreadsheet_v1.1 [File ref: MGLA250319-8616 Part 5]
	Delivery & Servicing Plan [File ref: MGLA250319-8616 Part 6]
	Design and Access Statement [File ref: MGLA250319-8616 Part 7]
	Energy Assessment [File ref: MGLA250319-8616 Part 2]
	Landscaping Drawing Pack [File ref: MGLA250319-8616 Part 8]
	Residential Travel Plan [File ref: MGLA250319-8616 Part 2]
	Sitewide Architectural Drawing Pack [File ref: MGLA250319-8616 Part 3]
	Sustainability Statement [File ref: MGLA250319-8616 Part 2]
	Transport Assessment [File ref: MGLA250319-8616 Part 9]

Please note that some names of members of staff are exempt from disclosure under Regulation 13 (Personal information) of the EIR. This information could potentially identify specific employees and as such constitutes as personal data which is defined by Article 4(1) of the General Data Protection Regulation (GDPR) to mean any information relating to an identified or identifiable living individual. It is considered that disclosure of this information would contravene the first data protection principle under Article 5(1) of GDPR which states that Personal data must be processed lawfully, fairly and in a transparent manner in relation to the data subject.

Due to the number and file size of attachments, these have been placed directly on to our disclosure log:

https://www.london.gov.uk/about-us/governance-and-spending/sharing-our-information/freedom-information/foi-disclosure-log/eir-gurnell-leisure-centre-redevelopment

If you have any further questions relating to this matter, please contact me, quoting the reference at the top of this letter.

Yours sincerely

Paul Robinson
Information Governance Officer

If you are unhappy with the way the GLA has handled your request, you may complain using the GLA's FOI complaints and internal review procedure, available at:

https://www.london.gov.uk/about-us/governance-and-spending/sharing-our-information/freedom-information

Gurnell Leisure Centre, Ealing

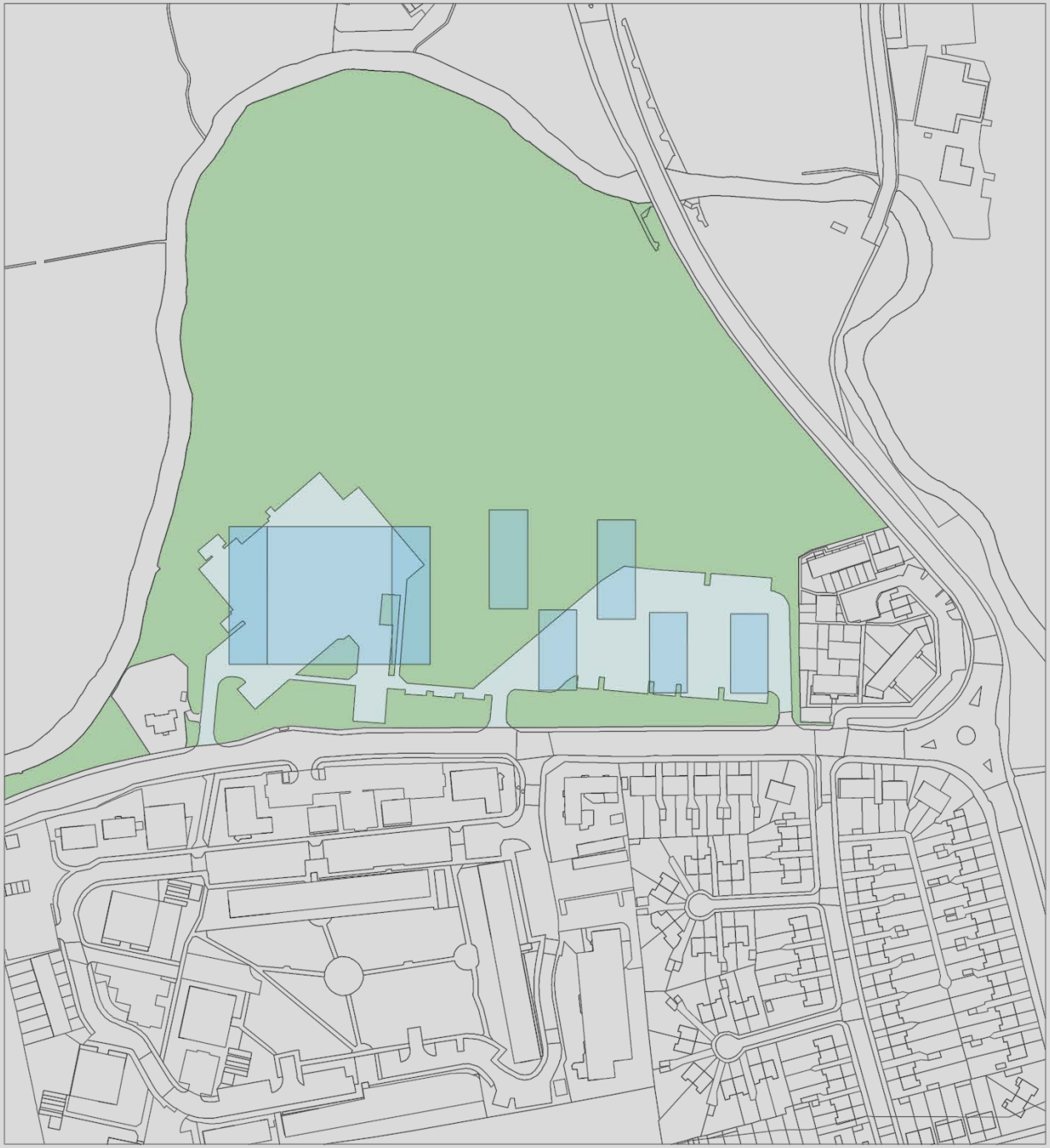
GLA Massing Options

April 2018

3D REID

00 Base Option

As presented to the GLA 27 March 2018



Previous Developed Land (PDL)
14202 sqm

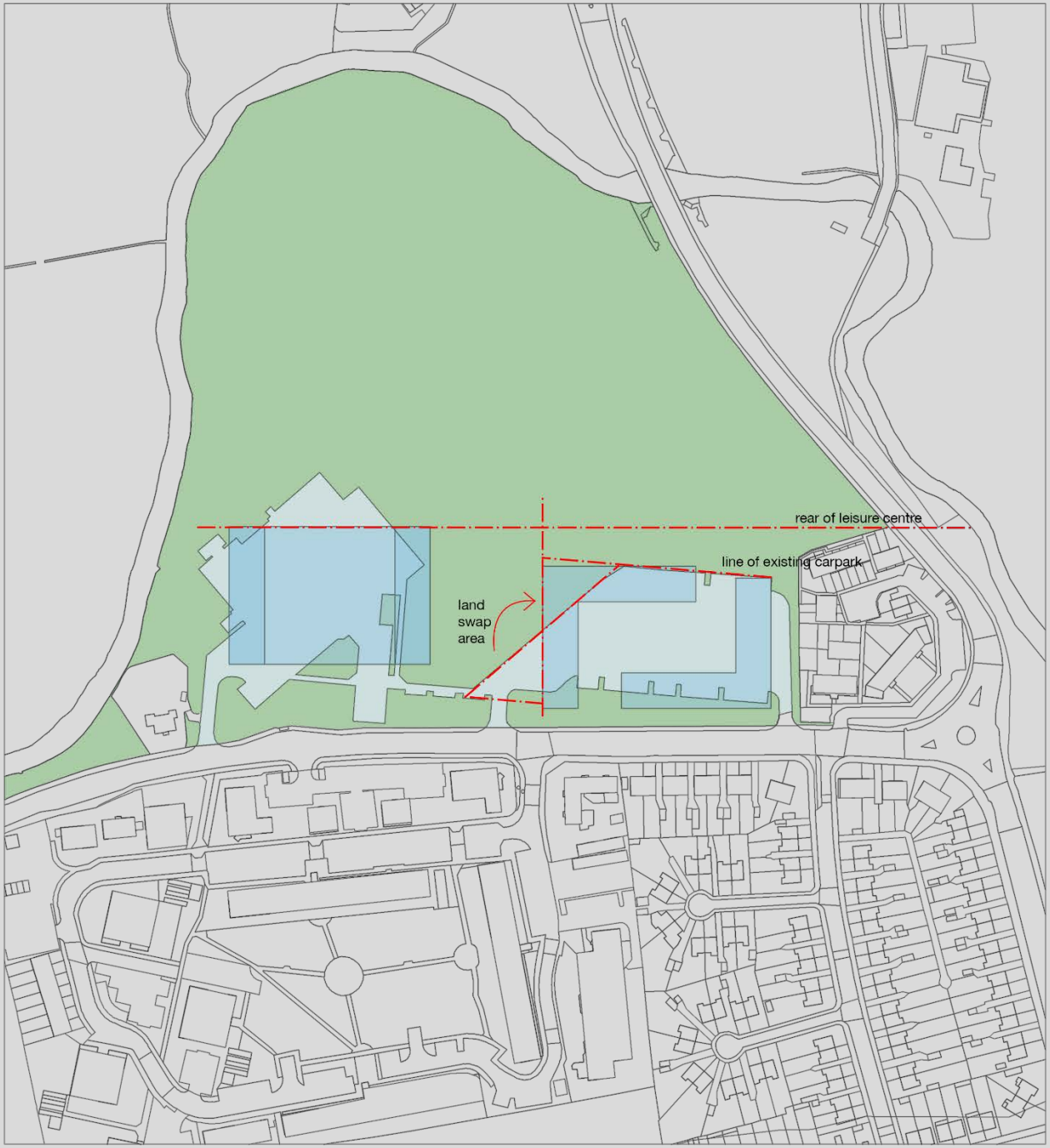
Proposed Building Footprint
9221 sqm

Constraints

Key footprint constraints, as agreed following meeting with GLA on 27 March 2018

This plan details the key footprint constraints as agreed with the GLA at the meeting on 27 March 2018 as:

- the 'back stop' of the leisure centre,
- the 'land swap' of the triangular element of the car park
- the rear line of the existing car park.



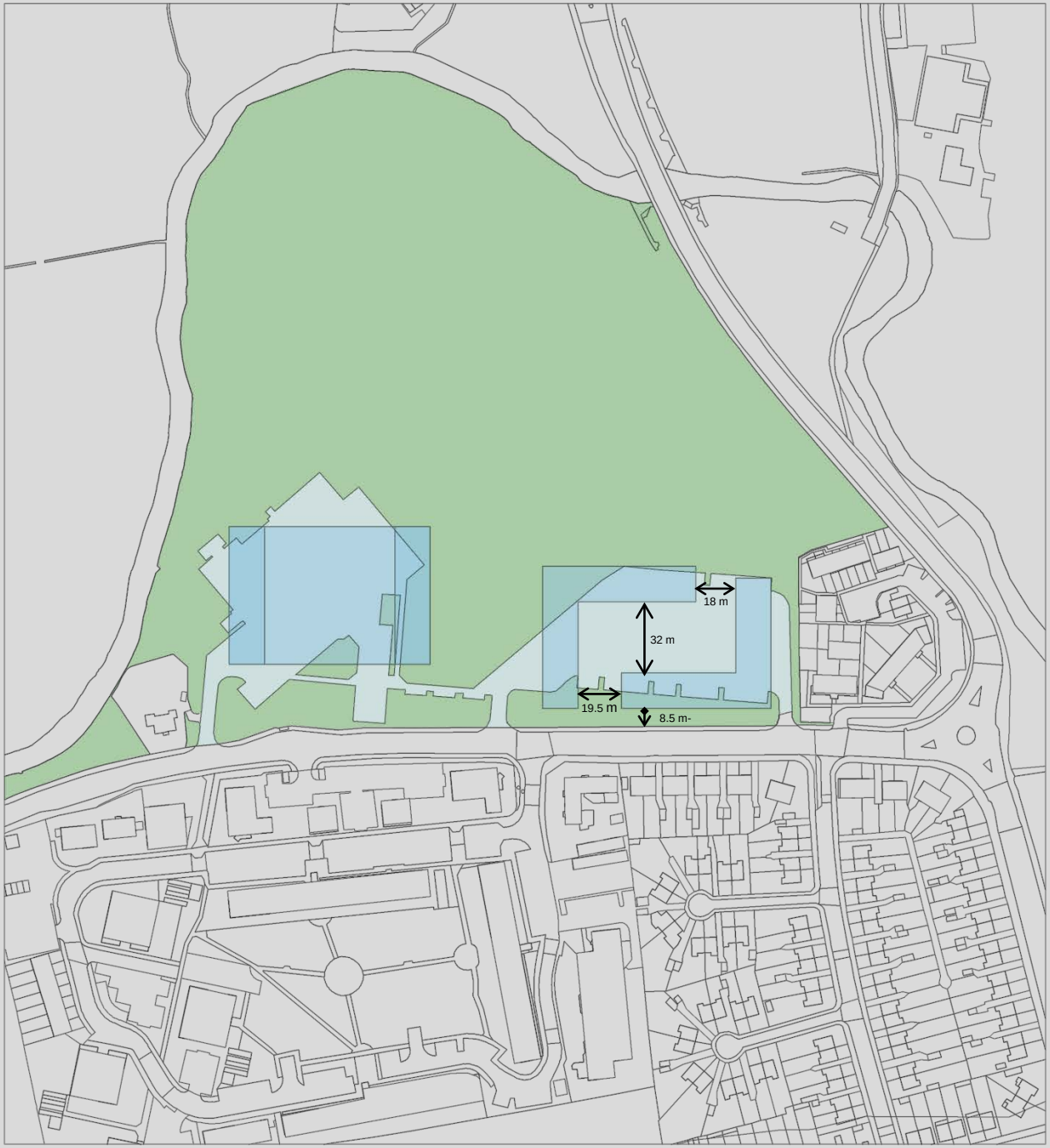
01 Courtyard scheme

Pros

- Scheme encroaches no further than northern most edge of car park, but provides sufficient separation distances between blocks to provide an adequate courtyard space and good quality living environment.
- Delivers quantum of development required in an efficient building form, enabling the most compact scheme to be delivered on previously development land, whilst also respecting the Peal Gardens properties to the east with a 3 storey building adjacent.
- Form of buildings fits within the context of the Gurnell Grove Estate to the south, which is based on a resident's' courtyard with buildings overlooking.
- Addresses the street better and helps to create a more defined residential development, supporting a sense of community.
- Permeability into the MOL to the north can be provided either side of the residential buildings.

Cons

- Has some north-facing frontages.
- Stacked massing to the north of courtyard would create a shadow on the green space.

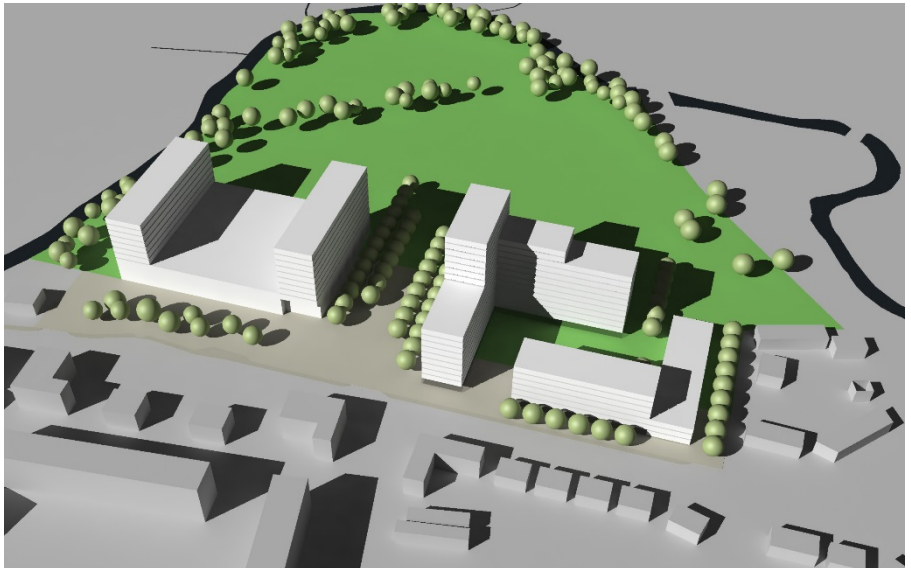


Previous Developed Land (PDL)
14202 sqm

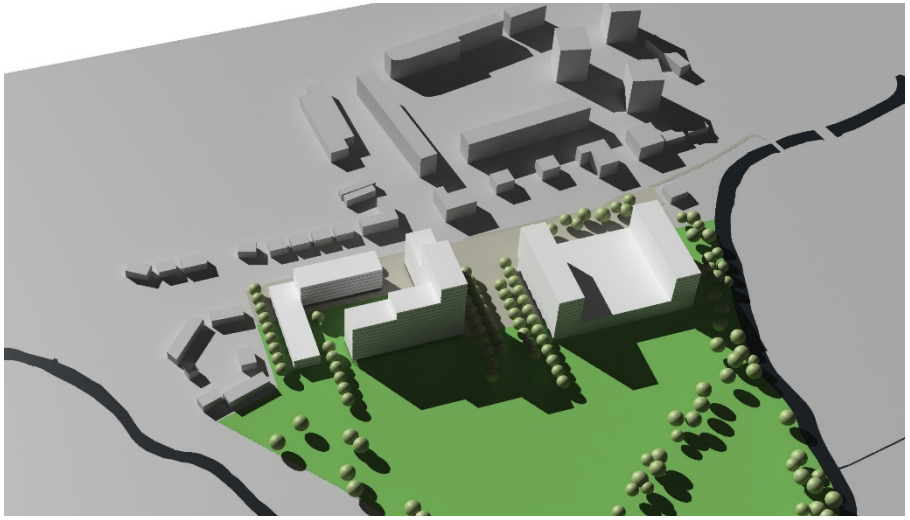
Proposed Building Footprint
9542 sqm

01 Courtyard scheme: sunlight

1000 21.03



1400 21.03



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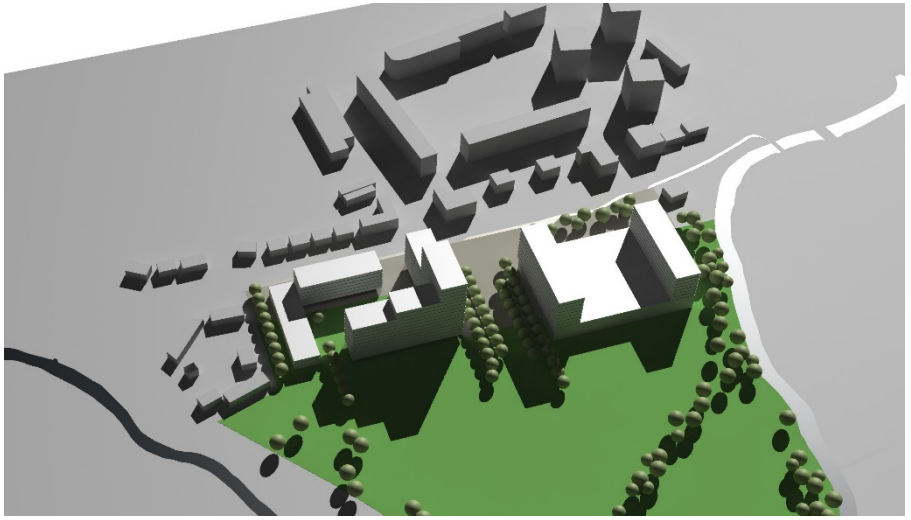


1400 21.03

02 Linear building scheme

Pros

- A series of alternating buildings, arranged to maximise views of green space and generate visual permeability to the park.
- Courtyard widths are the same as the single courtyard of Option 01.
- Gaps allow sun to penetrate and reduce overshadowing.
- Fewer north-facing dwellings.

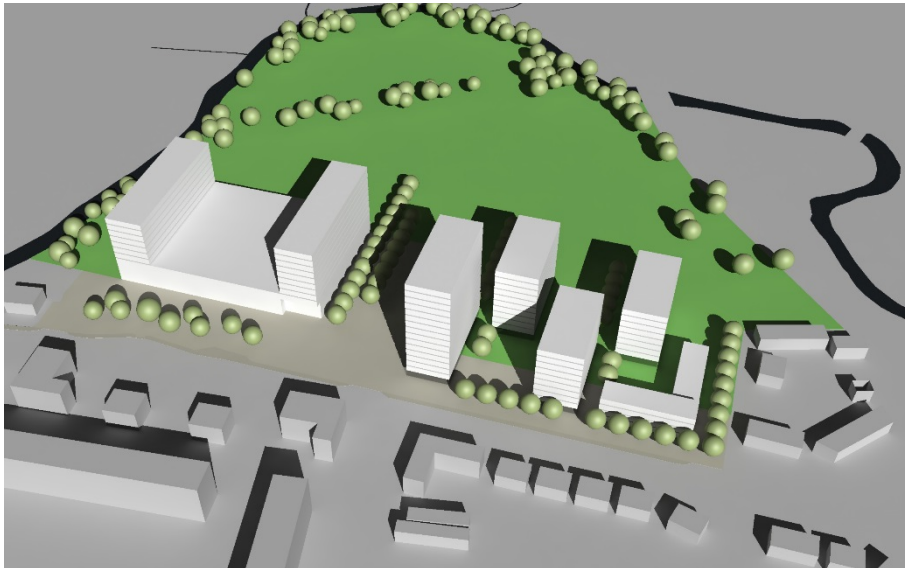
Cons

- Encroaches further north into MOL.
- Does not address the street as successfully as Option 1.
- The scheme is spatially fragmented and lacks any sense of boundary or clear definition, likely to result in less ownership by residents and a lack of community.
- Could be considered to represent a series of repetitive slab buildings with little relationship to surrounding context.
- Difficulties with overlooking between proposed blocks

Previous Developed Land (MOL)
14202 sqm

Proposed Building Footprint
9214 sqm

02 Linear blocks scheme: sunlight



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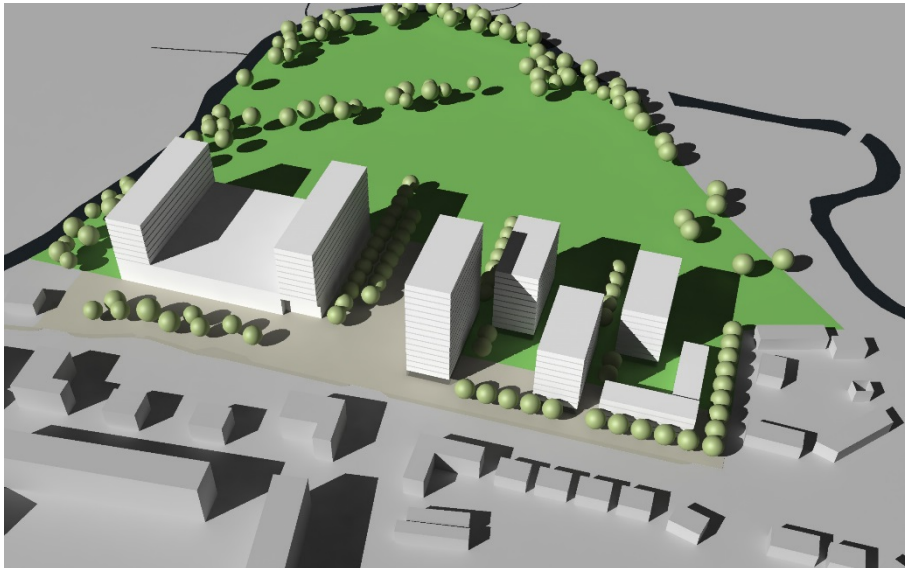

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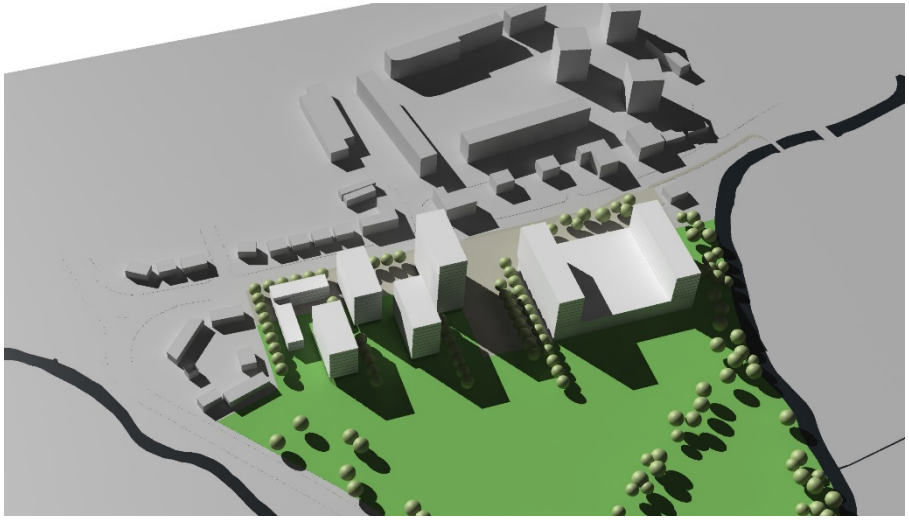

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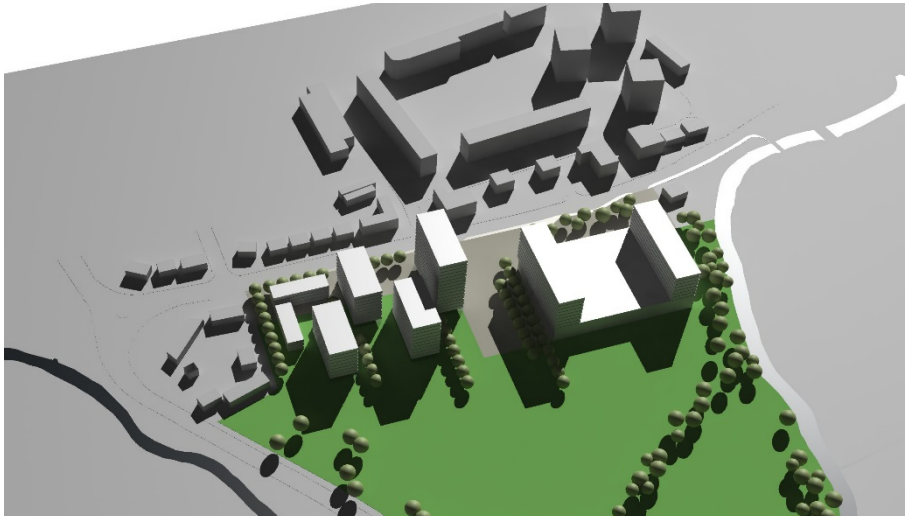
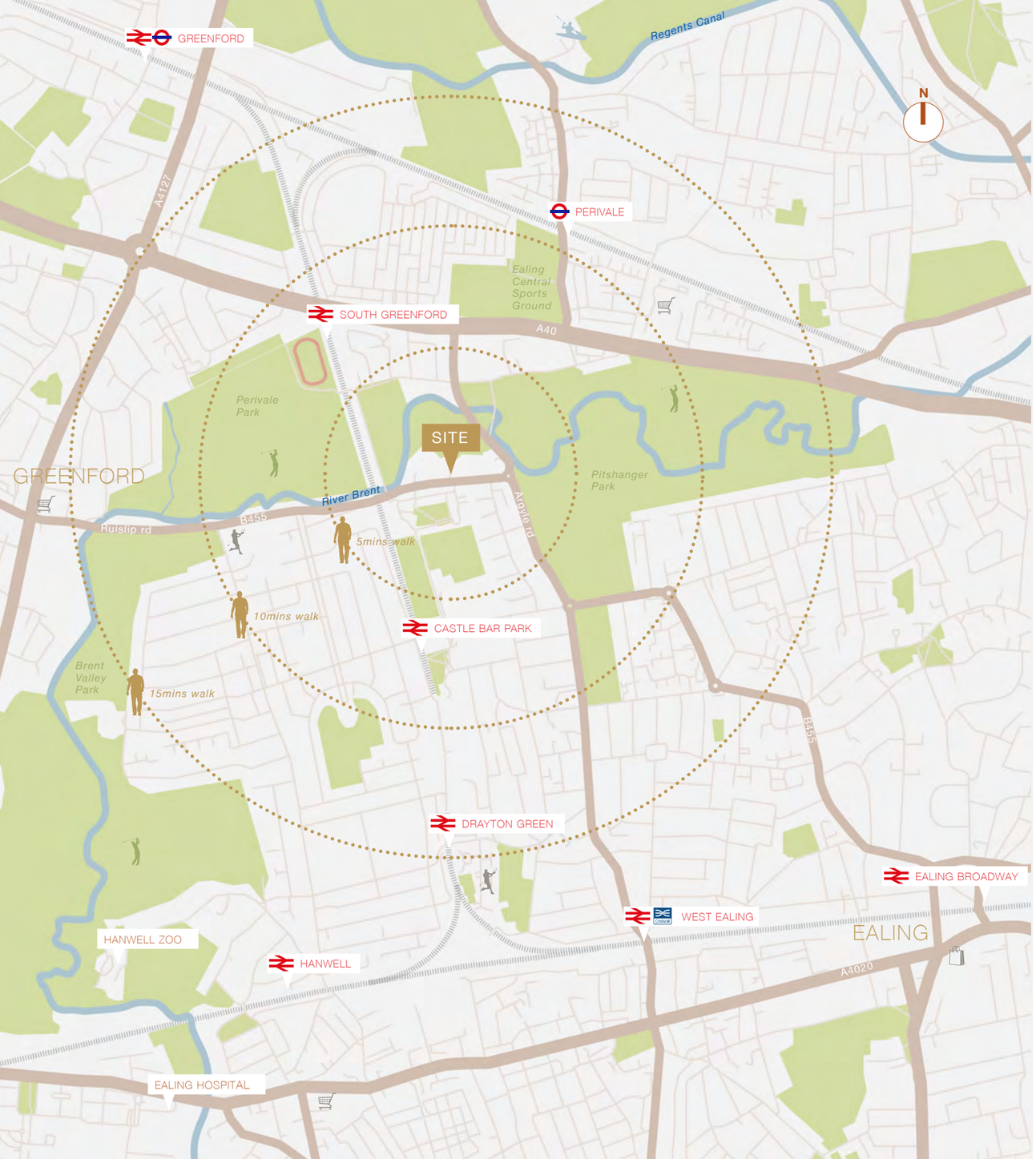


1400 21.03


Gurnell
ECOWORLD
INTERNATIONAL
CREATING TOMORROW & BEYOND
3D
REID

LOCAL AREA

Ealing has an abundance of green areas and both the Regents Canal and River Brent. Ealing Broadway is a centre for commerce and shopping.



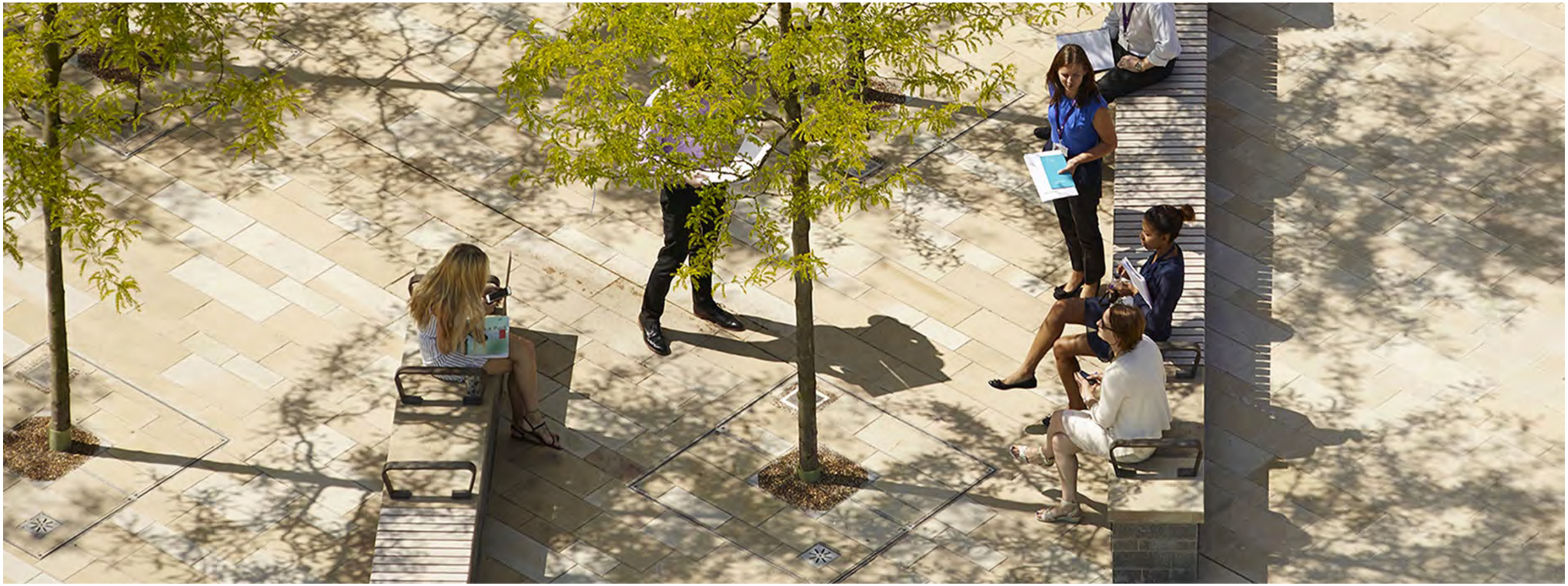
LOCATION & CONNECTIONS

A residential location with great links to the city. Surrounded by green spaces and sports facilities including the River Brent and Regents Canal

TAKE A STROLL	GET ON YOUR BIKE	RIDE THE BUS	HOP ON THE TRAIN & TUBE
CASTLE BAR PARK *10 mins*	CASTLE BAR PARK *3 mins*	PERIVALE *15 mins*	CASTLE BAR PARK to WEST EALING *5 mins*
SOUTH GREENFORD *15 mins*	SOUTH GREENFORD *5 mins*		
PERIVALE *20 mins*	PERIVALE *5 mins*	REGENTS CANAL *20 mins*	PERIVALE to OXFORD CIRCUS *25 mins*
GREENFORD CENTRE *18 mins*	REGENTS CANAL *7 mins*		
REGENTS CANAL *30 mins*	EALING BROADWAY *13 mins*	EALING BROADWAY *13 mins*	CASTLE BAR PARK to HEATHROW *45 mins*
EALING BROADWAY *40 mins*			

LIVING & PLAYING IN THE PARK

A space for leisure and relaxation, open green views and community facilities.



LIVING IN THE PUBLIC REALM

An extension of the home, to encourage wellbeing through social interaction, space and light.

GLA PARAMETERS

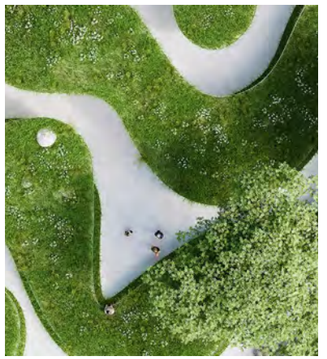
Parameters Scheme agreed in principle with the GLA in April 2018

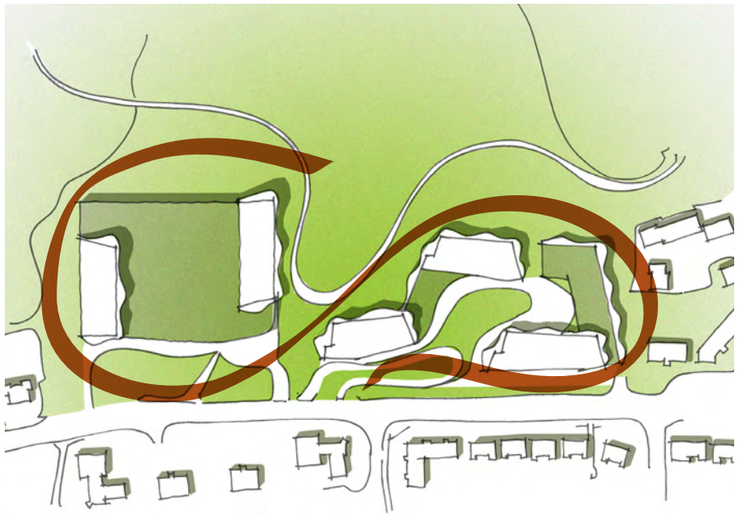
THE VISION

- New leisure centre with 50m pool, fun pool, fitness facilities and studios.
- Improved visibility and integration of the leisure centre within the setting.
- Panoramic views over a newly landscaped Gurnell Park stretching to the Brent River.
- Within the MOL green belt land and surrounded by green parks and outdoor sports and leisure facilities.
- Mix of PRS and open market sale homes.
- Park to include a Playground, BMX bike and skate boarding parks to enhance the local leisure offers.
- Light retail offer to support residents and visitors to the park

INSPIRATION & CONCEPT

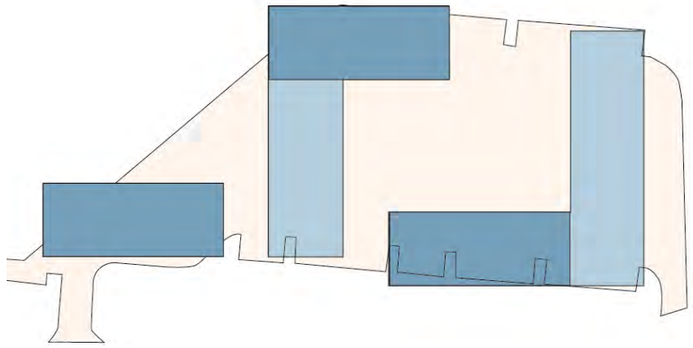
A sinuous ribbon that snakes through the development linking landscape, living and leisure.



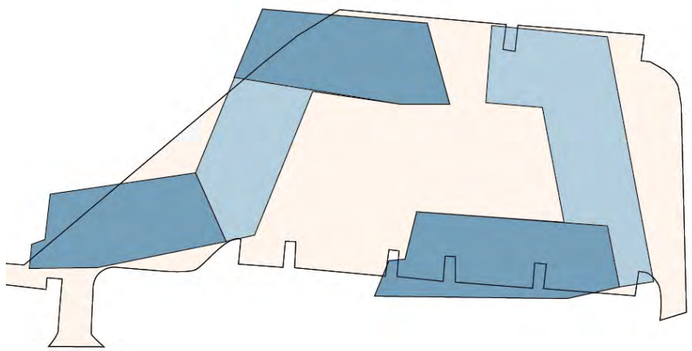


PLAN EVOLUTION

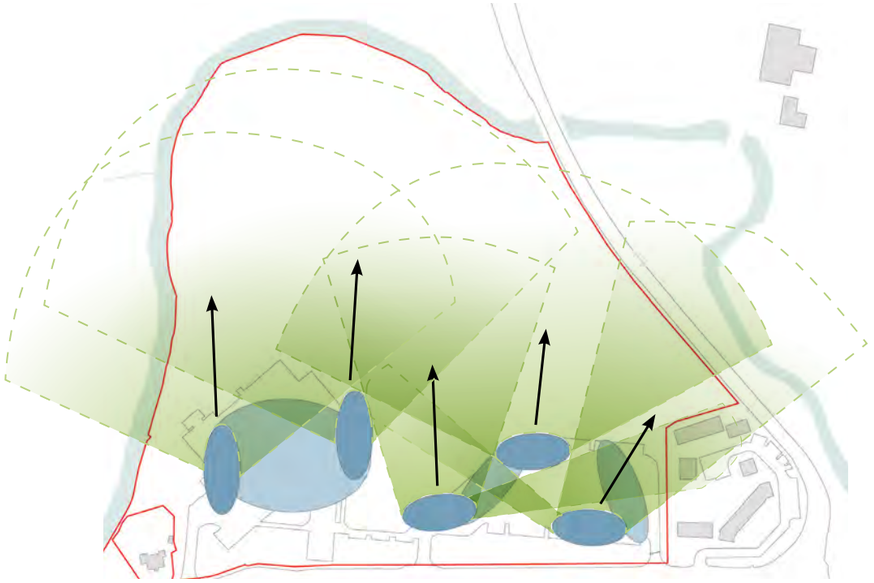
1. *Parameters Scheme agreed in principle with the GLA in April 2018*



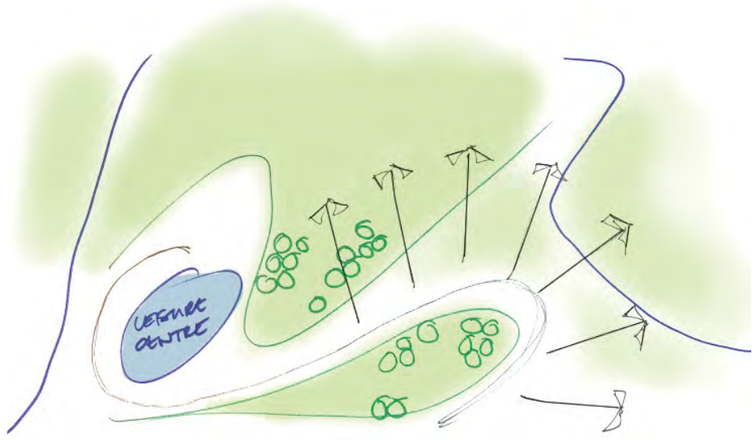
2. *Massing reduced through separating the buildings and adding a third high point*



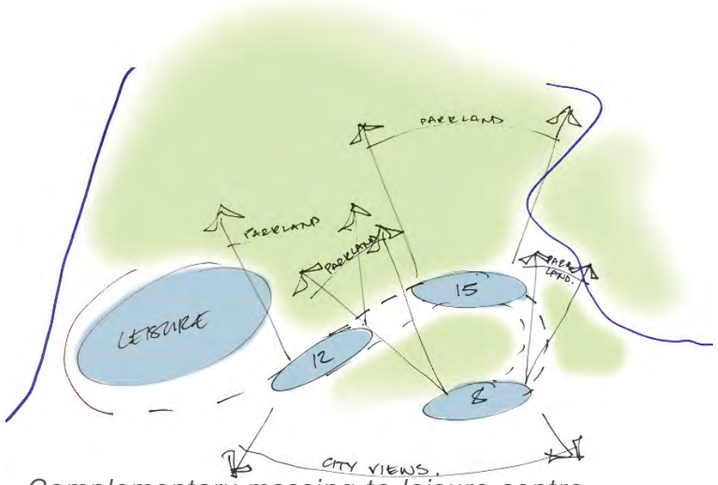
3. *Towers rotated to improve views.*



Parkland Views



Living and leisure within the park setting



Complementary massing to leisure centre

THE MASTERPLAN

PARAMETERS COMPARISON

- *More articulate distribution of massing*
- *Fewer single aspect units*
- *Fewer North facing units*
- *Neutral MOL land take*
- *Improved relationship with Peal Gardens*

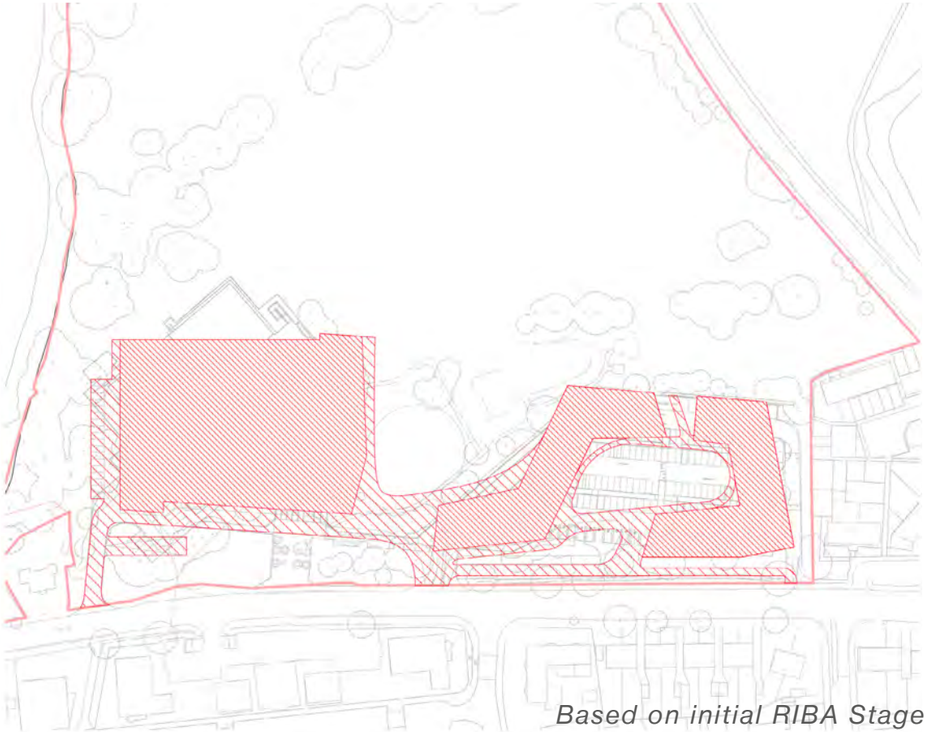
MOL COMPARISON

Existing GLC
3919 sqm

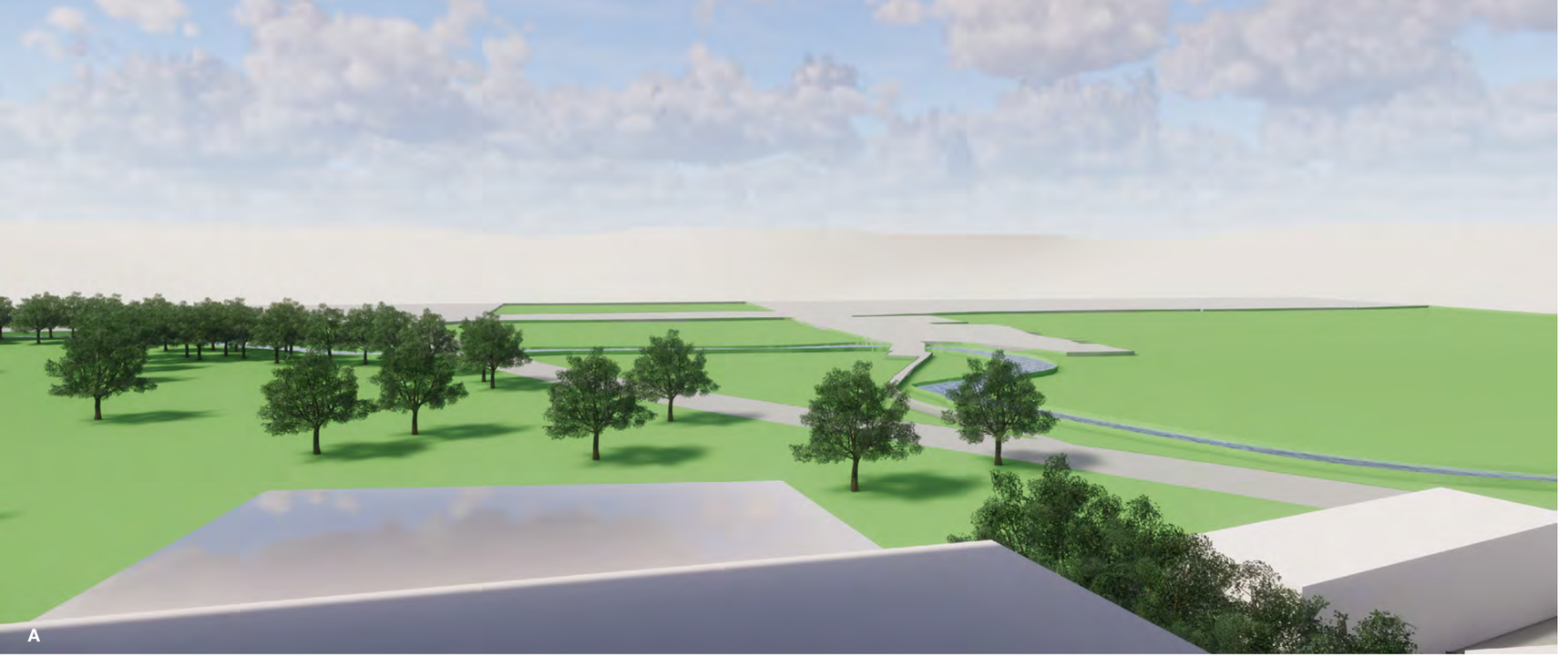
Existing Footprint
14202 sqm

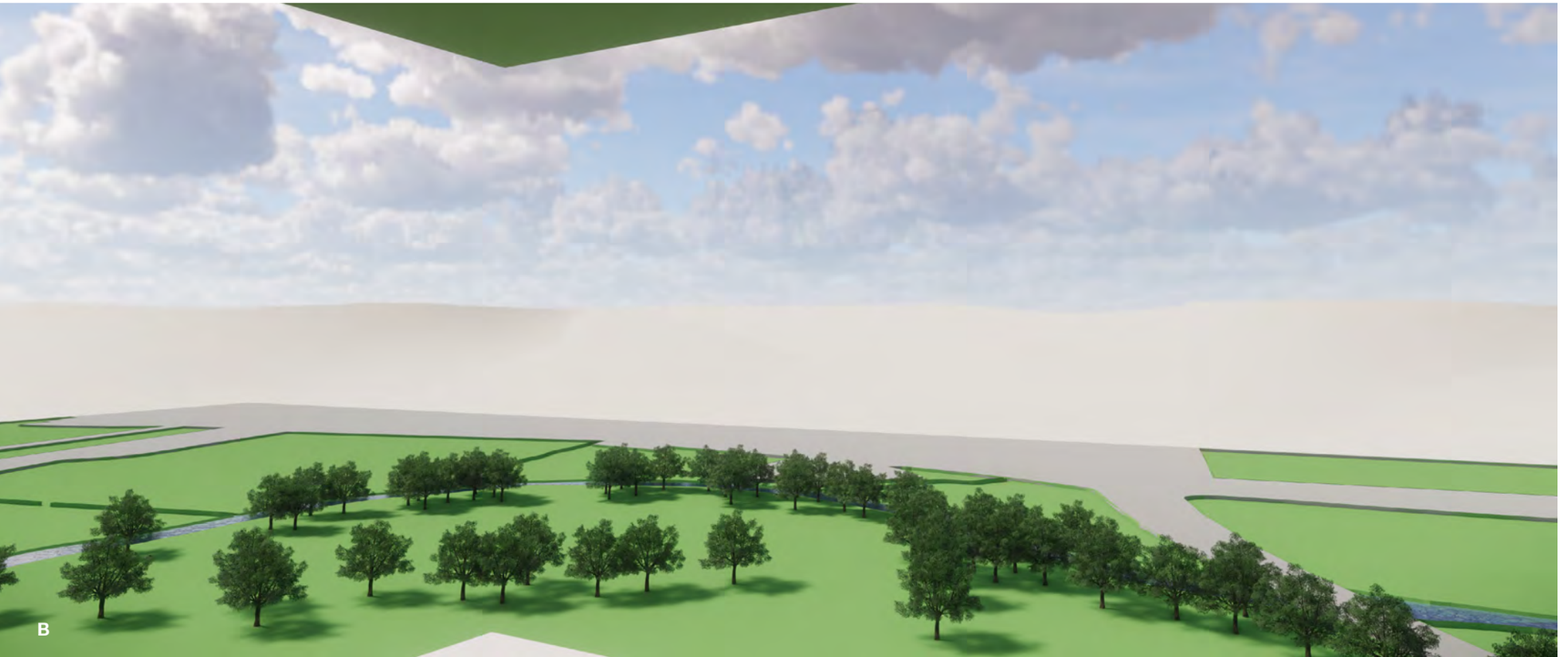
Proposed Building Footprint
9671 sqm

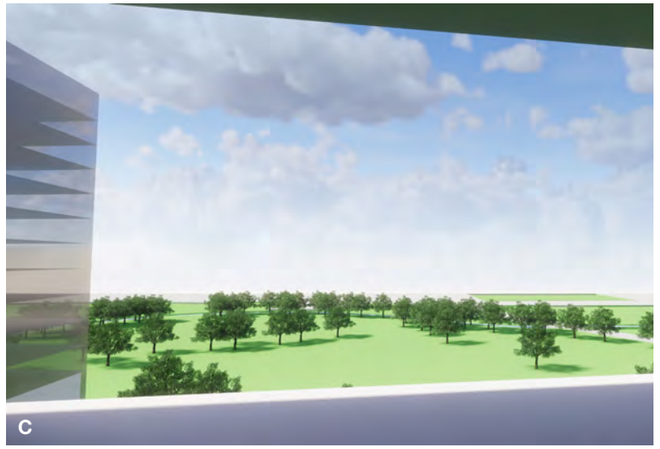
Total Proposed Footprint
14202 sqm

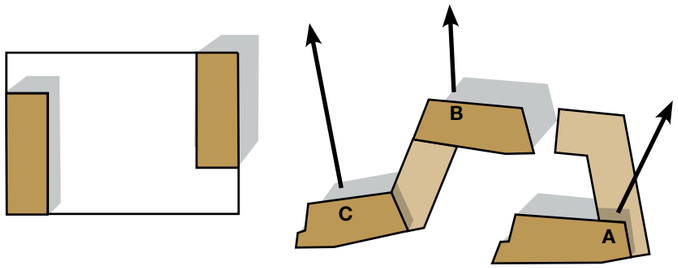


Based on initial RIBA Stage 1 analysis



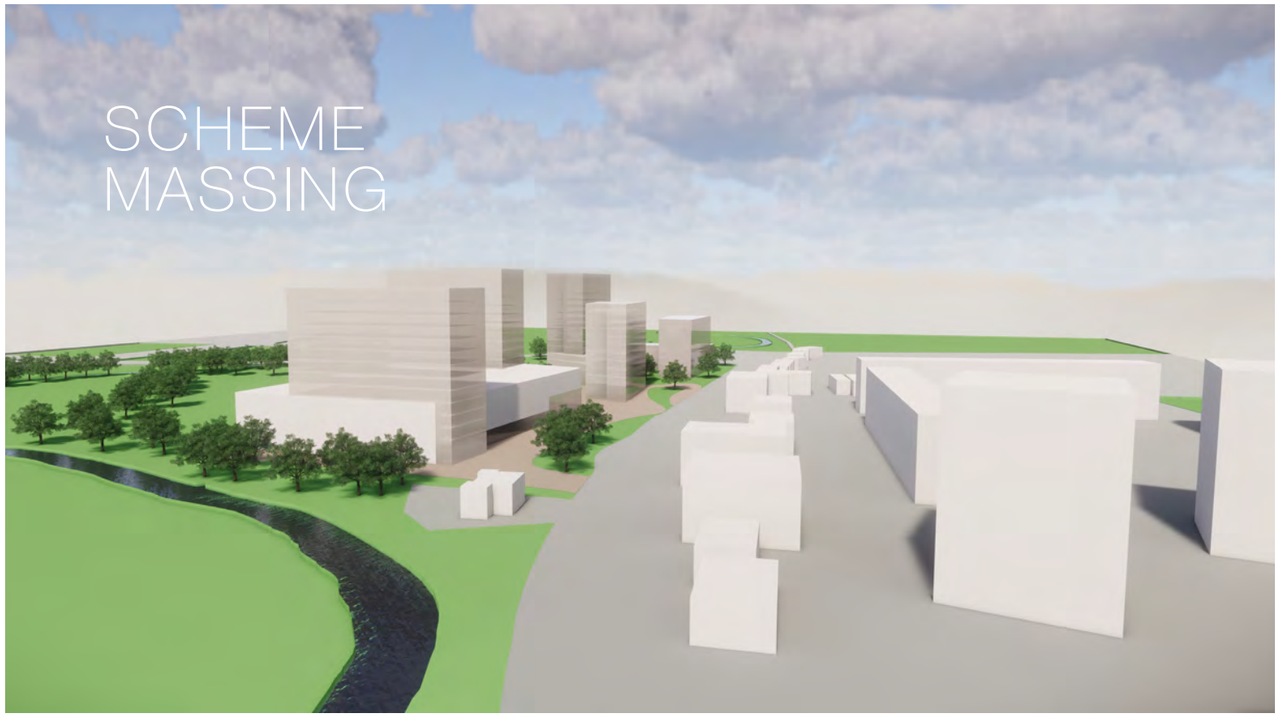


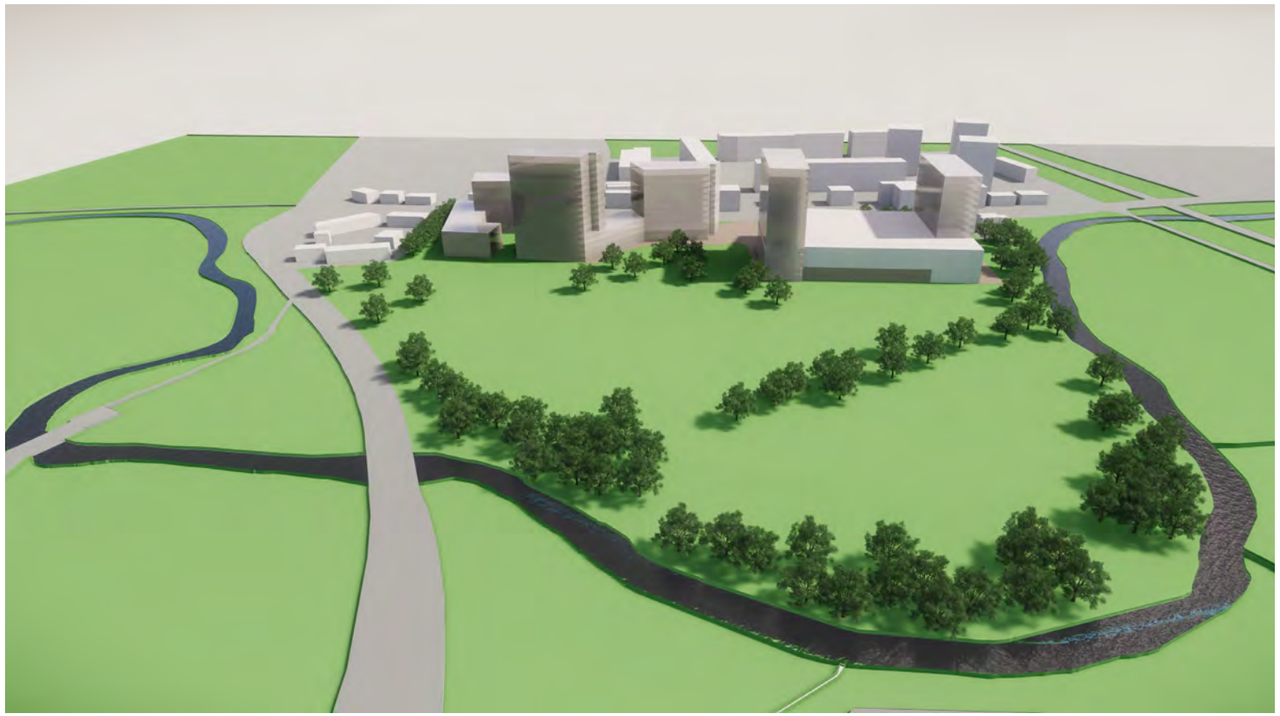


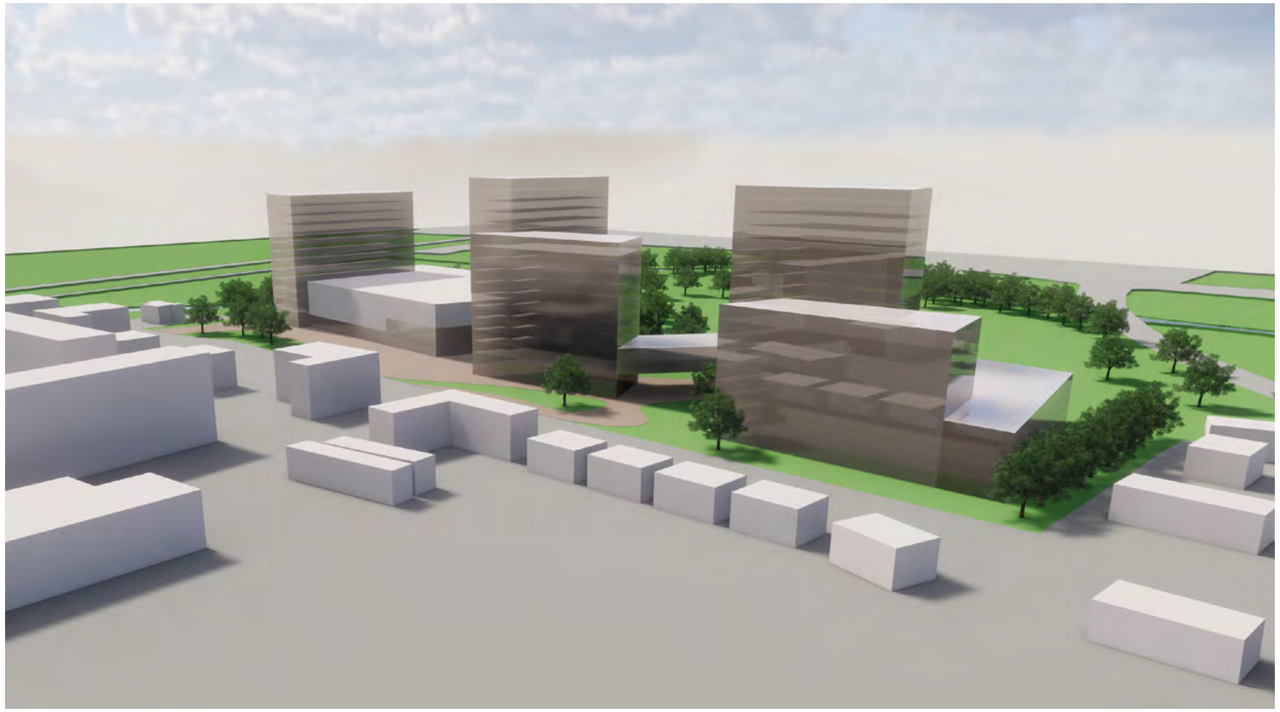


PARK VIEWS

SCHEME MASSING





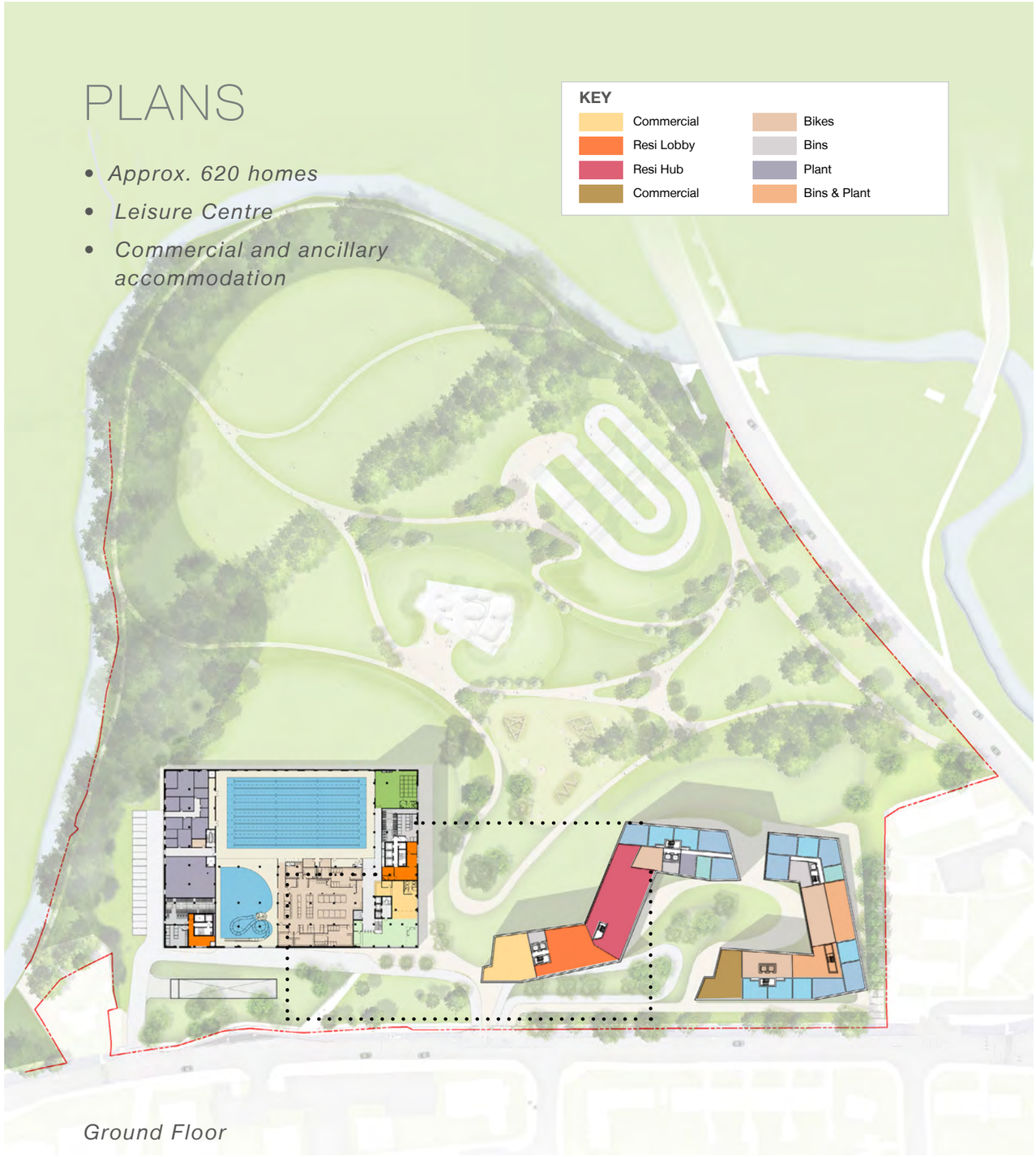


PLANS

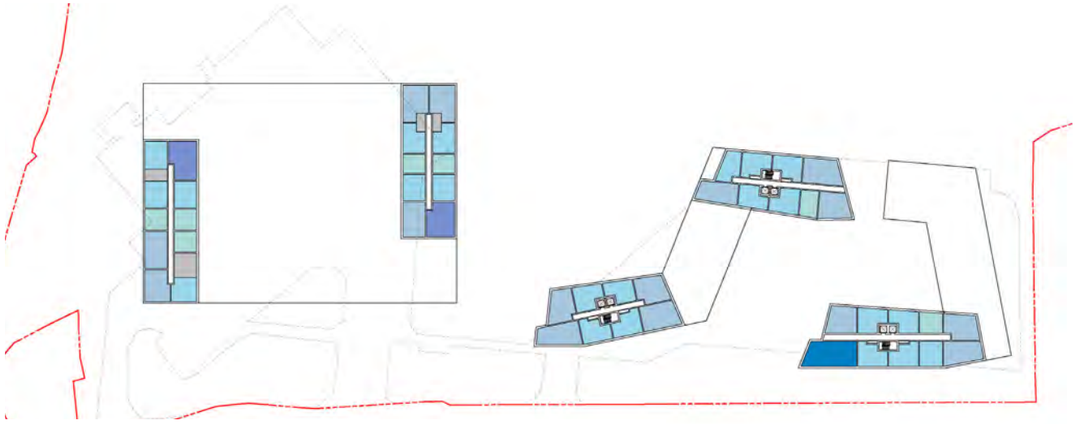
- *Approx. 620 homes*
- *Leisure Centre*
- *Commercial and ancillary accommodation*

KEY

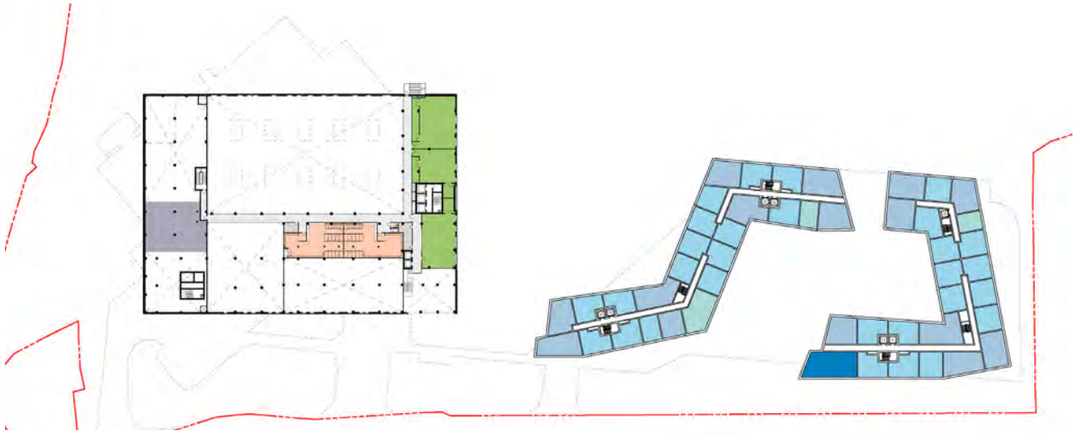
Commercial	Bikes
Resi Lobby	Bins
Resi Hub	Plant
Commercial	Bins & Plant



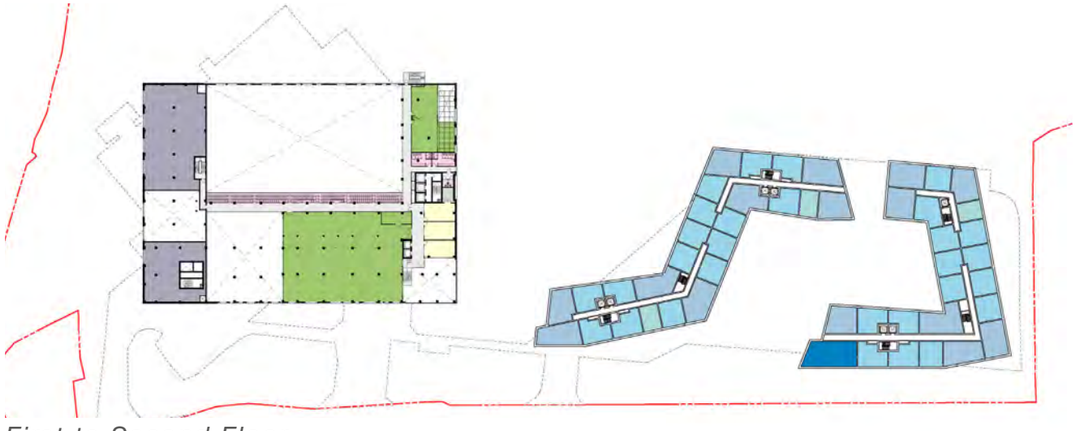
Ground Floor



Typical Upper Level

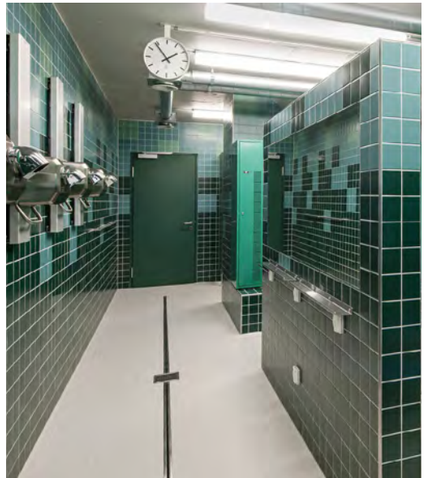


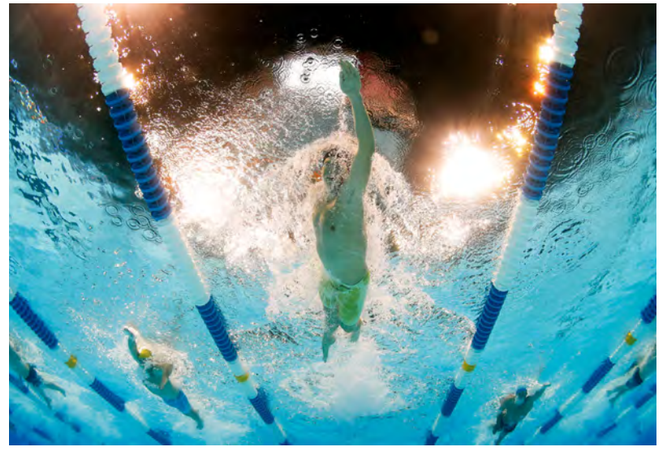
Third to Fourth Floor

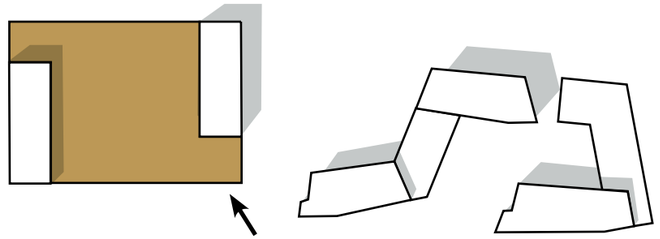


First to Second Floor

Bagneaux Swimming Pool

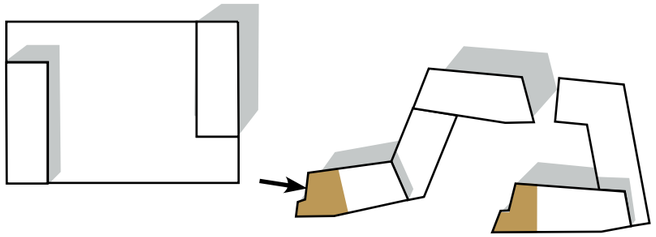




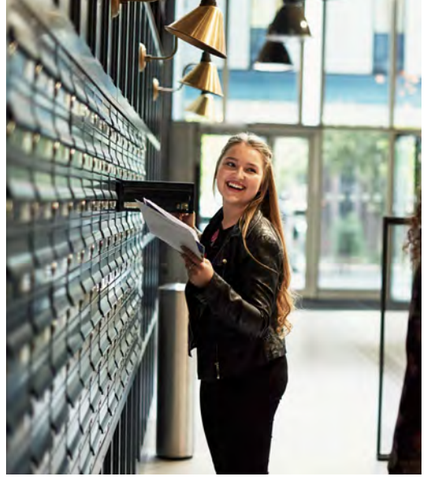


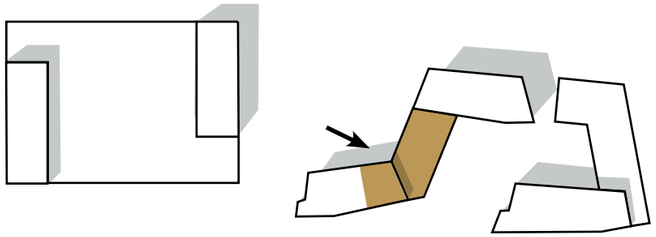
A NEW CENTRE FOR LEISURE

50m Olympic Size Pool
Fun Pool
Sauna and Steam Rooms
Changing Areas
Exercise Studios
Spin Bike Studios
Fitness Gym
Soft Play Area
Cafe



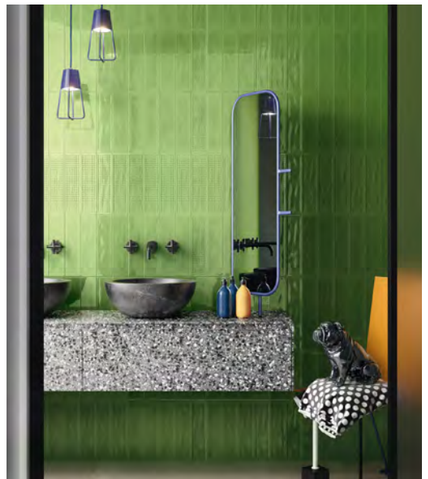
COMMERCIAL

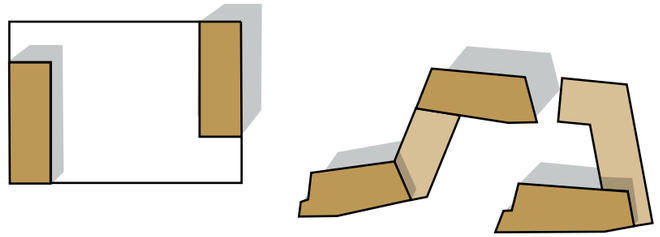




RESIDENTIAL AMENITIES

Security
Concierge
Letterbox and deliveries
Cafe Wifi
Community Areas



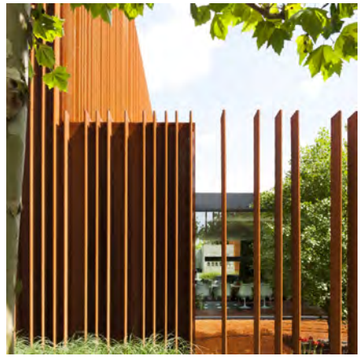


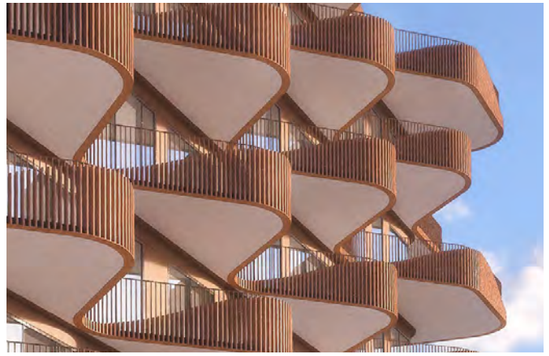
QUALITY HOMES

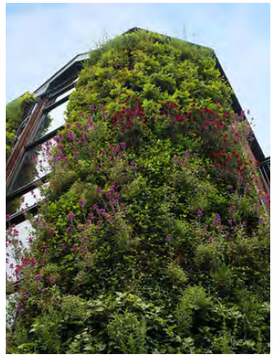
Balconies
Far reaching views
Quality materials
Healthy spaces with ventilation and light

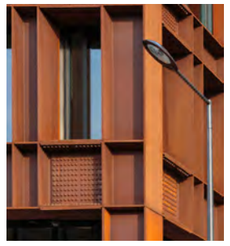
CONCEPT STYLE & MATERIALITY

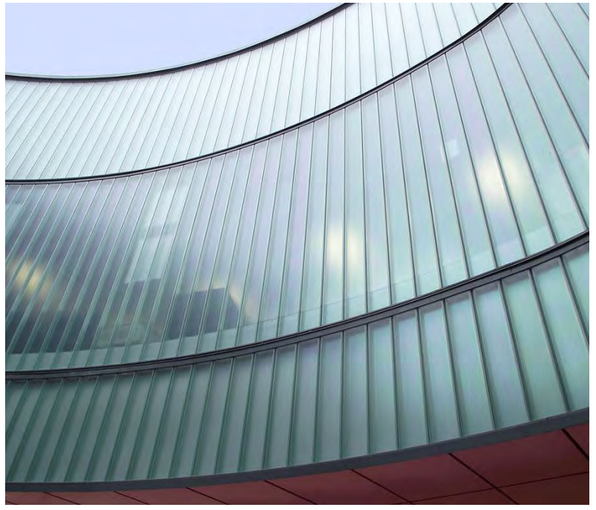
A palette of ecofriendly and natural materials. Organic shapes and sinuous lines. A plan that maximises views over the park.











Gurnell

Initial concept sketch

Gurnell Leisure Centre

Planning Application Summary Sheet (09/11/2018)

OVERVIEW	
Site Name	Gurnell Leisure Centre
Site Area (ha)	Site Area: 13.20ha - Developable area: 1.4218 ha
Site Location	• London Borough of Ealing; • Located on the north side of Ruislip Road East; • Bounded to the west by the railway and to the east by Argyle Road. The river Brent bisects through the centre of the site, with Stockdove Way bordering land to the very north. The residential dwellings of Peal Gardens bound the site to the south east alongside the junction of Ruislip Road East and Argyle Road.
PTAL	2-3 (2 within the site area, 3 for the developable area)
Applicant	BE:HERE EALING LIMITED
Description of Development	*"Demolition of all existing buildings and reprovision of leisure centre, car and coach parking, BMX track and skate park, a new public square and improvements to the existing park; and the erection of 497 sqm retail floorspace (Class A1/A3) and 613 residential units with associated landscaping, playspace, cycle and car parking, refuse storage, access and servicing"*
Introductory Paragraph for consultant reports	This document has been prepared by Barton Willmore LLP on behalf of BE:HERE EALING LIMITED ("the Applicant") in support of a Full Planning Application for the demolition of the existing Gurnell Leisure Centre ("the Application Site") and the construction of a new leisure centre alongside enabling residential uses. This planning application for the redevelopment of the Application Site seeks full planning permission for: ***"Demolition of all existing buildings and re-provision of leisure centre, car and coach parking, BMX track and skate park, alongside enhancements and access to the existing park; and the erection of up to 497sqm retail floorspace (Class A1-A3) and 613 residential units, with associated landscaping, playspace, cycle and car parking, refuse storage, access and servicing."*** (The Proposed Development). Gurnell Leisure Centre (GLC) opened in 1981 and is now one of London's busiest leisure centres, providing one of only four indoor 50m swimming pools in London. The number of users have been increasing in recent years, however the centre is in need of a significant level of repair and

	investment. Following a review of the options available and with an understanding that the cost of renovating the existing centre was prohibitive, in March 2015 the London Borough of Ealing (LBE) Cabinet made the decision to demolish the existing centre and replace it with a new state-of-the-art facility. The new leisure centre, designed to be a flagship facility of regional importance is proposed to be re-provided generally on the footprint of the existing leisure centre in order to mitigate impacts on the wider parkland, which is designated as Metropolitan Open Land (MOL). The leisure centre building will be part funded by LBE with the remaining cost be to funded through enabling residential development. These new residential units will be located both above the new leisure centre and generally within the footprint of the current adjacent car park, which is considered Previously Developed Land (PDL). Alongside the provision of a new flagship leisure centre and residential units, the adjacent open space and amenity provisions to the north will be enhanced for improved public use and access. The proposal therefore represents an opportunity to create a genuinely mixed-use and complementary development for use by not just the local community, but by residents throughout the borough and beyond.
RESIDENTIAL	
Total Residential Area	NIA: 36,805 sqm - GIA: 54,523 sqm - GEA: 54,789 sqm
Total Unit Number	613
Density (dph)	Based on developable area: • 431 units per hectare; • 843 habitable rooms per hectare • 651 bedrooms per hectare • 1165 bed spaces per hectare • Floor Area Ratio - 4.8 • Site Coverage Ratio – 0.7
Height	• Block A: 47m - 15 floors (GF + 14 Residential Levels) • Block B: 47m - 15 floors (GF + 14 Residential Levels) • Block C: 41m – 13 floors (GF + 12 Residential Levels) • Block D: 53m – 17 floors • Block E: 31m – 10 floors • Block F: 19m – 6 floors
Overall Dwelling Mix **combination of BtR and OMS*	
Studios	61 (10%)
1 bed	274 (44.7%)
2 bed	243 (39.6%)
3 bed	35 (5.7%)
Total	613
Car Parking	

Residential	• On street: 9 • Basement: 161 • Total No: 170	
Visitor	• On street: 5 drop-off - no parking	
Total	170 + 5 drop off	
Disabled Parking	21	
Cycle Parking		
Total Cycle Parking	• No spaces for Residents: 1028 • No spaces for Visitors: 17 • Total No: 1045	
Play Provision (sqm)		
0-5 years	TBC	
6-12 years	TBC	
12+ years	TBC	
Total	TBC	
NON RESIDENTIAL		
	Existing	**Proposed**
Floor Space Quantum (sqm)		
Leisure (D2)	5,460 sqm	• GIA (excluding plant & CP): – 7,847.8 sqm • GEA (excluding plant & CP): 10,823.2sqm • GEA: (including Plant – No Basement): 13,106 sqm
Retail (A1-A3)	N/A	• 497sqm (Café')
Car Parking		
Leisure (D2)	• On Carpark: /	• On street: / In basement: 176
Retail (A1-A3)	N/A	• On street: /
Total	/	176
Disabled Parking	/	12
Cycle Parking		
Total Cycle Parking		• No spaces for Customers: 79 • No spaces for Staff: 6 • Total No: 85 Cycle parking

GURNELL LEISURE CENTRE

FULL PLANNING APPLICATION

PROPOSED ACCOMMODATION SCHEDULE

DECEMBER 2018

ECOWORLD
INTERNATIONAL
CREATING TOMORROW & BEYOND

Ealing

20/12/18 **Area and Unit Schedule**

Building A

Total No of Units sqft	110	Perimeter	**116**		
Total NET Area sqm	6,356	Floor to Floor	**3**		
Total NET Area	68,416	Wall to floor ratio*	**0.47**		
NSA to GIA	**74%**	*Residential floors only			
NSA to GIA (Residential Floor)	**79%**				

Mix

1b1p	**24**	22%
1b2p	**32**	29%
2b3p	**34**	31%
2b4p	**10**	9%
3b4p	**0**	0%
3b5p	**10**	9%

Plot Number	Building	Level	Unit Type	Studio	1 Bed	2 Bed		3 Bed	3 Bed	NSA (sqm)	Circulation	Total	Dual Aspect	North Aspect	GIA	GEA
				1b1p_s	1b2p	2b3p_s	2b4p	3b4p	3b5p							
	BA	Gnd													314	332
Level Totals											34.00	34.00	0	0	314	332
001	BA	1st	Type B		62.00					62.00						
002	BA	1st	Type C			62.00				62.00			x			
003	BA	1st	Type L		47.00					47.00						
004	BA	1st	Type E	40.00						40.00						
005	BA	1st	Type D		58.00					58.00						
Level Totals				1	3	1	0	0	0	269.00	57.00	326.00	1	0	463	490
006	BA	2nd	Type B		62.00					62.00						
007	BA	2nd	Type C			62.00				62.00			x			
008	BA	2nd	Type L		47.00					47.00						
009	BA	2nd	Type E	40.00						40.00						
010	BA	2nd	Type D		58.00					58.00						
Level Totals				1	3	1	0	0	0	269.00	57.00	326.00	1	0	379	490
011	BA	3rd	Type B		62.00					62.00						
012	BA	3rd	Type C			62.00				62.00			x			
013	BA	3rd	Type L		47.00					47.00						
014	BA	3rd	Type E	40.00						40.00						
015	BA	3rd	Type D		58.00					58.00						
Level Totals				1	3	1	0	0	0	269.00	57.00	326.00	1	0	379	402
016	BA	4th	Type B		62.00					62.00						
017	BA	4th	Type C			62.00				62.00			x			
018	BA	4th	Type L		47.00					47.00						
019	BA	4th	Type E	40.00						40.00						
020	BA	4th	Type D		58.00					58.00						
Level Totals				1	3	1	0	0	0	269.00	57.00	326.00	1	0	379	402
021	BA	5th	Type F						89.00	89.00			x			
022	BA	5th	Type G			68.00				68.00			x			
023	BA	5th	Type H				70.00			70.00						
024	BA	5th	Type E	40.00						40.00						
025	BA	5th	Type C			62.00				62.00			x			
026	BA	5th	Type C			62.00				62.00			x			
027	BA	5th	Type L		47.00					47.00						
028	BA	5th	Type E	40.00						40.00						
029	BA	5th	Type A		50.00					50.00						
Level Totals				2	2	3	1	0	1	528.00	74.00	602.00	4	0	668	738
030	BA	6th	Type F						89.00	89.00			x			
031	BA	6th	Type G			68.00				68.00			x			
032	BA	6th	Type H				70.00			70.00						
033	BA	6th	Type E	40.00						40.00						
034	BA	6th	Type C			62.00				62.00			x			
035	BA	6th	Type C			62.00				62.00			x			
036	BA	6th	Type L		47.00					47.00						
037	BA	6th	Type E	40.00						40.00						
038	BA	6th	Type A		50.00					50.00						
Level Totals				2	2	3	1	0	1	528.00	74.00	602.00	4	0	668	738
039	BA	7th	Type F						89.00	89.00			x			
040	BA	7th	Type G			68.00				68.00			x			
041	BA	7th	Type H				70.00			70.00						
042	BA	7th	Type E	40.00						40.00						
043	BA	7th	Type C			62.00				62.00			x			
044	BA	7th	Type C			62.00				62.00			x			
045	BA	7th	Type L		47.00					47.00						
046	BA	7th	Type E	40.00						40.00						
047	BA	7th	Type A		50.00					50.00						
Level Totals				2	2	3	1	0	1	528.00	74.00	602.00	4	0	668	738
048	BA	8th	Type F						89.00	89.00			x			
049	BA	8th	Type G			68.00				68.00			x			
050	BA	8th	Type H				70.00			70.00						
051	BA	8th	Type E	40.00						40.00						
052	BA	8th	Type C			62.00				62.00			x			
053	BA	8th	Type C			62.00				62.00			x			
054	BA	8th	Type L		47.00					47.00						
055	BA	8th	Type E	40.00						40.00						
056	BA	8th	Type A		50.00					50.00						
Level Totals				2	2	3	1	0	1	528.00	74.00	602.00	4	0	668	738
057	BA	9th	Type F						89.00	89.00			x			
058	BA	9th	Type G			68.00				68.00			x			
059	BA	9th	Type H				70.00			70.00						
060	BA	9th	Type E	40.00						40.00						
061	BA	9th	Type C			62.00				62.00			x			
062	BA	9th	Type C			62.00				62.00			x			
063	BA	9th	Type L		47.00					47.00						
064	BA	9th	Type E	40.00						40.00						

065	BA	9th	Type A		50.00					50.00						
Level Totals				2	2	3	1	0	1	528.00	74.00	602.00	4	0	668	738
066	BA	10th	Type F						89.00	89.00			x			
067	BA	10th	Type G			68.00				68.00			x			
068	BA	10th	Type H				70.00			70.00						
069	BA	10th	Type E	40.00						40.00						
070	BA	10th	Type C			62.00				62.00			x			
071	BA	10th	Type C			62.00				62.00			x			
072	BA	10th	Type L		47.00					47.00						
073	BA	10th	Type E	40.00						40.00						
074	BA	10th	Type A		50.00					50.00						
Level Totals				2	2	3	1	0	1	528.00	74.00	602.00	4	0	668	738
075	BA	11th	Type F						89.00	89.00			x			
076	BA	11th	Type G			68.00				68.00			x			
077	BA	11th	Type H				70.00			70.00						
078	BA	11th	Type E	40.00						40.00						
079	BA	11th	Type C			62.00				62.00			x			
080	BA	11th	Type C			62.00				62.00			x			
081	BA	11th	Type L		47.00					47.00						
082	BA	11th	Type E	40.00						40.00						
083	BA	11th	Type A		50.00					50.00						
Level Totals				2	2	3	1	0	1	528.00	74.00	602.00	4	0	668	738
084	BA	12th	Type F						89.00	89.00			x			
085	BA	12th	Type G			68.00				68.00			x			
086	BA	12th	Type H				70.00			70.00						
087	BA	12th	Type E	40.00						40.00						
088	BA	12th	Type C			62.00				62.00			x			
089	BA	12th	Type C			62.00				62.00			x			
090	BA	12th	Type L		47.00					47.00						
091	BA	12th	Type E	40.00						40.00						
092	BA	12th	Type A		50.00					50.00						
Level Totals				2	2	3	1	0	1	528.00	74.00	602.00	4	0	668	738
093	BA	13th	Type F						89.00	89.00			x			
094	BA	13th	Type G			68.00				68.00			x			
095	BA	13th	Type H				70.00			70.00						
096	BA	13th	Type E	40.00						40.00						
097	BA	13th	Type C			62.00				62.00			x			
098	BA	13th	Type C			62.00				62.00			x			
099	BA	13th	Type L		47.00					47.00						
100	BA	13th	Type E	40.00						40.00						
101	BA	13th	Type A		50.00					50.00						
Level Totals				2	2	3	1	0	1	528.00	74.00	602.00	4	0	668	738
102	BA	14th	Type F						89.00	89.00			x			
103	BA	14th	Type G			68.00				68.00			x			
104	BA	14th	Type H				70.00			70.00						
105	BA	14th	Type E	40.00						40.00						
106	BA	14th	Type C			62.00				62.00			x			
107	BA	14th	Type C			62.00				62.00			x			
108	BA	14th	Type L		47.00					47.00						
109	BA	14st	Type E	40.00						40.00						
110	BA	14nd	Type A		50.00					50.00						
Level Totals				2	2	3	1	0	1	528.00	74.00	602.00	4	0	668	738
TOTAL				**24**	**32**	**44**		**0**	**10**	**6,356**	**1,002**	**7,324**	**44**	**0**	**8,594**	**9,496**

20/12/18 **Area and Unit Schedule**

Building B

Total No of Units sqft	102	Perimeter	**109**		
Total NET Area sqm	5,488	Floor to Floor	**3**		
Total NET Area	59,073	Wall to floor ratio*	**0.49**		
NSA to GIA	**71%**	*Residential floors only			
NSA to GIA (Residential Floor)	**79%**				

Mix

1b1p	**20**	20%
1b2p	**48**	47%
2b3p	**14**	14%
2b4p	**20**	20%
3b4p	**0**	0%
3b5p	**0**	0%

Plot Number	Building	Level	Unit Type	Studio	1 Bed	2 Bed		3 Bed	3 Bed	NSA (sqm)	Circulation	Total	Dual Aspect	North Aspect	GIA	GEA
				1b1p_s	1b2p	2b3p_s	2b4p	3b4p	3b5p							
	BB	Gnd														
Level Totals											49	49.00	0	0	299	317
111	BB	1st	Type I		53.00					53.00				x		
112	BB	1st	Type J			62.00				62.00			x			
113	BB	1st	Type L		47.00					47.00						
Level Totals				0	2	1	0	0	0	162.00	41.00	203.00	1	1	318	337
114	BB	2nd	Type I		53.00					53.00				x		
115	BB	2nd	Type J			62.00				62.00			x			
116	BB	2nd	Type L		47.00					47.00						
Level Totals				0	2	1	0	0	0	162.00	41.00	203.00	1	2	318	337
117	BB	3rd	Type I		53.00					53.00				x		
118	BB	3rd	Type J			62.00				62.00			x			
119	BB	3rd	Type L		47.00					47.00						
Level Totals				0	2	1	0	0	0	162.00	41.00	203.00	1	3	318	337
120	BB	4th	Type I		53.00					53.00				x		
121	BB	4th	Type J			62.00				62.00			x			
122	BB	4th	Type L		47.00					47.00						
Level Totals				0	2	1	0	0	0	162.00	41.00	203.00	1	3	318	337
123	BB	5th	Type I		53.00					53.00			x			
124	BB	5th	Type J			62.00				62.00			x			
125	BB	5th	Type L		47.00					47.00						
126	BB	5th	Type E	40.00						40.00						
127	BB	5th	Type A		50.00					50.00						
128	BB	5th	Type K				71.00			71.00			x			
129	BB	5th	Type K				71.00			71.00			x			
130	BB	5th	Type A		50.00					50.00						
131	BB	5th	Type E	40.00						40.00						
Level Totals				2	4	1	2	0	0	484.00	64.00	548.00	4	0	614	669
132	BB	6th	Type I		53.00					53.00			x			
133	BB	6th	Type J			62.00				62.00			x			
134	BB	6th	Type L		47.00					47.00						
135	BB	6th	Type E	40.00						40.00						
136	BB	6th	Type A		50.00					50.00						
137	BB	6th	Type K				71.00			71.00			x			
138	BB	6th	Type K				71.00			71.00			x			
139	BB	6th	Type A		50.00					50.00						
140	BB	6th	Type E	40.00						40.00						
Level Totals				2	4	1	2	0	0	484.00	64.00	548.00	4	0	614	669
141	BB	7th	Type I		53.00					53.00			x			
142	BB	7th	Type J			62.00				62.00			x			
143	BB	7th	Type L		47.00					47.00						
144	BB	7th	Type E	40.00						40.00						
145	BB	7th	Type A		50.00					50.00						
146	BB	7th	Type K				71.00			71.00			x			
147	BB	7th	Type K				71.00			71.00			x			
148	BB	7th	Type A		50.00					50.00						
149	BB	7th	Type E	40.00						40.00						
Level Totals				2	4	1	2	0	0	484.00	64.00	548.00	4	0	614	669
150	BB	8th	Type I		53.00					53.00			x			
151	BB	8th	Type J			62.00				62.00			x			
152	BB	8th	Type L		47.00					47.00						
153	BB	8th	Type E	40.00						40.00						
154	BB	8th	Type A		50.00					50.00						
155	BB	8th	Type K				71.00			71.00			x			
156	BB	8th	Type K				71.00			71.00			x			
157	BB	8th	Type A		50.00					50.00						
158	BB	8th	Type E	40.00						40.00						
Level Totals				2	4	1	2	0	0	484.00	64.00	548.00	4	0	614	669
159	BB	9th	Type I		53.00					53.00			x			
160	BB	9th	Type J			62.00				62.00			x			
161	BB	9th	Type L		47.00					47.00						
162	BB	9th	Type E	40.00						40.00						
163	BB	9th	Type A		50.00					50.00						
164	BB	9th	Type K				71.00			71.00			x			
165	BB	9th	Type K				71.00			71.00			x			
166	BB	9th	Type A		50.00					50.00						
167	BB	9th	Type E	40.00						40.00						
Level Totals				2	4	1	2	0	0	484.00	64.00	548.00	4	0	614	669
168	BB	10th	Type I		53.00					53.00			x			
169	BB	10th	Type J			62.00				62.00			x			
170	BB	10th	Type L		47.00					47.00						
171	BB	10th	Type E	40.00						40.00						
172	BB	10th	Type A		50.00					50.00						
173	BB	10th	Type K				71.00			71.00			x			

174	BB	10th	Type K				71.00			71.00			x			
175	BB	10th	Type A		50.00					50.00						
176	BB	10th	Type E	40.00						40.00						
Level Totals				2	4	1	2	0	0	484.00	64.00	548.00	4	0	614	669
177	BB	11th	Type I		53.00					53.00			x			
178	BB	11th	Type J			62.00				62.00			x			
179	BB	11th	Type L		47.00					47.00						
180	BB	11th	Type E	40.00						40.00						
181	BB	11th	Type A		50.00					50.00						
182	BB	11th	Type K				71.00			71.00			x			
183	BB	11th	Type K				71.00			71.00			x			
184	BB	11th	Type A		50.00					50.00						
185	BB	11th	Type E	40.00						40.00						
Level Totals				2	4	1	2	0	0	484.00	64.00	548.00	4	0	614	669
186	BB	12th	Type I		53.00					53.00			x			
187	BB	12th	Type J			62.00				62.00			x			
188	BB	12th	Type L		47.00					47.00						
189	BB	12th	Type E	40.00						40.00						
190	BB	12th	Type A		50.00					50.00						
191	BB	12th	Type K				71.00			71.00			x			
192	BB	12th	Type K				71.00			71.00			x			
193	BB	12th	Type A		50.00					50.00						
194	BB	12th	Type E	40.00						40.00						
Level Totals				2	4	1	2	0	0	484.00	64.00	548.00	4	0	614	669
195	BB	13th	Type I		53.00					53.00			x			
196	BB	13th	Type J			62.00				62.00			x			
197	BB	13th	Type L		47.00					47.00						
198	BB	13th	Type E	40.00						40.00						
199	BB	13th	Type A		50.00					50.00						
200	BB	13th	Type K				71.00			71.00			x			
201	BB	13th	Type K				71.00			71.00			x			
202	BB	13th	Type A		50.00					50.00						
203	BB	13th	Type E	40.00						40.00						
Level Totals				2	4	1	2	0	0	484.00	64.00	548.00	4	0	614	669
204	BB	14th	Type I		53.00					53.00			x			
205	BB	14th	Type J			62.00				62.00						
206	BB	14th	Type L		47.00					47.00						
207	BB	14th	Type E	40.00						40.00						
208	BB	14th	Type A		50.00					50.00						
209	BB	14th	Type K				71.00			71.00			x			
210	BB	14th	Type K				71.00			71.00			x			
211	BB	14th	Type A		50.00					50.00						
212	BB	14th	Type E	40.00						40.00						
Level Totals				2	4	1	2	0	0	484.00	64.00	548.00	3	0	614	669
TOTAL				**20**	**48**	**34**		**0**	**0**	**5,488**	**853**	**6,292**	**43**	**4**	**7,711**	**8,355**

20/12/18 **Area and Unit Schedule**

Building C

Total No of Units sqft	104	Perimeter	**119.2**
Total NET Area sqm	6,369	Floor to Floor	**3.075**
Total NET Area	68,556	Wall to floor ratio*	**0.55**
NSA to GIA	**73%**	*Based on the typ Tower Level	
NSA to GIA (Residential Floor)	**83%**		

Mix

Studios	**0**	0%
1b2p	**57**	55%
2b3p	**4**	4%
2b4p	**36**	35%
3b4p	**0**	0%
3b5p	**7**	7%

Plot Number	Building	Level	Unit Type	Studio	1 Bed	2 Bed		3 Bed	3 Bed	NSA (sqm)	Circulation	Total	Dual Aspect	North Aspect	GIA	GEA
				1p	1b2p	2b3p_s	2b4p	3b4p	3b5p							
	BC	Gnd														
Level Totals										0.00	51.00				839	931
	BC	1st														
Level Totals				0	0	0	0	0	0	0.00	34.00				230	931
213	BC	2nd	Type 01				70.00			70.00			x			
214	BC	2nd	Type 11		50.00					50.00				x		
215	BC	2nd	Type 12		51.00					51.00				x		
216	BC	2nd	Type 13			68.00				68.00				x		
217	BC	2nd	Type 15				86.00			86.00						
218	BC	2nd	Type 14				70.00			70.00						
219	BC	2nd	Type 17		50.00					50.00						
220	BC	2nd	Type 17		50.00					50.00						
221	BC	2nd	Type 18		50.00					50.00						
222	BC	2nd	Type 08		50.00					50.00						
223	BC	2nd	Type 08		50.00					50.00						
224	BC	2nd	Type 19				72.00			72.00			x			
Level Totals				0	7	1	4	0	0	717.00	71.00	788.00	2	3	868	931
225	BC	3rd	Type 01				70.00			70.00			x			
226	BC	3rd	Type 11		50.00					50.00				x		
227	BC	3rd	Type 12		51.00					51.00				x		
228	BC	3rd	Type 13			68.00				68.00				x		
229	BC	3rd	Type 15				86.00			86.00						
230	BC	3rd	Type 14				70.00			70.00						
231	BC	3rd	Type 17		50.00					50.00						
232	BC	3rd	Type 17		50.00					50.00						
233	BC	3rd	Type 18		50.00					50.00						
234	BC	3rd	Type 08		50.00					50.00						
235	BC	3rd	Type 08		50.00					50.00						
236	BC	3rd	Type 19				72.00			72.00			x			
Level Totals				0	7	1	4	0	0	717.00	71.00	788.00	2	3	868	931
237	BC	4th	Type 01				70.00			70.00			x			
238	BC	4th	Type 11		50.00					50.00				x		
239	BC	4th	Type 12		51.00					51.00				x		
240	BC	4th	Type 13			68.00				68.00				x		
241	BC	4th	Type 15				86.00			86.00						
242	BC	4th	Type 14				70.00			70.00						
243	BC	4th	Type 17		50.00					50.00						
244	BC	4th	Type 17		50.00					50.00						
245	BC	4th	Type 18		50.00					50.00						
246	BC	4th	Type 08		50.00					50.00						
247	BC	4th	Type 08		50.00					50.00						
248	BC	4th	Type 19				72.00			72.00			x			
Level Totals				0	7	1	4	0	0	717.00	71.00	788.00	2	3	868	931
249	BC	5th	Type 01				70.00			70.00			x			
250	BC	5th	Type 11		50.00					50.00				x		
251	BC	5th	Type 12		51.00					51.00				x		
252	BC	5th	Type 13			68.00				68.00				x		
253	BC	5th	Type 15				86.00			86.00						
254	BC	5th	Type 14				70.00			70.00						
255	BC	5th	Type 17		50.00					50.00						
256	BC	5th	Type 17		50.00					50.00						
257	BC	5th	Type 18		50.00					50.00						
258	BC	5th	Type 08		50.00					50.00						
259	BC	5th	Type 08		50.00					50.00						
260	BC	5th	Type 19				72.00			72.00			x			
Level Totals				0	7	1	4	0	0	717.00	71.00	788.00	2	3	868	931
261	BC	6th	Type 01				70.00			70.00			x			
262	BC	6th	Type 11		50.00					50.00				x		
263	BC	6th	Type 12		51.00					51.00				x		
264	BC	6th	Type 20		57.00					57.00			x			
265	BC	6th	Type 21						89.00	89.00			x			
266	BC	6th	Type 08		50.00					50.00						
267	BC	6th	Type 08		50.00					50.00						
268	BC	6th	Type 19				72.00			72.00			x			
Level Totals				0	5	0	2	0	1	489.00	57.00	546.00	4	2	606	662
269	BC	7th	Type 01				70.00			70.00			x			
270	BC	7th	Type 11		50.00					50.00				x		
271	BC	7th	Type 12		51.00					51.00				x		
272	BC	7th	Type 22				70.00			70.00			x			
273	BC	7th	Type 21						89.00	89.00			x			
274	BC	7th	Type 08		50.00					50.00						
275	BC	7th	Type 08		50.00					50.00						
276	BC	7th	Type 19				72.00			72.00			x			
Level Totals				0	4	0	3	0	1	502.00	45.50	547.50	4	2	606	662
277	BC	8th	Type 01				70.00			70.00			x			
278	BC	8th	Type 11		50.00					50.00				x		

279	BC	8th	Type 12		51.00					51.00				x			
280	BC	8th	Type 22				70.00			70.00			x				
281	BC	8th	Type 21						89.00	89.00			x				
282	BC	8th	Type 08		50.00					50.00							
283	BC	8th	Type 08		50.00					50.00							
284	BC	8th	Type 19				72.00			72.00			x				
Level Totals				0	4	0	3	0	1	502.00	45.50	547.50	4	2	606	662	
285	BC	9th	Type 01				70.00			70.00			x				
286	BC	9th	Type 11		50.00					50.00				x			
287	BC	9th	Type 12		51.00					51.00				x			
288	BC	9th	Type 22				70.00			70.00			x				
289	BC	9th	Type 21						89.00	89.00			x				
290	BC	9th	Type 08		50.00					50.00							
291	BC	9th	Type 08		50.00					50.00							
292	BC	9th	Type 19				72.00			72.00			x				
Level Totals				0	4	0	3	0	1	502.00	45.50	547.50	4	2	606	662	
293	BC	10th	Type 01				70.00			70.00			x				
294	BC	10th	Type 11		50.00					50.00				x			
295	BC	10th	Type 12		51.00					51.00				x			
296	BC	10th	Type 22				70.00			70.00			x				
297	BC	10th	Type 21						89.00	89.00			x				
298	BC	10th	Type 08		50.00					50.00							
299	BC	10th	Type 08		50.00					50.00							
300	BC	10th	Type 19				72.00			72.00			x				
Level Totals				0	4	0	3	0	1	502.00	45.50	547.50	4	2	606	662	
301	BC	11th	Type 01				70.00			70.00			x				
302	BC	11th	Type 11		50.00					50.00				x			
303	BC	11th	Type 12		51.00					51.00				x			
304	BC	11th	Type 22				70.00			70.00			x				
305	BC	11th	Type 21						89.00	89.00			x				
306	BC	11th	Type 08		50.00					50.00							
307	BC	11th	Type 08		50.00					50.00							
308	BC	11th	Type 19				72.00			72.00			x				
Level Totals				0	4	0	3	0	1	502.00	45.50	547.50	4	2	606	662	
309	BC	12th	Type 01				70.00			70.00			x				
310	BC	12th	Type 11		50.00					50.00				x			
311	BC	12th	Type 12		51.00					51.00				x			
312	BC	12th	Type 22				70.00			70.00			x				
313	BC	12th	Type 21						89.00	89.00			x				
314	BC	12th	Type 08		50.00					50.00							
315	BC	12th	Type 08		50.00					50.00							
316	BC	12th	Type 19				72.00			72.00			x				
Level Totals				0	4	0	3	0	1	502.00	45.50	547.50	4	2	606	662	
TOTAL				**0**	**57**	**40**		**0**	**7**	**6,369**	**699**	**6,983**	**36**	**26**	**8,783**	**10,220**	

20/12/18 **Area and Unit Schedule**

Building D

Total No of Units sqft	158	Perimeter	**124**		
Total NET Area sqm	9,775	Floor to Floor	**3.075**		
Total NET Area	105,218	Wall to floor ratio*	**0.52**		
NSA to GIA	**78%**	*Based on the typ Tower Level			
NSA to GIA (Residential Floor)	**82%**				

Mix

Studios	**15**	9%
1b2p	**66**	42%
2b3p	**1**	1%
2b4p	**58**	37%
3b4p	**1**	1%
3b5p	**17**	11%

Plot Number	Building	Level	Unit Type	Studio	1 Bed	2 Bed		3 Bed	3 Bed	NSA (sqm)	Circulation	Total	Dual Aspect	North Aspect	GIA	GEA
				1p	1b2p	2b3p_s	2b4p	3b4p	3b5p							
317	BD	Gnd	Type 01				70.00			70.00			x			
318	BD	Gnd	Type 05		50					50.00				x		
319	BD	Gnd	Type 05		50					50.00				x		
320	BD	Gnd	Type 02						86	86.00			x			
321	BD	Gnd	Type 03					84		84.00			x			
Level Totals				0	2	0	1	1	1	340.00	98.00	438.00	3	2	849	914
322	BD	1st	Type 01				70.00			70.00			x			
323	BD	1st	Type 05		50.00					50.00				x		
324	BD	1st	Type 05		50.00					50.00				x		
325	BD	1st	Type 02						86.00	86.00			x			
326	BD	1st	Type 06				70.00			70.00			x			
327	BD	1st	Type 04		52.00					52.00						
328	BD	1st	Type 09				80.00			80.00						
329	BD	1st	Type 14				70.00			70.00						
330	BD	1st	Type 14				70.00			70.00			x			
331	BD	1st	Type 10		50.00					50.00			x			
Level Totals				0	4	0	5	0	1	648.00	80.40	728.40	5	2	849	914
332	BD	2nd	Type 01				70.00			70.00			x			
333	BD	2nd	Type 05		50.00					50.00				x		
334	BD	2nd	Type 05		50.00					50.00				x		
335	BD	2nd	Type 02						86.00	86.00			x			
336	BD	2nd	Type 06				70.00			70.00			x			
337	BD	2nd	Type 07	37.00						37.00						
338	BD	2nd	Type 04		52.00					52.00						
339	BD	2nd	Type 09				80.00			80.00						
340	BD	2nd	Type 14				70.00			70.00						
341	BD	2nd	Type 14				70.00			70.00						
342	BD	2nd	Type 10		50.00					50.00						
Level Totals				1	4	0	5	0	1	685.00	80.40	765.40	3	6	849	914
343	BD	3rd	Type 01				70.00			70.00			x			
344	BD	3rd	Type 05		50.00					50.00				x		
345	BD	3rd	Type 05		50.00					50.00				x		
346	BD	3rd	Type 02						86.00	86.00			x			
347	BD	3rd	Type 06				70.00			70.00			x			
348	BD	3rd	Type 07	37.00						37.00						
349	BD	3rd	Type 04		52.00					52.00						
350	BD	3rd	Type 09				80.00			80.00						
351	BD	3rd	Type 14				70.00			70.00						
352	BD	3rd	Type 14				70.00			70.00						
353	BD	3rd	Type 10		50.00					50.00						
Level Totals				1	4	0	5	0	1	685.00	80.40	765.40	3	4	849	914
354	BD	4th	Type 01				70.00			70.00			x			
355	BD	4th	Type 05		50.00					50.00				x		
356	BD	4th	Type 05		50.00					50.00				x		
357	BD	4th	Type 02						86.00	86.00			x			
358	BD	4th	Type 06				70.00			70.00			x			
359	BD	4th	Type 07	37.00						37.00						
360	BD	4th	Type 04		52.00					52.00						
361	BD	4th	Type 09				80.00			80.00						
362	BD	4th	Type 14				70.00			70.00						
363	BD	4th	Type 14				70.00			70.00						
364	BD	4th	Type 10		50.00					50.00						
Level Totals				1	4	0	5	0	1	685.00	80.40	765.40	3	4	849	914
365	BD	5th	Type 01				70.00			70.00			x			
366	BD	5th	Type 05		50.00					50.00				x		
367	BD	5th	Type 05		50.00					50.00				x		
368	BD	5th	Type 02						86.00	86.00			x			
369	BD	5th	Type 06				70.00			70.00			x			
370	BD	5th	Type 07	37.00						37.00						
371	BD	5th	Type 04		52.00					52.00						
372	BD	5th	Type 09				80.00			80.00						
373	BD	5th	Type 14				70.00			70.00						
374	BD	5th	Type 14				70.00			70.00						
375	BD	5th	Type 10		50.00					50.00						
Level Totals				1	4	0	5	0	1	685.00	80.40	765.40	3	4	849	914
376	BD	6th	Type 01				70.00			70.00			x			
377	BD	6th	Type 05		50.00					50.00				x		
378	BD	6th	Type 05		50.00					50.00				x		
379	BD	6th	Type 02						86.00	86.00			x			
380	BD	6th	Type 06				70.00			70.00			x			
381	BD	6th	Type 07	37.00						37.00						
382	BD	6th	Type 04		52.00					52.00						
383	BD	6th	Type 04		52.00					52.00						
384	BD	6th	Type 16			60.00				60.00			x			

Level Totals				1	4	1	2	0	1	527.00	75.30	602.30	4	2	676	737
385	BD	7th	Type 01				70.00			70.00			x			
386	BD	7th	Type 05		51.00					51.00				x		
387	BD	7th	Type 05		51.00					51.00				x		
388	BD	7th	Type 02						90.00	90.00			x			
389	BD	7th	Type 06				72.00			72.00			x			
390	BD	7th	Type 07	37.00						37.00						
391	BD	7th	Type 08		53.00					53.00						
392	BD	7th	Type 08		53.00					53.00						
393	BD	7th	Type 19				75.00			75.00			x			
Level Totals				1	4	0	3	0	1	552.00	64.30	616.30	4	2	676	737
394	BD	8th	Type 01				70.00			70.00			x			
395	BD	8th	Type 05		51.00					51.00				x		
396	BD	8th	Type 05		51.00					51.00				x		
397	BD	8th	Type 02						90.00	90.00			x			
398	BD	8th	Type 06				72.00			72.00			x			
399	BD	8th	Type 07	37.00						37.00						
400	BD	8th	Type 08		53.00					53.00						
401	BD	8th	Type 08		53.00					53.00						
402	BD	8th	Type 19				75.00			75.00			x			
Level Totals				1	4	0	3	0	1	552.00	64.30	616.30	4	2	676	737
403	BD	9th	Type 01				70.00			70.00			x			
404	BD	9th	Type 05		51.00					51.00				x		
405	BD	9th	Type 05		51.00					51.00				x		
406	BD	9th	Type 02						90.00	90.00			x			
407	BD	9th	Type 06				72.00			72.00			x			
408	BD	9th	Type 07	37.00						37.00						
409	BD	9th	Type 08		53.00					53.00						
410	BD	9th	Type 08		53.00					53.00						
411	BD	9th	Type 19				75.00			75.00			x			
Level Totals				1	4	0	3	0	1	552.00	64.30	616.30	4	2	676	737
412	BD	10th	Type 01				70.00			70.00			x			
413	BD	10th	Type 05		51.00					51.00				x		
414	BD	10th	Type 05		51.00					51.00				x		
415	BD	10th	Type 02						90.00	90.00			x			
416	BD	10th	Type 06				72.00			72.00			x			
417	BD	10th	Type 07	37.00						37.00						
418	BD	10th	Type 08		53.00					53.00						
419	BD	10th	Type 08		53.00					53.00						
420	BD	10th	Type 19				75.00			75.00			x			
Level Totals				1	4	0	3	0	1	552.00	64.30	616.30	4	2	676	737
421	BD	11th	Type 01				70.00			70.00			x			
422	BD	11th	Type 05		51.00					51.00				x		
423	BD	11th	Type 05		51.00					51.00				x		
424	BD	11th	Type 02						90.00	90.00			x			
425	BD	11th	Type 06				72.00			72.00			x			
426	BD	11th	Type 07	37.00						37.00						
427	BD	11th	Type 08		53.00					53.00						
428	BD	11th	Type 08		53.00					53.00						
429	BD	11th	Type 19				75.00			75.00			x			
Level Totals				1	4	0	3	0	1	552.00	64.30	616.30	4	2	676	737
430	BD	12th	Type 01				70.00			70.00			x			
431	BD	12th	Type 05		51.00					51.00				x		
432	BD	12th	Type 05		51.00					51.00				x		
433	BD	12th	Type 02						90.00	90.00			x			
434	BD	12th	Type 06				72.00			72.00			x			
435	BD	12th	Type 07	37.00						37.00						
436	BD	12th	Type 08		53.00					53.00						
437	BD	12th	Type 08		53.00					53.00						
438	BD	12th	Type 19				75.00			75.00			x			
Level Totals				1	4	0	3	0	1	552.00	64.30	616.30	4	2	676	737
439	BD	13th	Type 01				70.00			70.00			x			
440	BD	13th	Type 05		51.00					51.00				x		
441	BD	13th	Type 05		51.00					51.00				x		
442	BD	13th	Type 02						90.00	90.00			x			
443	BD	13th	Type 06				72.00			72.00			x			
444	BD	13th	Type 07	37.00						37.00						
445	BD	13th	Type 08		53.00					53.00						
446	BD	13th	Type 08		53.00					53.00						
447	BD	13th	Type 19				75.00			75.00			x			
Level Totals				1	4	0	3	0	1	552.00	64.30	616.30	4	2	676	737
448	BD	14th	Type 01				70.00			70.00			x			
449	BD	14th	Type 05		51.00					51.00				x		
450	BD	14th	Type 05		51.00					51.00				x		
451	BD	14th	Type 02						90.00	90.00			x			
452	BD	14th	Type 06				72.00			72.00			x			
453	BD	14th	Type 07	37.00						37.00						
454	BD	14th	Type 08		53.00					53.00						
455	BD	14th	Type 08		53.00					53.00						
456	BD	14th	Type 19				75.00			75.00			x			
Level Totals				1	4	0	3	0	1	552.00	64.30	616.30	4	2	676	737
457	BD	15th	Type 01				70.00			70.00			x			
458	BD	15th	Type 05		51.00					51.00				x		
459	BD	15th	Type 05		51.00					51.00				x		
460	BD	15th	Type 02						90.00	90.00			x			
461	BD	15th	Type 06				72.00			72.00			x			
462	BD	15th	Type 07	37.00						37.00						
463	BD	15th	Type 08		53.00					53.00						
464	BD	15th	Type 08		53.00					53.00						

465	BD	15th	Type 19				75.00			75.00			x			
Level Totals				1	4	0	3	0	1	552.00	64.30	616.30	4	2	676	737
466	BD	16th	Type 01				70.00			70.00			x			
467	BD	16th	Type 05		51.00					51.00				x		
468	BD	16th	Type 05		51.00					51.00				x		
469	BD	16th	Type 02						90.00	90.00			x			
470	BD	16th	Type 06				72.00			72.00			x			
471	BD	16th	Type 07	37.00						37.00						
472	BD	16th	Type 08		53.00					53.00						
473	BD	16th	Type 08		53.00					53.00						
474	BD	16th	Type 19				75.00			75.00			x			
Level Totals				1	4	0	3	0	1	552.00	64.30	616.30	4	2	676	737
TOTAL				**15**	**66**	**59**		**1**	**17**	**9,775**	**1,218**	**10,993**	**64**	**34**	**12,530**	**13,591**

20/12/18 **Area and Unit Schedule**

Building E

Total No of Units sqft	87	Perimeter	**97.6**		
Total NET Area sqm	5,362	Floor to Floor	**3.075**		
Total NET Area	57,717	Wall to floor ratio*	**0.58**		
NSA to GIA	**70%**	*Based on the typ Tower Level			
NSA to GIA (Residential Floor)	**83%**				

Mix

Studios	**0**	0%
1b2p	**43**	49%
2b3p	**0**	0%
2b4p	**44**	51%
3b4p	**0**	0%
3b5p	**0**	0%

Plot Number	Building	Level	Unit Type	Studio	1 Bed	2 Bed		3 Bed	3 Bed	NSA (sqm)	Circulation	Total	Dual Aspect	North Aspect	GIA	GEA
				1p	1b2p	2b3p_s	2b4p	3b4p	3b5p							
	BE	Gnd														
Level Totals				0	0	0	0	0	0	0.00	98.00	98.00	0	0	997	1069
475	BE	1st	Type 31		59.00					59.00						
476	BE	1st	Type 14				70.00			70.00						
477	BE	1st	Type 33				70.00			70.00						
478	BE	1st	Type 34				70.00			70.00			x			
479	BE	1st	Type 18		50.00					50.00						
480	BE	1st	Type 18		50.00					50.00						
481	BE	1st	Type 28		51.00					51.00						
482	BE	1st	Type 08		50.00					50.00						
483	BE	1st	Type 11		50.00					50.00				x		
484	BE	1st	Type 29		54.00					54.00				x		
485	BE	1st	Type 30				92.00			92.00						
Level Totals				0	7	0	4	0	0	574.00	95.00	669.00	1	2	845	1068
486	BE	2nd	Type 31		59.00					59.00						
487	BE	2nd	Type 14				70.00			70.00						
488	BE	2nd	Type 33				70.00			70.00						
489	BE	2nd	Type 34				70.00			70.00			x			
490	BE	2nd	Type 18		50.00					50.00						
491	BE	2nd	Type 18		50.00					50.00						
492	BE	2nd	Type 28		51.00					51.00						
493	BE	2nd	Type 08		50.00					50.00						
494	BE	2nd	Type 19				72.00			72.00			x			
495	BE	2nd	Type 01				70.00			70.00			x			
496	BE	2nd	Type 11		50.00					50.00				x		
497	BE	2nd	Type 29		54.00					54.00				x		
498	BE	2nd	Type 30				92.00			92.00				x		
Level Totals				0	7	0	6	0	0	808.00	98.50	906.50	3	3	997	1068
499	BE	3rd	Type 31		59.00					59.00						
500	BE	3rd	Type 14				70.00			70.00						
501	BE	3rd	Type 33				70.00			70.00						
502	BE	3rd	Type 34				70.00			70.00			x			
503	BE	3rd	Type 18		50.00					50.00						
504	BE	3rd	Type 18		50.00					50.00						
505	BE	3rd	Type 28		51.00					51.00						
506	BE	3rd	Type 08		50.00					50.00						
507	BE	3rd	Type 19				72.00			72.00			x			
508	BE	3rd	Type 01				70.00			70.00			x			
509	BE	3rd	Type 11		50.00					50.00				x		
510	BE	3rd	Type 29		54.00					54.00				x		
511	BE	3rd	Type 30				92.00			92.00				x		
Level Totals				0	7	0	6	0	0	808.00	98.50	906.50	3	3	997	1068
512	BE	4th	Type 31		59.00					59.00						
513	BE	4th	Type 14				70.00			70.00						
514	BE	4th	Type 33				70.00			70.00						
515	BE	4th	Type 34				70.00			70.00			x			
516	BE	4th	Type 18		50.00					50.00						
517	BE	4th	Type 18		50.00					50.00						
518	BE	4th	Type 28		51.00					51.00						
519	BE	4th	Type 08		50.00					50.00						
520	BE	4th	Type 19				72.00			72.00			x			
521	BE	4th	Type 01				70.00			70.00			x			
522	BE	4th	Type 11		50.00					50.00				x		
523	BE	4th	Type 29		54.00					54.00				x		
524	BE	4th	Type 30				92.00			92.00				x		
Level Totals				0	7	0	6	0	0	808.00	98.50	906.50	3	3	997	1068
525	BE	5th	Type 31		59.00					59.00						
526	BE	5th	Type 14				70.00			70.00						
527	BE	5th	Type 33				70.00			70.00						
528	BE	5th	Type 34				70.00			70.00			x			
529	BE	5th	Type 18		50.00					50.00						
530	BE	5th	Type 18		50.00					50.00						
531	BE	5th	Type 28		51.00					51.00						
532	BE	5th	Type 08		50.00					50.00						
533	BE	5th	Type 19				72.00			72.00			x			
534	BE	5th	Type 01				70.00			70.00			x			
535	BE	5th	Type 11		50.00					50.00				x		
536	BE	5th	Type 29		54.00					54.00				x		
537	BE	5th	Type 30				92.00			92.00				x		
Level Totals				0	7	0	6	0	0	808.00	98.50	906.50	3	3	997	1068
538	BE	6th	Type 01				70.00			70.00			x			
539	BE	6th	Type 11		50.00					50.00						
540	BE	6th	Type 25				76.00			76.00			x			

541	BE	6th	Type 35				71.00			71.00			x			
542	BE	6th	Type 08		50.00					50.00				x		
543	BE	6th	Type 19				72.00			72.00			x			
Level Totals				0	2	0	4	0	0	389.00	38.00	427.00	4	1	470	518
544	BE	7th	Type 01				70.00			70.00			x			
545	BE	7th	Type 11		50.00					50.00						
546	BE	7th	Type 25				76.00			76.00			x			
547	BE	7th	Type 35				71.00			71.00			x			
548	BE	7th	Type 08		50.00					50.00				x		
549	BE	7th	Type 19				72.00			72.00			x			
Level Totals				0	2	0	4	0	0	389.00	38.00	427.00	4	1	470	518
550	BE	8th	Type 01				70.00			70.00			x			
551	BE	8th	Type 11		50.00					50.00						
552	BE	8th	Type 25				76.00			76.00			x			
553	BE	8th	Type 35				71.00			71.00			x			
554	BE	8th	Type 08		50.00					50.00				x		
555	BE	8th	Type 19				72.00			72.00			x			
Level Totals				0	2	0	4	0	0	389.00	38.00	427.00	4	1	470	518
556	BE	9th	Type 01				70.00			70.00			x			
557	BE	9th	Type 11		50.00					50.00						
558	BE	9th	Type 25				76.00			76.00			x			
559	BE	9th	Type 35				71.00			71.00			x			
560	BE	9th	Type 08		50.00					50.00				x		
561	BE	9th	Type 19				72.00			72.00			x			
Level Totals				0	2	0	4	0	0	389.00	38.00	427.00	4	1	470	518
TOTAL				**0**	**43**	**44**		**0**	**0**	**5,362**	**739**	**6,101**	**29**	**18**	**7,710**	**8,481**

20/12/18 **Area and Unit Schedule**

Building F

Total No of Units sqft	54	Perimeter	**114**		
Total NET Area sqm	3,112	Floor to Floor	**3.075**		
Total NET Area	33,498	Wall to floor ratio*	**0.50**		
NSA to GIA	**80%**	*Based on the typ Tower Level			
NSA to GIA (Residential Floor)	**81%**				

Mix

1b1p	**2**	4%
1b2p	**30**	56%
2b3p	**1**	2%
2b4p	**21**	39%
3b4p	**0**	0%
3b5p	**0**	0%

Plot Number	Building	Level	Unit Type	Studio	1 Bed	2 Bed		3 Bed	3 Bed	NSA (sqm)	Circulation	Total	Dual Aspect	North Aspect	GIA	GEA
				1p	1b2p	2b3p_s	2b4p	3b4p	3b5p							
562	BF	Gnd	Type 18		50					50.00						
563	BF	Gnd	Type 26			63				63.00						
564	BF	Gnd	Type 07	37						37.00						
565	BF	Gnd	Type 27	42						42.00			x			
566	BF	Gnd	Type 23		50					50.00			x			
567	BF	Gnd	Type 18		50					50.00				x		
568	BF	Gnd	Type 24				70.00			70.00			x			
569	BF	Gnd	Type 18b		50					50.00						
570	BF	Gnd	Type 18b		50					50.00						
Level Totals				2	5	1	1	0	0	462.00	132.30	594.30	3	1	651	699
571	BF	1st	Type 32				70.00			70.00			x			
572	BF	1st	Type 23		50.00					50.00			x			
573	BF	1st	Type 18		50.00					50.00				x		
574	BF	1st	Type 24				70.00			70.00			x			
575	BF	1st	Type 18b		50.00					50.00						
576	BF	1st	Type 18b		50.00					50.00						
577	BF	1st	Type 14				70.00			70.00						
578	BF	1st	Type 14				70.00			70.00						
579	BF	1st	Type 18b		50.00					50.00						
Level Totals				0	5	0	4	0	0	530.00	56.50	586.50	3	1	651	700
580	BF	2nd	Type 32				70.00			70.00			x			
581	BF	2nd	Type 23		50.00					50.00			x			
582	BF	2nd	Type 18		50.00					50.00				x		
583	BF	2nd	Type 24				70.00			70.00			x			
584	BF	2nd	Type 18b		50.00					50.00						
585	BF	2nd	Type 18b		50.00					50.00						
586	BF	2nd	Type 14				70.00			70.00						
587	BF	2nd	Type 14				70.00			70.00						
588	BF	2nd	Type 18b		50.00					50.00						
Level Totals				0	5	0	4	0	0	530.00	56.50	586.50	3	1	651	700
589	BF	3rd	Type 32				70.00			70.00			x			
590	BF	3rd	Type 23		50.00					50.00			x			
591	BF	3rd	Type 18		50.00					50.00				x		
592	BF	3rd	Type 24				70.00			70.00			x			
593	BF	3rd	Type 18b		50.00					50.00						
594	BF	3rd	Type 18b		50.00					50.00						
595	BF	3rd	Type 14				70.00			70.00						
596	BF	3rd	Type 14				70.00			70.00						
597	BF	3rd	Type 18b		50.00					50.00						
Level Totals				0	5	0	4	0	0	530.00	56.50	586.50	3	1	651	700
598	BF	4th	Type 32				70.00			70.00			x			
599	BF	4th	Type 23		50.00					50.00			x			
600	BF	4th	Type 18		50.00					50.00				x		
601	BF	4th	Type 24				70.00			70.00			x			
602	BF	4th	Type 18b		50.00					50.00						
603	BF	4th	Type 18b		50.00					50.00						
604	BF	4th	Type 14				70.00			70.00						
605	BF	4th	Type 14				70.00			70.00						
606	BF	4th	Type 18b		50.00					50.00						
Level Totals				0	5	0	4	0	0	530.00	56.50	586.50	3	1	651	700
607	BF	5th	Type 32				70.00			70.00			x			
608	BF	5th	Type 23		50.00					50.00			x			
609	BF	5th	Type 18		50.00					50.00				x		
610	BF	5th	Type 24				70.00			70.00			x			
611	BF	5th	Type 18b		50.00					50.00						
612	BF	5th	Type 18b		50.00					50.00						
613	BF	5th	Type 14				70.00			70.00						
614	BF	5th	Type 14				70.00			70.00						
615	BF	5th	Type 18b		50.00					50.00						
Level Totals				0	5	0	4	0	0	530.00	56.50	586.50	3	1	651	700
TOTAL				**2**	**30**	**22**		**0**	**0**	**3,112**	**415**	**3,527**	**18**	**6**	**3,906**	**4,199**

20/12/18 **Leisure Centre Accommodation Schedule**

Total NIA (inclusive of columns) sqm	**15533**
Total GIA sqm	**16041**
Total GEA sqm	**21004**

Note: NIA areas shown are currently including the columns as the structural grid design is not finalised.

Facilities per Level (NIA)		
Name	Area	Comments & Revisions

Basement	**20/12/2018**	
Main Pool Tank	1250	
Main Pool Balance Tank		TBC
Fun Pool Balance Tank		TBC
Plantroom- pumps/ circulation	627	
Ventilation shaft (main pool)	156	Plenum
Ventilation shaft (Fun pool)		Plenum (not included in basement)
Car Park Ventilation Plant Room	105.6	Plant shared with residential carpark
GLC Basement to Ground Floor Core	28.2	
Fire Escape 1	34.6	
GLC Bikes Store (Staff)	11	
Car Park	5464	175 spaces (inc. 13 disable bays)

TOTAL NIA	**7676**
TOTAL GIA	**7822**
TOTAL GEA	**7949**

Level 0	**20/12/2018**	
Entrance Foyer	123	
Entrance Circulation	138	
Reception Area	49.5	
Reception Main Office	26	
Reception Secure Office	8.4	
Toilets	7.2	
Café	89	
Café Servery/Prep	55	
Café Toilets	7	
Soft Play	236	
Soft Play Toilet/Baby Change	13.2	
GLC Basement to Ground Floor Core Circulation	31	
Fire Escape	24.4	
Escape Corridor	16	
Main Swimming Pool Surround	631	
Fun Pool Tank	328.9	
Fun Pool Surround	292	
Main Pool Store	38	
Pool Side Store	28	
First Aid	12	
Steam Room	13	
Sauna	12	
Wet Changing Room	775	
Plantroom 1/Energy Centre	362	Contents TBC CPW
Plantroom 2/Services Access Corridor	139	Contents TBC CPW
Bin Store 1	30.5	
Bin Store 2	6.2	
Escape Corridor	32	
Fire Escape 2	34	
Store	22	

TOTAL NIA	**3579.3**
TOTAL GIA	**3734**

TOTAL GEA	**5078**

Level 1	**20/12/2018**	
Gym	881	Inc. Office
Soft Play Party Room 1	57	
Soft Play Party Room 2	69	
Spectator Seating	167	
Male Toilets	30.5	
Female Toilets	34	
Dis. Toilet 1	5	
Dis. Toilet 2	3.8	
Main Circulation	79.7	
Party Circulation	33.7	
Spectator Circulation	135.7	
Fire Escape 1	27.1	
Fire Escape 2	26	
Plantroom 1	456	
Plantroom 2	38	Not fully utilised, Contents TBC CPW, (inc server)

TOTAL NIA	**2044**
TOTAL GIA	**2138**
TOTAL GEA	**4895**

Level 2 (Level 3 Residential)	**20/12/2018**	
Studio 1	149.5	
Studio 1 Store	10.3	
Studio 2	151.9	
Studio 2 Store	10.6	
Studio 3	190.5	
Studio 3 Store	16.3	
Breakout	68.3	
Male Dry Changing	172.5	
Male WC		Included in Dry Changing area
Male Shower		Included in Dry Changing area
Female Dry Changing	180.8	
Female WC		Included in Dry Changing area
Female Shower		Included in Dry Changing area
Srore 1	4	
Store 2	4	
Club Room 1	21.8	
Club Room 2	21.8	
Meeting Room	39.4	
Plantroom 1	506	Contents TBC CPW
Plantroom 2	68.4	Contents TBC CPW
Plantroom 3	276.5	Contents TBC CPW
Main Circulation	216	
Escape Corridor	74.5	
Fire Escape 1	26	
Fire Escape 2	24.5	

TOTAL NIA	**2234**
TOTAL GIA	**2347**
TOTAL GEA	**3082**

20/12/18 **Amenities & Services**

Floor	Amenities	Area (sqm)						
		BA	BB	BC	BD	BE	BF	TOTAL
Level G	Commercial Unit			269		229		**498**
Level G	Lobby	53	84		36	36	29	**238**
Level G	Amenity Hub / Lounge			395				**395**
Level 1st	Amenity Hub / Lounge			66				**66**
	Totals	**52.6**	**84**	**730**	**36**	**265**	**29**	**1196.6**

Back of House Services

Floor	Amenities	Area (sqm)						
		BA	BB	BC	BD	BE	BF	TOTAL
Basement	Bike Store - CP Lobby		161		338			**499**
Basement	Lobby			54				**54**
Basement	Car Park				4165			**4165**
Level G	Bin Store	48	42	35	49	133	63	**370**
Level G	Bike Store	70	48	21	32	187		**358**
Level G	Plant *	51	39	60	150	145		**445**
	Stores	8	132					**140**
Upper Lev	Plant	79	132	81				**292**
	Totals	**255.5**	**554**	**250.8**	**4734.4**	**465**	**63**	**6322.7**

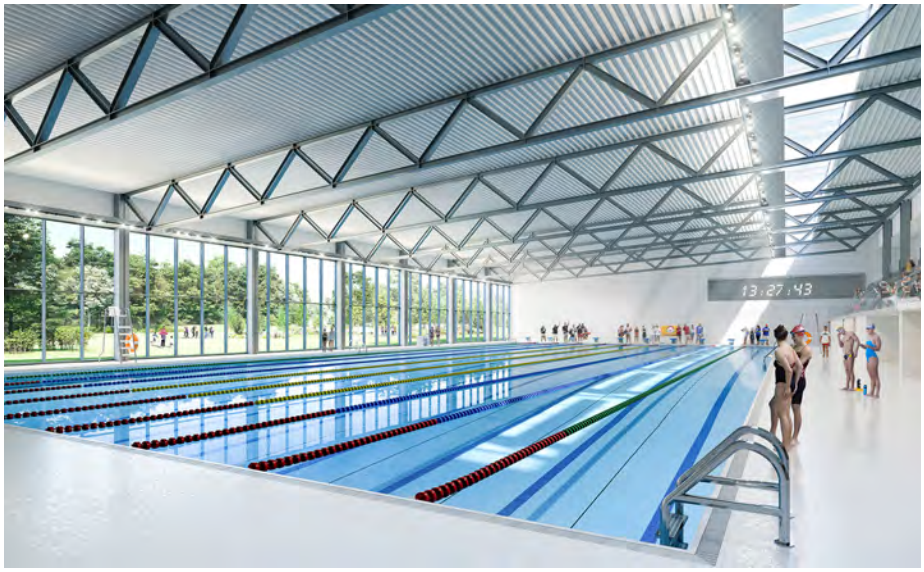
	Notes:							
	O/A Totals	308	638	981	4770	730	92	7519

20/12/18 **Area and Unit Schedule Summary**

Floor	GEA (sqm)	GIA (sqm)	GIA:NSA	NSA (sqm) Residential	Studio 1b1p_s	Studio 1b1p	1 Bed 1b2p	2 Bed 2b3p	2 Bed 2b4p	3 Bed 3b4p	3 Bed 3b5p	Notes	Total Units
Basement	4,973	4,915											
Ground	4,262	3,949	20%	802	2	0	7	1	2	1	1		14
1st	4,440	3,356	65%	2,183	0	1	21	2	13	0	1		38
2nd	4,440	4,062	78%	3,171	1	1	28	3	19	0	1		53
3rd	4,352	4,062	78%	3,171	1	1	28	3	19	0	1		53
4th	4,352	4,062	78%	3,171	1	1	28	3	19	0	1		53
5th	5,020	4,647	81%	3,752	1	4	29	5	22	0	2		63
6th	3,324	3,034	80%	2,417	1	4	17	5	11	0	3		41
7th	3,324	3,034	81%	2,455	1	4	16	4	13	0	3		41
8th	3,324	3,034	81%	2,455	1	4	16	4	13	0	3		41
9th	3,324	3,034	81%	2,455	1	4	16	4	13	0	3		41
10th	2,806	2,564	81%	2,066	1	4	14	4	9	0	3		35
11th	2,806	2,564	81%	2,066	1	4	14	4	9	0	3		35
12th	2,806	2,564	81%	2,066	1	4	14	4	9	0	3		35
13th	2,144	1,958	80%	1,564	1	4	10	4	6	0	2		27
14th	2,144	1,958	80%	1,564	1	4	10	4	6	0	2		27
15th	737	676	82%	552	1	0	4	0	3	0	1		9
16th	737	676	82%	552	1	0	4	0	3	0	1		9
Totals	**59,315**	**54,149**	**67%**	**36,462**	**17**	**44**	**276**	**54**	**189**	**1**	**34**		**615**
					9.9%		**44.9%**	**39.5%**		**5.7%**			

GURNELL LEISURE CENTRE

FULL PLANNING APPLICATION



ENERGY STATEMENT

DECEMBER 2018

ECOWORLD INTERNATIONAL
CREATING TOMORROW & BEYOND

Ealing

couchperrywilkes®
engineering change

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Gurnell Leisure Centre Energy Assessment

16191

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Executive Summary

An Energy Assessment has been produced for the proposed redevelopment of the Gurnell Leisure Centre site in accordance with the requirements of Ealing Council. The project involves the delivery of a new leisure centre and associated facilities together with 615 new dwellings as enabling development.

In order to deliver an environmentally responsible development, an exemplar approach is being proposed based on low energy design principles. In summary, this approach involves energy demand minimisation through effective building form and orientation, good envelope design and proficient use of services before considering the use of CHP-led district heating and LZC technologies to decarbonise the energy supply – in line with the Energy Hierarchy.

In line with Policy 5.2 of the London Plan – Minimising Carbon Dioxide Emissions all residential elements plus the Leisure Centre will achieve a 35% improvement beyond Building Regulations Part L 2103.

Furthermore, residential elements are also required to achieve a standard of zero carbon with non-residential major developments meeting this from 2019 (as such the Leisure Centre will not be considered as part of this application). The remaining regulated carbon emissions, to 100%, are to be offset through a cash in-lieu contribution to be ring-fenced to secure delivery of carbon savings elsewhere. This has been calculated as **£709,376** at this stage of the project.

It should be noted that the emerging Draft New London Plan has been considered as part of this application to some extent. Although not due for adoption until 2019/2020, the proposed energy related policies are referred to in this report to demonstrate our commitment to delivering a scheme that is based on true low carbon design principles.

It has been shown via accredited computer modelling that, by incorporating best practice energy efficiency measures alone, results in a development that is Part L 2013 complaint without the use of CHP plant or renewable technologies (see tables/graphs below and accompanying BRUKL/SAP documents).

Opportunities to connect the planned development to existing or future decentralised heat distribution networks, including those featuring CHP plant, have been investigated with reference to the London Heat Map. No such networks exist or are planned in the vicinity of the proposed development.

The design intention is to install site-wide district heating infrastructure connected to an energy centre featuring gas-fired CHP engines, low NO_x boilers and a thermal buffer store.

Energy Assessment

Having reviewed the feasibility of installing a range of LZC technology solutions at the proposed development, the inclusion of 350m^2 of roof mounted solar PV panels to the residential elements and 500m^2 of solar PV panels to the leisure centre and other non-domestic areas is deemed the most appropriate to decarbonise the energy supply.

The combined effect of the aforementioned measures in reducing CO_2 emissions by at least 35.0% compared to the notional development is shown below.

As part of the energy assessment, dynamic thermal modelling of the overheating risk associated with the leisure centre has been undertaken in accordance with CIBSE TM52 guidance utilising CIBSE TM49 data sets.

It has been shown that despite the introduction of passive measures as part of the design in accordance with the cooling hierarchy, the leisure centre still failed to pass the TM52 criteria and would overheat unless active cooling was deployed. As a result, peak-lop cooling and full comfort cooling via VRV heat pump systems will be provided to those specific areas of the leisure centre to combat the overheating risk.

Following discussions with the local authority, it was agreed to undertake dynamic thermal modelling of the overheating risk associated with representative dwellings across the development in line with the latest CIBSE TM59 guidance.

In accordance with the TM59 methodology, a single London Design Summer Years (DSY1) weather file has been used for the assessment for the 2020s, high emissions, 50% percentile scenario.

It has been shown that the living rooms, kitchens and bedrooms pass the required criteria 1 standards, and the bedrooms pass the required criteria 2 standards under TM59 for the representative flats across the development.

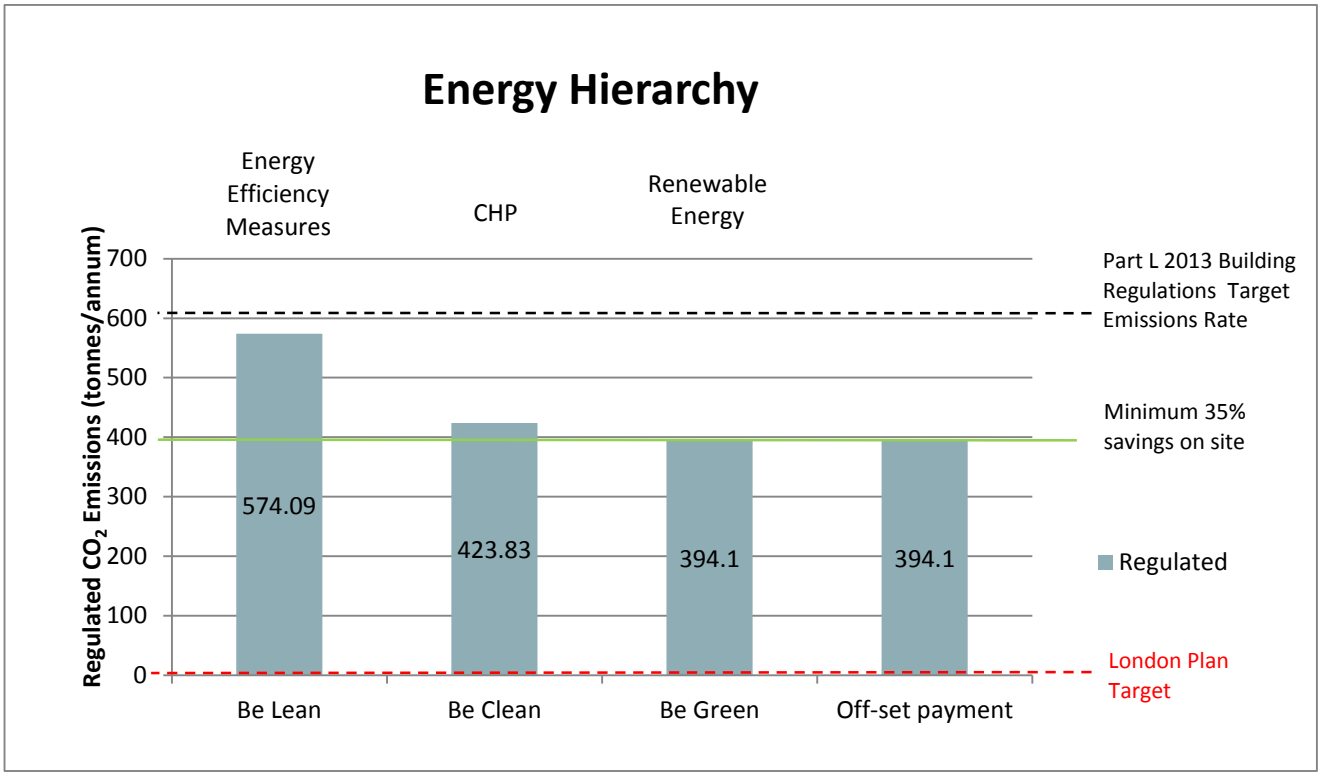


Figure 1. Regulated CO_2 Savings from each Stage of the Energy Hierarchy for Domestic Buildings

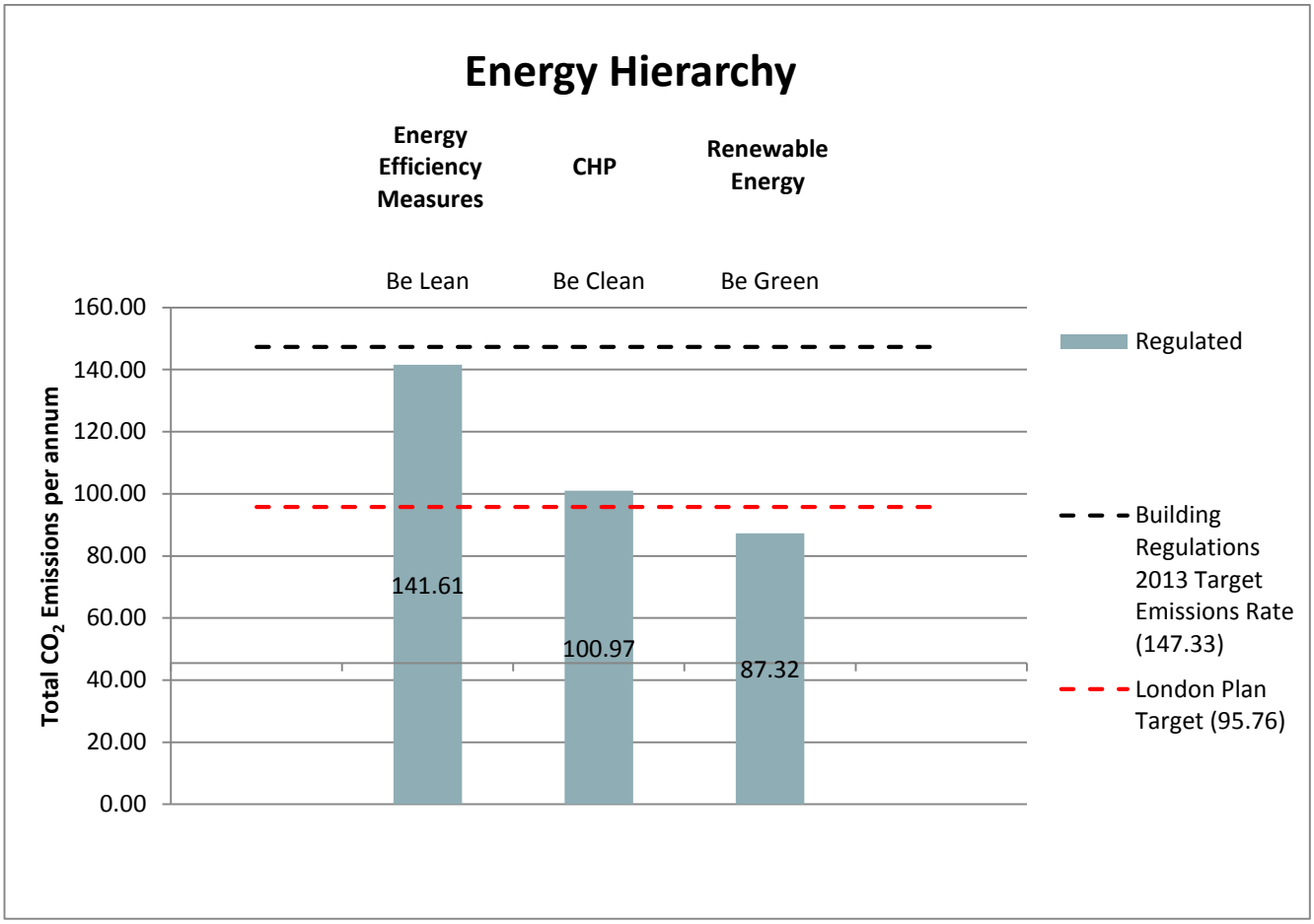


Figure 2. Regulated CO_2 Savings from each Stage of the Energy Hierarchy for Non-domestic Buildings

	Total Regulated Emissions (Tonnes CO_2/year)	CO_2 Savings (Tonnes CO_2/year)	Percentage Savings (%)
Part L 2013 Baseline	753.9	-	-
Be Lean	715.7	38.2	5.1
Be Clean	524.8	229.1	30.4
Be Green	481.42	272.48	36.1
		CO_2 Savings Off-set (Tonnes CO_2)	
Off-set	-	**11,822.926 (£709,376)**	

Table 1. Site-wide Regulated CO_2 Emissions and Savings

1.0 Introduction

This document has been prepared by Couch Perry Wilkes LLP on behalf of BE:HERE EALING LIMITED ("the Applicant") in support of a Full Planning Application for the demolition of the existing Gurnell Leisure Centre ("the Application Site") and the construction of a new leisure centre alongside enabling residential uses.

This planning application for the redevelopment of the Application Site seeks full planning permission for:

Gurnell Leisure Centre (GLC) opened in 1981 and is now one of London's busiest leisure centres, providing one of only four indoor 50m swimming pools in London.

> ***"Demolition of all existing buildings and re-provision of leisure centre, car and coach parking, BMX track and skate park, alongside enhancements and access to the existing park; and the erection of up to 498sqm retail floorspace (Class A1-A3) and 615 residential units, with associated landscaping, playspace, cycle and car parking, refuse storage, access and servicing."*** (The Proposed Development).

The number of users have been increasing in recent years, however the centre is in need of a significant level of repair and investment. Following a review of the options available and with an understanding that the cost of renovating the existing centre was prohibitive, in March 2015 the London Borough of Ealing (LBE) Cabinet made the decision to demolish the existing centre and replace it with a new state-of-the-art facility.

The new leisure centre, designed to be a flagship facility of regional importance is proposed to be re-provided generally on the footprint of the existing leisure centre in order to mitigate impacts on the wider parkland, which is designated as Metropolitan Open Land (MOL). The leisure centre building will be part funded by LBE with the remaining cost be to funded through enabling residential development. These new residential units will be located both above the new leisure centre and generally within the footprint of the current adjacent car park, which is considered Previously Developed Land (PDL).

Alongside the provision of a new flagship leisure centre and residential units, the adjacent open space and amenity provisions to the north will be enhanced for improved public use and access. The proposal therefore represents an opportunity to create a genuinely mixed-use and complementary development for use by not just the local community, but by residents throughout the borough and beyond.

The planned new mixed-use development totals some 67,682m^2 Gross Internal Area (GIA) of accommodation arranged as follows:

Part L2A – Non-domestic

Leisure Centre Including plant and Car park. 15,709m^2

Part L1A – Domestic

615 Residential Units (1-2-3 bed flats) 51,973m^2

Energy Assessment

The proposed site layout is shown below:

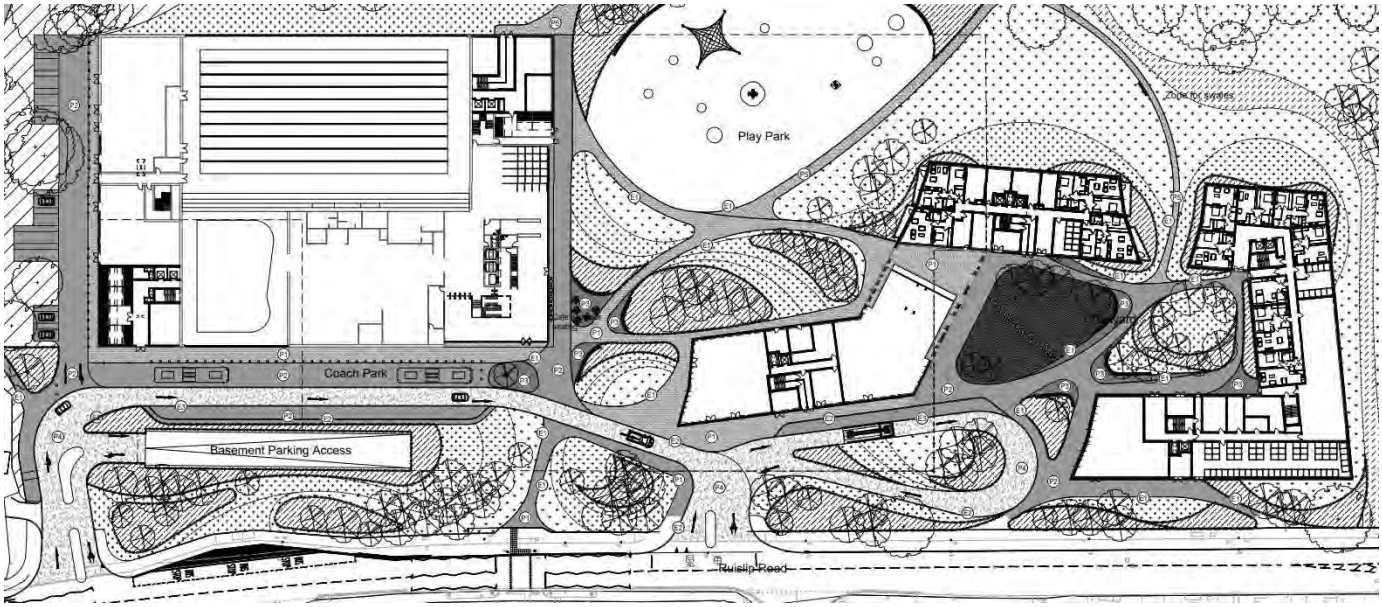


Figure 3. Proposed Site Layout

The Energy Assessment will address London Plan Policies 5.2 – 5.9 in accordance with the requirements set out by the Greater London Authority (GLA). Particular emphasis will be given to the Energy Hierarchy for reducing carbon dioxide (CO_2) emissions expressed in the following form:

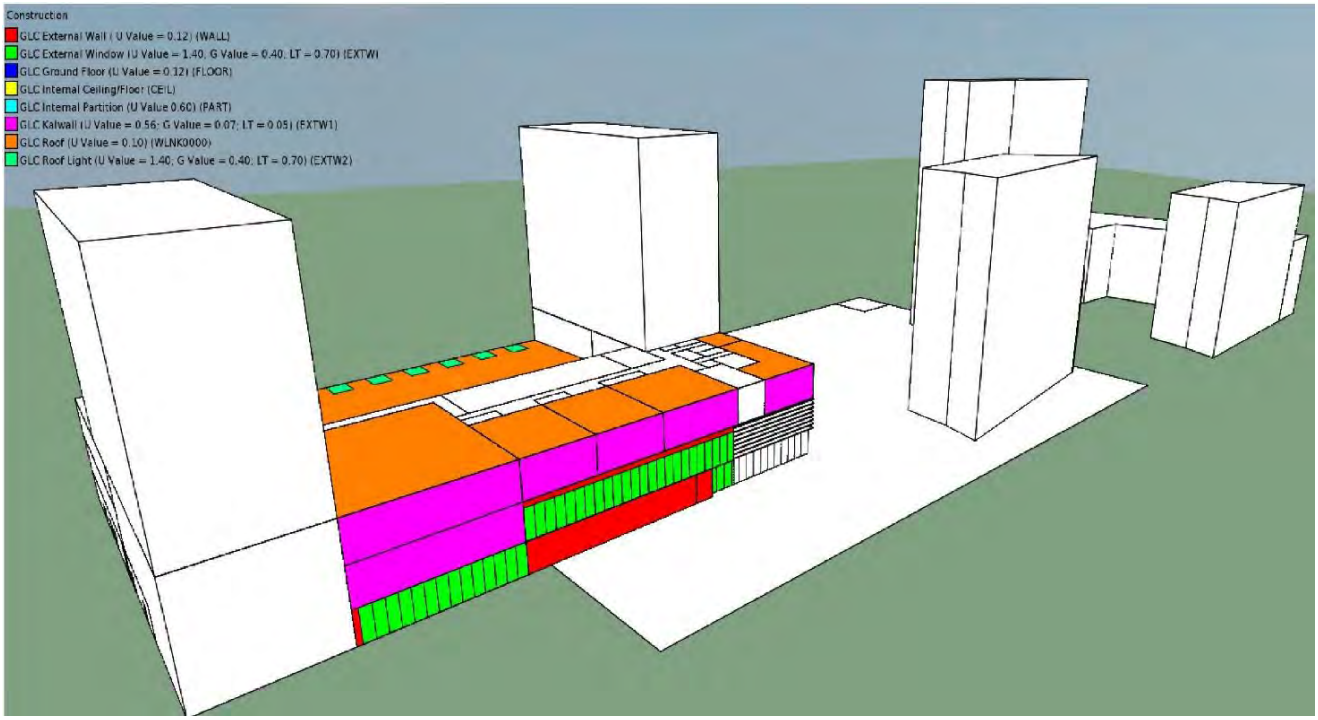
1. Be Lean: use less energy
2. Be Clean: supply energy efficiently
3. Be Green: use renewable energy

All development proposals (domestic and non-domestic) must demonstrate a reduction in the predicted regulated CO_2 emissions of at least 35.0% against Building Regulations Part L 2013 standards.

As of 1st October 2016, major residential developments are required to go much further and achieve 'zero carbon' emissions in terms of regulated CO_2. Where this is not possible, a cash in lieu contribution to the local authority will be necessary to off-set the shortfall.

Finally, the risk of overheating must be assessed using dynamic simulation modelling and mitigation measures introduced in line with the cooling hierarchy.

This report will address all aspects of the above in accordance with GLA guidance.



2.0 Draft New London Plan:

A draft of the new London Plan was issued in July 2018 and opened to public consultation. The final published/adopted version is expected in winter 2019/2020.

As the document has not yet been adopted, it is not expected that the policies within it will carry material weight for this planning application. However, the following policies have nonetheless been considered in determining the most appropriate energy strategy for the development.

- Policy SI1 – Improving Air Quality – Sets out a list of priorities for development proposals to consider in ensuring no deterioration of existing poor air quality is realised. Particular focus should be given to those people most vulnerable to poor air quality, such as children or older people.

- Policy SI2 – Minimising Greenhouse Gas Emissions – states that residential development is expected to aim for a 10% reduction in emissions over the current Building Regulations baseline. Non-residential development should aim to achieve a 15% reduction.

- Policy SI3 – Energy Infrastructure – Requires development proposals to consider the revised communal heating hierarchy.

3.0 Energy Benchmarking

3.1 Estimated Energy Demands and CO_2 Emissions – Baseline Case

In order to benchmark the proposed new development, estimated notional energy demands and resulting CO_2 emissions data (known as the Target Emissions Rate [TER]) have been calculated. The TER is used as the benchmark to assess the percentage of the building's total regulated CO_2 emissions that could be reduced or offset in accordance with the Energy Hierarchy.

Dynamic Simulation Model (DSM) software and Standard Assessment Procedure (SAP) software, which use government and industry agreed National Calculation Methodology (NCM) room templates containing standard operating conditions, have been used to determine the TER data for the non-domestic and domestic elements respectively.

A total of 90 plots were selected as representative of the residential aspects of the development (top floor, mid-floor and corner flats) and the results extrapolated.

The leisure centre and associated facilities along with the corridors/communal areas in the residential blocks were modelled in their entirety using approved DSM software (IES).

The Part L 2013 baseline CO_2 data is summarised in tabular and graphical form through Section 7 of this report.

Note. CO_2 emission factors of 0.216 for Gas and 0.519 for Electricity have been used in the calculations; taken from Building Regulations Approved Documents.

4.0 Energy Efficiency – Be Lean

In order to deliver an environmentally responsible building, an exemplar approach is being proposed based on low energy design principles. In summary, this approach involves energy demand minimisation through effective building form and orientation, good envelope design and proficient use of services; such that the building itself is being used as the primary environmental modifier.

Long term energy benefits are best realised by reducing the inherent energy demand of the development in the first instance before introducing Low and Zero Carbon (LZC) technology solutions to decarbonise the energy supply – Firstly, to meet minimum London Plan standards (35% CO_2 reduction against Part L) and Secondly, to migrate towards a 'Zero Carbon' design standard. These benefits are described and quantified as follows:

4.1 Building Design – Energy Efficiency

The general construction design standards to be adopted must exceed the requirements of the current (2013 Edition) Part L Building Regulations which stipulate an improvement on the CO_2 emissions of an aggregated 6% against 2010 standards for residential elements and an aggregated 9% against 2010 standards for non-domestic elements.

The building envelope will be designed to ensure that the fabric and form of the development encompasses low energy sustainability principles.

The following table (Table 1) describes the proposed minimum building envelope thermal performance criteria for the residential elements.

Element	Part L 2013 Building Regulations U-Value (W/m^2K)	Target U-Value (W/m^2K)	Notes
General Glazing (including frame)	U = 2.00	U = 1.30	Glass to achieve g value = 0.4
External Walls	U = 0.30	U = 0.15	
Party Wall	U = 0.20	U = 0.00	
Roof	U = 0.20	U = 0.11	

Element	Part L 2013 Building Regulations U-Value (W/m²K)	Target U-Value (W/m²K)	Notes
Ground Floor	U = 0.25	U = 0.11	
Thermal Bridging ψ Value	Default = 0.15W/mK	Accredited Details	

Table 1. Summary of Building Envelope Thermal Performance Criteria – Residential Elements

The following table (Table 2) describes the proposed minimum building envelope thermal performance criteria for the leisure centre elements.

Element	Part L 2013 Building Regulations U-Value (W/m²K)	Target U-Value (W/m²K)	Notes
General Glazing (including frame) and Roof Lights	U = 2.20	U = 1.30	Glass to achieve a total light transmission of 0.70 (g = 0.40)
External Walls	U = 0.35	U = 0.12	
Roof	U = 0.25	U = 0.10	
Ground Floor	U = 0.25	U = 0.12	
Thermal Bridging ψ Value	-	0.01W/mK	

Table 2. Summary of Building Envelope Thermal Performance Criteria – Leisure Centre Elements

In accordance with the requirements of a low energy building, the air tightness characteristics will be addressed. With robust design, the target proposed for the development is 4.0m³/m²/hr @ 50Pa. This compares to the current Part L Building Regulations standard of 10m³/m²/hr @ 50Pa and hence represents an improvement of 70%.

Energy Assessment

High levels of natural daylight will be provided, wherever possible, through effective window design. The glazing specification for the new development will be optimised to ensure that the glazed elements provide excellent thermal performance combined with optimum solar reflectance to minimise summer solar heat gains along with high daylight transmittance factors to maximise daylight factors. Encouraging the correct quality and quantity of daylight to penetrate the building is key to reducing the amount of light required from artificial sources and hence energy requirements.

It is imperative that the lighting design philosophy provides the correct quality of lighting with minimum energy input and hence reduce internal heat gains. The latest low energy lighting technology will be employed throughout, including LED's, where appropriate. External lighting will be designed with consideration to security requirements and minimising nuisance glare and light pollution to the surrounding area.

The dwellings will be ventilated via a 'mixed-mode' approach. Mechanical Ventilation Heat Recovery (MVHR) will be used during winter months to minimise heat losses and ensure good indoor air quality. It is proposed to utilise an MVHR system with a minimum heat exchange efficiency of 91%.

Natural ventilation, via means of openable windows, will also be possible where conditions allow for use outside of the heating season and for enhanced summer ventilation to prevent the risk of overheating.

The corridors and communal spaces in the residential blocks will be electrically heated where necessary.

The leisure centre will be mechanically ventilated with an array of air-handling units throughout. Peak-lop cooling and full comfort cooling will be provided, where appropriate.

Reducing demand to a minimum after applying the foregoing passive measures means that the duty and energy consumption of the heating systems will be also minimised. The design intention is for an energy centre approach and heat network connecting the building stock. In accordance with GLA guidance at this stage, communal gas boilers have been assumed with an efficiency of 89.5% supplying the residential elements and 90.0% supplying the non-domestic elements. It is proposed that hot water be supplied to each dwelling via a Heat Interface Unit (HIU) and to the leisure centre via plate heat exchanger(s).

Energy Assessment

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

- Low temperature flow and return hot water heating to maximise heat generating efficiency and minimise distribution losses.
- Zoning of mechanical ventilation systems.
- Modular open architecture controls systems and associated network.
- 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 approximately 90% of the input energy from each utility service may be accounted for at end use. The Building Management System (BMS) will be interfaced to provide automatic monitoring and targeting of all sub-meters to promote energy management and deliver lower consumption.

It has been shown via accredited computer modelling that, by incorporating the above best practice energy efficiency measures alone, results in a development that is Part L 2013 complaint without the use of CHP plant or renewable technologies (see Section 7 and accompanying BRUKL/SAP documents). Therefore, compliance with this stage of the energy hierarchy is achieved.

	Regulated Domestic CO_2 Savings	
	Tonnes CO_2 per annum	%
BE LEAN - Savings from Energy Demand Reduction	**32.480**	**5.35 ****

Regulated CO_2 Savings from Stage 1 – BE LEAN of the Energy Hierarchy for Domestic Buildings

	Regulated Non-domestic CO_2 Savings	
	Tonnes CO_2 per annum	%
Savings from Energy Demand Reduction	**5.72**	**3.88****

Regulated CO_2 Savings from Stage 1 – BE LEAN of the Energy Hierarchy for Non-Domestic Buildings

** Whilst a significant improvement over Building Regulations Part L has been achieved, this result does represent a c.4% shortfall on domestic and c11% shortfall on Non-Domestic when compared to the requirements of the Draft New London

Plan Policy SI2 which stipulates a 10% reduction for Domestic and 15% reduction for Non-Domestic at this stage of the energy hierarchy.

If compliance is deemed necessary, further substantial improvements to building fabric thermal performance must be incorporated such as triple glazing and increased air tightness similar to those required on a Passivhaus building. On a project of this scale, the associated capital costs of these enhancements prove unviable.

5.0 Decentralised Energy – Be Clean

The deployment of a decentralised heating and/or cooling network has been investigated and evaluated against the requirements of the project with a view to delivering energy from a low carbon primary source.

5.1 London Heat Map

Opportunities to connect the planned development to existing or future decentralised heat distribution networks, including those featuring Combined Heat and Power (CHP) plant, have been investigated with reference to the London Heat Map.

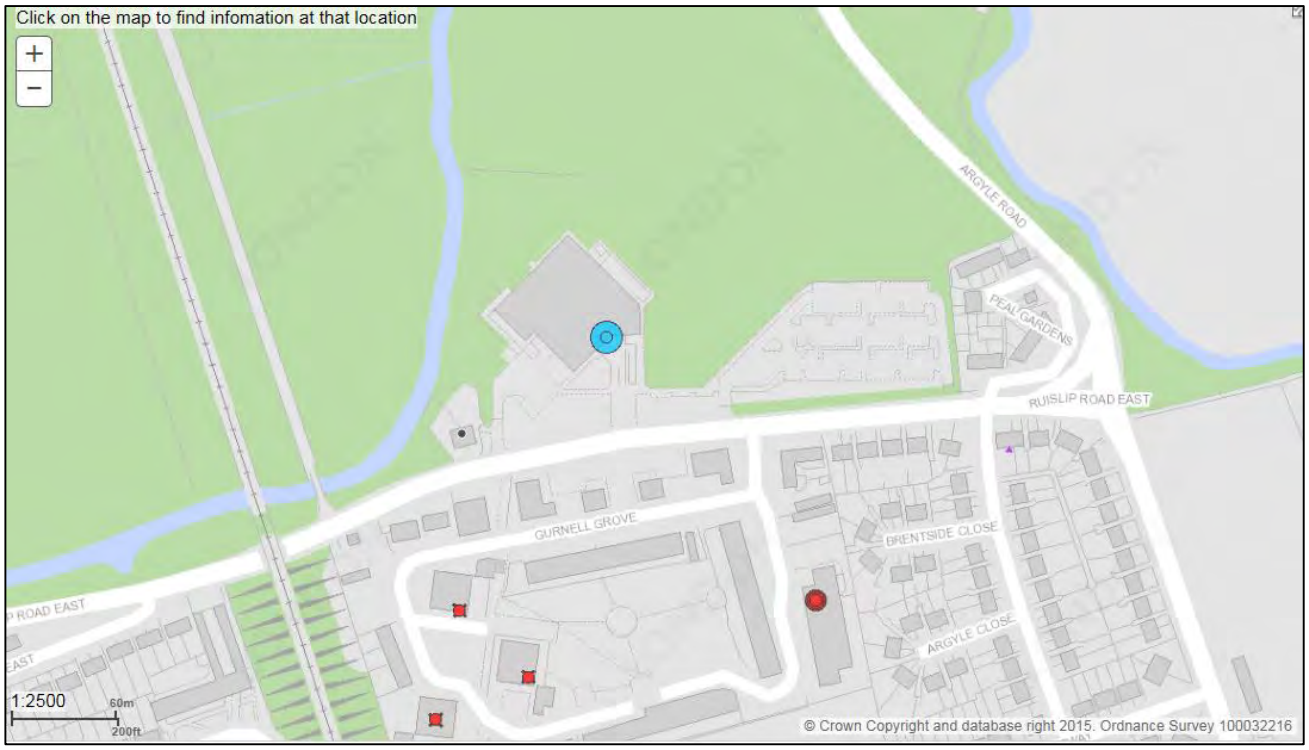


Figure 4. London Heat Map Image of the Proposed Site

The above extract shows that there are no existing or potential future district heating networks planned in the area of the proposed development. However, it is envisaged that the site energy requirement for space heating and base year-round domestic hot water (DHW) will be such that an on-site CHP-led 'energy centre' and district heating network becomes viable.

5.2 Combined Heat and Power (CHP) with District Heating

A CHP installation is effectively an on-site mini power plant providing both electrical power and useful heat. CHP is strictly an energy efficiency measure rather than a renewable energy technology. A CHP system operates by burning a primary fuel (normally natural gas) by use of either a reciprocating engine or turbine, which in turn drive an alternator to generate electrical power. The heat emitted by the engine and exhaust gases is recovered and used to heat the building or to provide hot water.

Figure 5. Gas Fired CHP System (above left) and Thermal Buffer Store (above right)

The viability of CHP is dependent upon the building base load requirements for both heat and power. 24 hour buildings with high heat demands and constant power demands lend themselves to CHP.

The noise levels associated with a CHP installation should not be overlooked. Typically, acoustic enclosures and upgraded low noise attenuators are employed to ensure noise levels don't exceed 65dBA when 1m from the unit. On confined sites, the plant room structure can be enhanced and attenuators fitted to the mechanical ventilation to prevent any noise issues.

An initial evaluation indicates that a gas-fired CHP engine with a thermal capacity of circa 280kW and electrical capacity of 180kW would be viable to serve the site; operating for c. 4,500hours per annum. This arrangement would be housed within an 'energy centre' along with a series of low NO_x boilers and a thermal buffer store. Expected Carbon Savings are shown below.

	Regulated Domestic CO_2 Savings	
	Tonnes CO_2 per annum	%
Saving from CHP	**150.260**	**24.77**

Regulated CO_2 Savings from Stage 2 – BE CLEAN of the Energy Hierarchy for Domestic Buildings

	Regulated Non-domestic CO_2 Savings	
	Tonnes CO_2 per annum	%
Saving from CHP	**40.64**	**28.70**

Table 8. Regulated CO_2 Savings from Stage 2 – BE CLEAN of the Energy Hierarchy for Non-Domestic Buildings

The thermal buffer is important to prevent the CHP engine shutting down unnecessarily when the heating/hot water load demand falls during the course of the day. As the thermal buffer store can extend the run-time of the CHP, this ensures the use of gas fired boilers are reduced to a minimum, thus ensuring that the heat energy is derived from the most efficient source.

A series of underground flow and return pre-insulated pipework will be installed to connect buildings to the energy centre, designed to minimise distribution runs and hence heat losses.

It should be noted that the installation and connection of embedded generation equipment to the grid, is subject to technical approval by the District Network Operator (DNO). As such, there is no guarantee that approval for the connection of embedded generation equipment will be granted.

5.3 Future Connection

The proposed energy centre will have provision for connection to any future district heating network in the vicinity of the development by way of headers in the plant room.

6.0 Appraisal of Renewable and Low Carbon Technology Energy Options – Be Green

The technical feasibility and economic viability of installing each LZC technology at the Gurnell development have been assessed in order to discount any unsuitable options at an early stage. A summary of the feasibility process is tabulated below and an overview of each viable technology is given subsequently.

Technology	Brief Description	Benefits	Issues/Limitations	Feasible for site
Solar Photovoltaic	Solar photovoltaic panels convert solar radiation into electrical energy through semiconductor cells. They are not to be confused with solar panels which use the sun's energy to heat water (or air) for water and space heating.	Low maintenance/no moving parts Easily integrated into building design Income generated from Feed-in Tariff (FIT)	Any overshadowing reduces panel performance Panels ideally inclined at 30º to the horizontal facing a southerly direction	Yes
Solar Thermal	Solar thermal energy can be used to contribute towards space heating and hot water requirements. The two commonest forms of collector are panel and evacuated tube.	Low maintenance Little/no ongoing costs Income generated from Renewable Heat Incentive (RHI) scheme	Must be sized for the building hot water requirements Panels ideally inclined at 30º to the horizontal facing a southerly direction	No, if CHP is used
Ground Source Heat Pump (GSHP)	GSHP systems tap into the earth's considerable energy store to provide both heating and cooling to buildings. A number of installation methods are possible including horizontal trench, vertical boreholes, piled foundations (energy piles) or	Minimal maintenance Unobtrusive technology Flexible installation options to meet available site footprint	Large area required for horizontal pipes Full ground survey required to determine geology	No, prohibitively expensive installation costs

Technology	Brief Description	Benefits	Issues/Limitations	Feasible for site
	plates/pipe work submerged in a large body of water. The design, installation and operation of GSHPs is well established.	Income generated from Renewable Heat Incentive (RHI) scheme	More beneficial to the development if cooling is required Integration with piled foundations must be done at an early stage	
Air Source Heat Pump	Electric or gas driven air source heat pumps extract thermal energy from the surrounding air and transfer it to the working fluid (air or water).	Efficient use of fuel Relatively low capital costs Income generated from Renewable Heat Incentive (RHI) scheme	Specialist maintenance More beneficial to the development if cooling is required Requires defrost cycle in extreme conditions Some additional plant space required	No
Wind Turbine *(Stand-alone column mounted)*	Wind generation equipment operates on the basis of wind turning a propeller, which is used to drive an alternator to generate electricity. Small scale (1kW – 15kW) wind turbines can be pole or roof mounted.	Low maintenance/ongoing costs Minimum wind speed available *(www.bwea.com)* Excess electricity can be exported to the grid Income generated from Feed-in Tariff (FIT)	Planning issues Aesthetic impact and background noise Space limitations on site Wind survey to be undertaken to verify 'local' viability	No, not suitable on this site
Wind Turbine *(Roof Mounted)*	As above	Low maintenance/ongoing costs Minimum wind speed available *(www.bwea.com)*	Planning issues Aesthetic impact and background noise	No, not suitable on this site

Technology	Brief Description	Benefits	Issues/Limitations	Feasible for site
		Excess electricity can be exported to the grid Income generated from Feed-in Tariff (FIT)	Structural/vibration impact on building to be assessed Proximity of other buildings raises issues with downstream turbulence Wind survey to be undertaken to verify 'local' viability	
Gas Fired Combined Heat and Power	A Combined Heat and Power (CHP) installation is effectively a mini on-site power plant providing both electrical power and useful heat. CHP is strictly an energy efficiency measure rather than a renewable energy technology.	Potential high CO_2 saving available Efficient use of fuel Excess electricity can be exported to the grid Benefits from being part of an energy centre/district heating scheme	Maintenance intensive Sufficient base thermal and electrical demand required Some additional plant space required	Yes, as part of an energy centre approach
Bio-fuel Fired Combined Heat and Power	As above.	Potential high CO_2 saving available Efficient use of fuel Excess electricity can be exported back to the grid Benefits from being part of an energy centre/district heating scheme Income generated from Renewable Obligation Certificates (ROCs) and Renewable Heat Incentive (RHI) scheme	Maintenance intensive Sufficient base thermal and electrical demand required Significant plant space required Biomass fuelled systems are at early stages of commercialisation Large area needed for fuel delivery and storage	No, not suitable on this site

Technology	Brief Description	Benefits	Issues/Limitations	Feasible for site
			Reliable biomass fuel supply chain required	
Bio-Renewable Energy Sources *(Automated feed – wood-fuel boiler plant)*	Modern wood-fuel boilers are highly efficient, clean and almost carbon neutral (the tree growing process effectively absorbs the CO_2 that is emitted during combustion). Automated systems require mechanical fuel handling and a large storage silo.	Stable long term running costs Potential good CO_2 saving Income generated from Renewable Heat Incentive (RHI) scheme	Large area needed for fuel delivery and storage Reliable fuel supply chain required Regular maintenance required Significant plant space required	No, not suitable on this site
Fuel Cells and Fuel Cell Combined Heat and Power	Fuel cells convert the energy of a controlled chemical reaction, typically involving hydrogen and oxygen, into electricity, heat and water vapour. Fuel cell stacks operate in the temperature range 65°C – 800°C providing co-generation opportunities in the form of Combined Heat and Power (CHP) solutions.	Zero CO_2 emissions if fired on pure hydrogen and low CO_2 emissions if fired on other hydrocarbon fuels Virtually silent operation since no moving parts High electrical efficiency Excess electricity can be exported back to the grid Benefits from being part of an energy centre/district heating scheme	Expensive Pure hydrogen fuel supply and distribution infrastructure limited in the UK Sufficient base thermal and electrical demand required Some additional plant space required Reforming process, used to extract hydrogen from alternative fuels, requires energy; lowering overall system efficiency	No, expensive, emerging technology

Table 3. Summary of Renewable and Low Carbon Technology Energy Options

6.1 Solar Photovoltaic (PV) Panels

Solar photovoltaic panels convert solar radiation into electrical energy through semiconductor cells. They are not to be confused with solar panels which use the sun's energy to heat water (or air) for water and space heating.

Figure 6. CPW Photovoltaic Installations: Project Epic (BREEAM Excellent Office – above left) and Castle Wood (BREEAM Excellent School – above right)

Photovoltaic panels are available in a number of forms including mono-crystalline, polycrystalline, amorphous silicon (thin film) or hybrid panels. They are fixed or integrated into a building's un-shaded south facing façade or pitched roof ideally at an incline of 30º to the horizontal for maximum energy yield.

It is essential that the panels remain un-shaded, as even a small shadow can significantly reduce output. The individual modules are connected to an inverter to convert their direct current (DC) into alternating current (AC) which is usable in buildings.

Although sloping rooftops provide an ideal site for fixing PV panels using traditional mounting frames, there are a number of alternative solutions whereby PV panels can be incorporated into the actual building fabric of the development.

Figure 7. Solar PV Louvres on the South Facade

Solar louvres use PV panels to provide solar shading on the south façade of buildings as part of the brise soleil (see above), and this can be a highly effective way of controlling overheating and help reduce glare.

Figure 8. CPW Solar Glazing Installation, University of Warwick - Materials and Analytical Sciences Building

Solar glazing uses a combination of solar PV and glass, where the PV cells are laminated between two panes of specialised glazing (see above). The resulting glass laminate serves the dual function of creating energy and shade at the same time, reducing the risk of overheating.

Solar glazing can be used wherever conventional glass would be specified, especially in atria. Bespoke designs allow for varying light penetration by changing the spacing between individual cells. Typically, a combination of 50% PV and 50% translucent glazing is used.

Vertical solar facades can be used to directly replace conventional rain screen cladding materials providing a smooth, flat facade surface for the building. Where circumstances allow, the PV panels can be tilted towards the sun to maximize the energy yield.

Photovoltaic technology may be feasibly incorporated into the building design with little/no maintenance or on-going costs. Installations are scaleable in terms of active area; size being restricted only by available façade and/or roof space.

Energy Assessment

Consider 350m^2 of roof mounted solar PV panels with an annual yield of 57.3MWh to the residential elements and 500m^2 of solar PV panels with an annual yield of 80.2MWh to the leisure centre and associated non-domestic elements. Expected Carbon Savings are shown below.

	Regulated Domestic CO_2 Savings	
	Tonnes CO_2 per annum	%
Saving from Renewable Energy	**29.732**	**4.90**

Regulated CO_2 Savings from Stage 3 – BE GREEN of the Energy Hierarchy for Domestic Buildings

	Regulated Non-domestic CO_2 Savings	
	Tonnes CO_2 per annum	%
Saving from Renewable Energy	**13.65**	**13.52**

Regulated CO_2 Savings from Stage 3 – BE GREEN of the Energy Hierarchy for Non-domestic Buildings

A particular advantage of solar PV, even over other types of LZC technology, is that running costs are very low (requires no fossil fuel for operation) and, since there are no moving parts, very little maintenance is required.

It should be noted that the installation and connection of embedded generation equipment to the mains electrical utility grid (National Grid), including solar PV panels rated at more than 16A per phase, is subject to technical approval by the District Network Operator (DNO). This takes the form of a G59/2-1 agreement. The G59 is the regulation surrounding the connection of any form of generator device to run 'in parallel' or 'synchronised' with the grid.

The DNO are required (under the Connection and Use of System Code) to make a request for a Statement of Works (SoW) to National Grid Electricity Transmission plc (NGET) in relation to the potential impact of connection of embedded generation on the National Electricity Transmission System (NETS). As such, there is no guarantee that approval for the connection of embedded generation equipment will be granted.

7.0 Cooling and Overheating Risk Analysis

7.1 The Cooling Hierarchy

In accordance with the requirements of the London Plan, it is proposed to design out the need for active cooling wherever possible.

The general construction will be heavyweight in nature with high levels of strategically located thermal mass in the roof structure and walls. Heavyweight materials with high density and specific heat capacity can absorb heat generated by occupants, equipment, lighting and through solar gain during the day. At night, the exposed mass can be cooled through a combination of natural and mechanical ventilation means. This night purging facilitates the storing of 'coolth' by the heavyweight fabric which can be released the following day.

The glazing specification has been chosen to ensure excellent performance criteria for light transmission (Lt value = 0.71) to promote daylighting, combined with a low solar transmission (g value = 0.4) to protect against solar gain to mitigate effects of summertime overheating.

Mechanical ventilation systems are proposed for both the domestic and non-domestic elements of the development. This opens up the opportunity for the buildings to benefit from 'free cooling' in summer where the outside air temperature is below that of the occupied spaces.

7.2 Overheating Risk Analysis

As part of the energy assessment, dynamic thermal modelling of the overheating risk associated with the leisure centre has been undertaken in accordance with CIBSE TM52 guidance. The modelling has been carried out using the following three CIBSE TM49 data sets – design weather years:

- DSY1: Moderately warm summer
- DSY2: Short, intense warm spell
- DSY3: Long, less intense warm spell

To enable the urban island effect in the locality of the development to be taken into account, the following location has been used:

London Weather Centre Data

It has been shown that despite the introduction passive measures such as solar shading, utilisation of thermal mass as a heat sink, and adequate ventilation, as part of the design, the leisure centre still failed to pass the TM52 criteria and would overheat unless active cooling was deployed. This is described and quantified in the next section.

Following discussions with the local authority, it was agreed to undertake dynamic thermal modelling of the overheating risk associated with representative dwellings across the development in line with the latest CIBSE TM59 guidance.

In accordance with the TM59 methodology, a single London Design Summer Years (DSY1) weather file has been used for the assessment for the 2020s, high emissions, 50% percentile scenario.

It has been shown that the living rooms, kitchens and bedrooms pass the required criteria 1 standards, and the bedrooms pass the required criteria 2 standards under TM59 for the representative flats across the development.

7.3 Active Cooling

Some areas of the leisure centre, by virtue of their specific operational needs, require active cooling. Where this has been identified as part of the overheating risk analysis under TM52 criteria, peak-lop cooling and full comfort cooling via chillers will be provided.

	Area Weighted Average Building Cooling Demand (MJ/m^2)
Actual	31.12
Notional	25.67

Table 4. Active Cooling Demand for the Leisure Centre

8.0 Summary and Conclusions

An Energy Assessment has been produced for the proposed redevelopment of the Gurnell Leisure Centre site in accordance with the requirements of Ealing Council. The project involves the delivery of a new leisure centre and associated facilities together with 613 new dwellings.

In order to deliver an environmentally responsible development, an exemplar approach is being proposed based on low energy design principles. In summary, this approach involves energy demand minimisation through effective building form and orientation, good envelope design and proficient use of services before considering the use of CHP-led district heating and LZC technologies to decarbonise the energy supply – in line with the Energy Hierarchy.

It has been shown via accredited computer modelling that, by incorporating the aforementioned best practice energy efficiency measures alone, results in a development that is Part L 2013 complaint without the use of CHP plant or renewable technologies (see tables/graphs below and accompanying BRUKL/SAP documents).

Opportunities to connect the planned development to existing or future decentralised heat distribution networks, including those featuring CHP plant, have been investigated with reference to the London Heat Map. No such networks exist or are planned in the vicinity of the proposed development.

The design intention is to install site-wide district heating infrastructure connected to an energy centre featuring a gas-fired CHP engine, low NO_x boilers and a thermal buffer store.

Having reviewed the feasibility of installing a range of LZC technology solutions at the proposed development, the inclusion of 350m^2 (@ min. 18% efficiency) of roof mounted solar PV panels to the residential elements and 500m^2 (@ min. 18% efficiency) of solar PV panels to the leisure centre and other non-domestic areas is deemed the most appropriate to decarbonise the energy supply.

The combined effect of the aforementioned measures in reducing CO_2 emissions by at least 35.0% compared to the notional development is shown below.

As domestic buildings are now required to achieve zero carbon in terms of regulated emissions, a cash in lieu contribution to the local authority of £**709,376** is necessary in this case to off-set the shortfall.

As part of the energy assessment, dynamic thermal modelling of the overheating risk associated with the leisure centre has been undertaken in accordance with CIBSE TM52 guidance utilising CIBSE TM49 data sets.

It has been shown that despite the introduction of passive measures as part of the design in accordance with the cooling hierarchy, the leisure centre still failed to pass the TM52 criteria and would overheat unless active cooling was deployed. As a result, peak-lop cooling and full comfort cooling via chillers will be provided to those specific areas of the leisure centre to combat the overheating risk.

Following discussions with the local authority, it was agreed to undertake dynamic thermal modelling of the overheating risk associated with representative dwellings across the development in line with the latest CIBSE TM59 guidance.

In accordance with the TM59 methodology, a single London Design Summer Years (DSY1) weather file has been used for the assessment for the 2020s, high emissions, 50% percentile scenario.

It has been shown that the living rooms, kitchens and bedrooms pass the required criteria 1 standards, and the bedrooms pass the required criteria 2 standards under TM59 for the representative flats across the development.

	Carbon Dioxide Emissions for Domestic Buildings (Tonnes CO_2 per annum)	
	Regulated	Unregulated*
Baseline: Part L 2013 of the Building Regulations Compliant Development	606.57	711.43
After Energy Demand Reduction	574.09	711.43
After CHP	423.83	711.43
After Renewable Energy	394.1	711.43

*equipment load calculated by Part L software

Table 5. CO_2 Emissions after each Stage of the Energy Hierarchy for Domestic Buildings

	Regulated Domestic CO_2 Savings	
	Tonnes CO_2 per annum	%
Savings from Energy Demand Reduction	**32.480**	**5.35**
Saving from CHP	**150.260**	**24.77**
Saving from Renewable Energy	**29.732**	**4.90**
Cumulative on-site Savings	**212.472**	**35.03**
Annual Savings from Off-set Payment	**394.098**	-
	(Tonnes CO_2)	
Cumulative Savings for Off-set Payment	**11,822.926 (£709,376)**	

Table 6. Regulated CO_2 Savings from each Stage of the Energy Hierarchy for Domestic Buildings

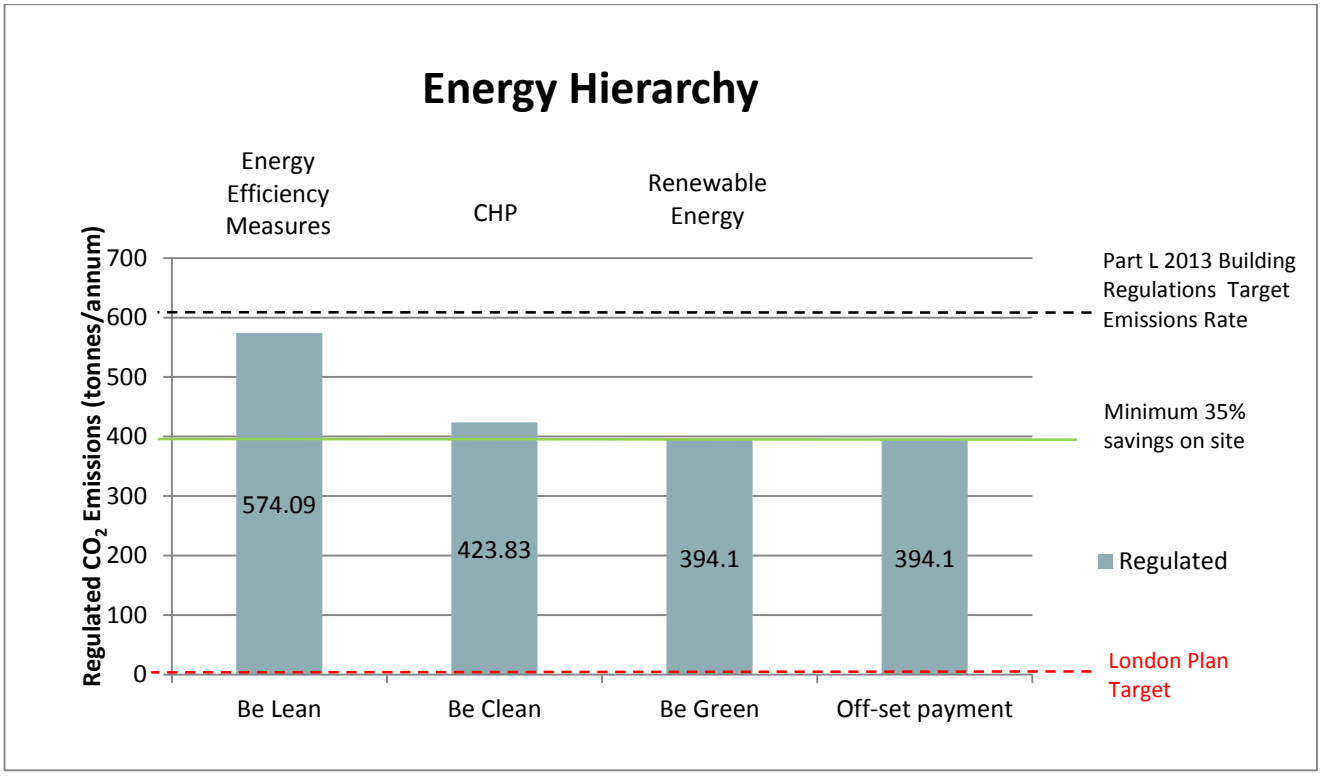


Figure 9. Regulated CO_2 Savings from each Stage of the Energy Hierarchy for Domestic Buildings

	Carbon Dioxide Emissions for Non-domestic Buildings (Tonnes CO_2 per annum)	
	Regulated	Unregulated*
Baseline: Part L 2013 of the Building Regulations Compliant Development	147.33	148.20
After Energy Demand Reduction	141.61	148.20
After CHP	100.97	148.20
After Renewable Energy	87.32	148.20

*equipment load calculated by Part L software

Table 7. CO_2 Emissions after each Stage of the Energy Hierarchy for Non-domestic Buildings

	Regulated Non-domestic CO_2 Savings	
	Tonnes CO_2 per annum	%
Savings from Energy Demand Reduction	5.72	3.88
Saving from CHP	40.64	28.70
Saving from Renewable Energy	13.65	13.52
Total Cumulative Savings	**60.01**	**40.73**

Table 8. Regulated CO_2 Savings from each Stage of the Energy Hierarchy for Non-domestic Buildings

	Annual Shortfall (Tonnes CO_2)	Cumulative Shortfall (Tonnes CO_2)
Total Target Savings	**0.00**	-
Shortfall	**0.00**	**0.00**

Table 9. Shortfall in Regulated CO_2 Savings for Non-domestic Buildings

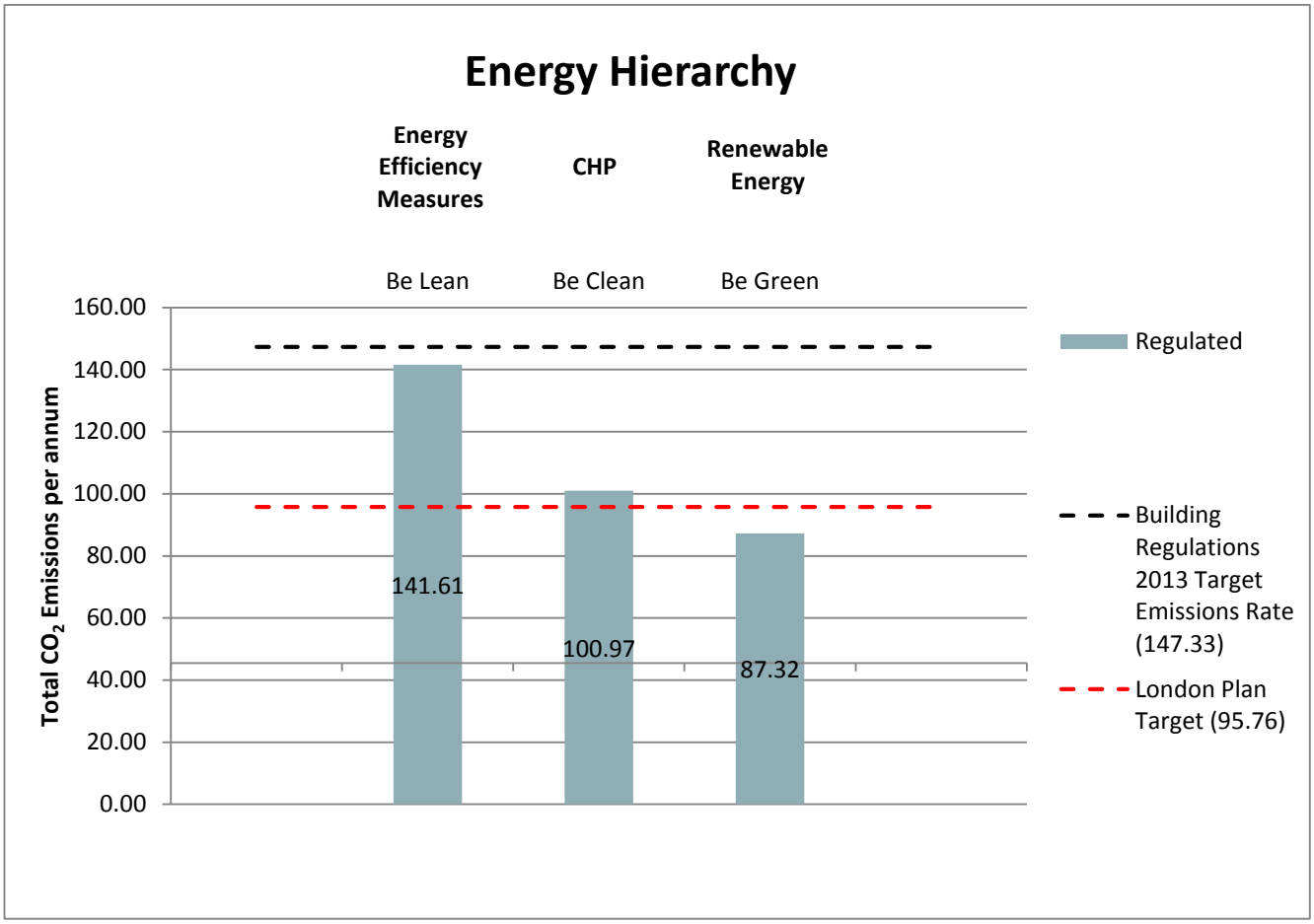


Figure 10. Regulated CO_2 Savings from each Stage of the Energy Hierarchy for Non-domestic Buildings

	Total Regulated Emissions (Tonnes CO_2/year)	CO_2 Savings (Tonnes CO_2/year)	Percentage Savings (%)
Part L 2013 Baseline	753.9	-	-
Be Lean	715.7	38.2	5.1
Be Clean	524.8	229.1	30.4
Be Green	481.42	272.48	36.1
		CO_2 Savings Off-set (Tonnes CO_2)	
Off-set	-	**11,822.926 (£709,376)**	

Table 10. Site-wide Regulated CO_2 Emissions and Savings

9.0 Appendix A – BRUKL Documents

See accompanying documentation.

9.1 Appendix B – SAP Documents

See accompanying documentation.

9.2 Appendix C – Overheating

See accompanying documentation.

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

GURNELL LEISURE CENTRE CLEAN

As designed

Date: Fri Oct 26 15:08:34 2018

Administrative information

Building Details

Address: City,

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.10

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.10

BRUKL compliance check version: v5.4.b.0

Owner Details

Name:

Telephone number:

Address: , City,

Certifier details

Name: COUCH PERRY AND WILKES

Telephone number: 01217096600

Address: INTERFACE 100 ARLESTON WAY, SOLIHULL, B90 4LH

Criterion 1: The calculated CO_2 emission rate for the building must not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	46.4
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	46.4
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	31.8
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.17	0.22	RM000023:Surf[0]
Floor	0.25	0.12	0.12	RM00001F:Surf[0]
Roof	0.25	0.13	0.25	RM000037:Surf[0]
Windows***, roof windows, and rooflights	2.2	1.08	1.4	RM00001F:Surf[2]
Personnel doors	2.2	2	2	RM000014:Surf[1]
Vehicle access & similar large doors	1.5	-	-	No Vehicle access doors in building
High usage entrance doors	3.5	-	-	No High usage entrance doors in building

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(m²K)]

$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m²K)]

$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [W/(m²K)]

* There might be more than one surface where the maximum U-value occurs.

** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

*** Display windows and similar glazing are excluded from the U-value check.

N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	4

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- System 1&2(Swimming Pool)- Heating Via Air + Mech Vent(PHE-95%)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	-	0	1.7	0.95
Standard value	0.91	N/A	N/A	1.5^	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

2- System 12- Heating via Radiator + Mech Vent (TW-80%)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	-	0.3	0	0.8
Standard value	0.91*	N/A	N/A	N/A	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

3- System 7- Heating Via Radiator + Toilet Extract

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	-	0.3	0	0.8
Standard value	0.91*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

4- System 5(Gym/Studio)- Heating & Cooling Via FCU + Mech Vent(TW-80%)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	8	0	1.9	0.89
Standard value	N/A	3.9	N/A	1.6^	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

5- System 9- Heating Via Radiator + Natural Ventilation

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	-	0.3	0	-
Standard value	0.91*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

6- System 6(Main Entrance/Offices)- Underfloor Heating + Mech Vent(TW-80%)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	-	0.5	0	0.8
Standard value	0.91*	N/A	N/A	N/A	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

7- System 10(Soft Plays)- Heating & Cooling Via FCU + Mech Vent(TW-80%)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	8	0	1.9	0.89
Standard value	0.91*	3.9	N/A	1.6^	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

8- System 4(Dry Changing Room)- Heating Via Rdaiant Panels + Mech Vent(PHE-70%)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	-	0.63	0	0.7
Standard value	0.91*	N/A	N/A	N/A	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

9- System 3(Wet Changing Room)- Underfloor Heating + Mech Vent(PHE-90%)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	-	-	0	0.9
Standard value	0.91*	N/A	N/A	N/A	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

"No HWS in project, or hot water is provided by HVAC system"

1- CHECK2-CHP

	CHPQA quality index	CHP electrical efficiency
This building	0	0.35
Standard value	105	0.2

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide
A	Local supply or extract ventilation units serving a single area
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
FF_CIRCULATION	-	-	-	1.9	-	-	-	-	-	-	N/A
FF_DIS WC	-	-	0.5	-	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
FF_GYM	-	-	-	-	-	-	-	0.3	-	-	N/A
FF_GYM OFFICE	-	-	-	-	-	-	-	0.3	-	-	N/A
FF_PARTY ROOM	-	-	-	-	-	-	-	0.3	-	-	N/A
FF_PARTY ROOM	-	-	-	-	-	-	-	0.3	-	-	N/A
FF_WC	-	-	0.5	-	-	-	-	-	-	-	N/A
FF_WC	-	-	0.5	-	-	-	-	-	-	-	N/A
GF_BABY CHANGE	-	-	0.5	-	-	-	-	-	-	-	N/A
GF_CIRCULATION	-	-	-	1.9	-	-	-	-	-	-	N/A
GF_DIS WC	-	-	0.5	-	-	-	-	-	-	-	N/A
GF_OFFICE	-	-	-	-	-	-	-	0.3	-	-	N/A
GF_OFFICE	-	-	-	-	-	-	-	0.3	-	-	N/A
GF_SOFT PLAY	-	-	-	-	-	-	-	0.3	-	-	N/A
GF_STAIR LOBBY	-	-	-	1.9	-	-	-	-	-	-	N/A
GF_WC	-	-	0.5	-	-	-	-	-	-	-	N/A
SF_CLUB ROOM	-	-	-	-	-	-	-	0.3	-	-	N/A
SF_CLUB ROOM	-	-	-	-	-	-	-	0.3	-	-	N/A
SF_DIS WC	-	-	0.5	-	-	-	-	-	-	-	N/A
SF_DIS. WC	-	-	0.5	-	-	-	-	-	-	-	N/A
SF_DRY CHANGING	-	-	-	1.7	-	-	-	-	-	-	N/A
SF_DRY CHANGING	-	-	-	1.7	-	-	-	-	-	-	N/A
SF_LOBBY	-	-	-	1.7	-	-	-	-	-	-	N/A
SF_SHOWER	-	-	-	1.7	-	-	-	-	-	-	N/A
SF_STUDIO 02	-	-	-	-	-	-	-	0.3	-	-	N/A
SF_STUDIO 03	-	-	-	-	-	-	-	0.3	-	-	N/A
SF_STUDIO 01	-	-	-	-	-	-	-	0.3	-	-	N/A
SF_WC	-	-	0.5	-	-	-	-	-	-	-	N/A
SF_WC	-	-	0.5	-	-	-	-	-	-	-	N/A
SF_WC	-	-	0.5	-	-	-	-	-	-	-	N/A
GF_ FOYER	-	-	-	1.9	-	-	-	-	-	-	N/A
GF_SERVERY/CAFE	-	-	-	1.9	-	-	-	-	-	-	N/A
SF_CIRCULATION SPACE	-	-	-	1.7	-	-	-	-	-	-	N/A
GF_WET CHANGING	-	-	-	1.7	-	-	-	-	-	-	N/A
GF_WET CHANGING	-	-	-	1.7	-	-	-	-	-	-	N/A

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
FF_CIRCULATION	-	100	-	527
FF_CIRCULATION	-	100	-	375
FF_DIS WC	-	100	-	56
FF_GYM	-	85	-	2589
FF_GYM OFFICE	81	-	-	246
FF_PARTY ROOM	-	85	-	440

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
FF_PARTY ROOM	-	85	-	438
FF_PLANT	77	-	-	1958
FF_STAIR	-	100	-	114
FF_WC	-	85	-	196
FF_WC	-	85	-	234
GF_BABY CHANGE	-	85	-	56
GF_CIRCULATION	-	100	-	410
GF_DIS WC	-	85	-	70
GF_ESCAPE CORRIDOR	-	100	-	149
GF_FIRST AID	77	-	-	209
GF_FUN POOL	-	100	-	3612
GF_LOBBY	-	100	-	38
GF_OFFICE	77	-	-	302
GF_OFFICE	77	-	-	163
GF_PLANT	77	-	-	898
GF_PLANT	77	-	-	1561
GF_POOL	-	100	-	10112
GF_POOL STORE	77	-	-	117
GF_POOL STORE	77	-	-	99
GF_SAUNA	-	100	-	54
GF_SOFT PLAY	-	100	-	1722
GF_STAIR	-	100	-	67
GF_STAIR LOBBY	-	100	-	99
GF_STAIR LOBBY	-	100	-	93
GF_STEAM ROOM	-	85	-	67
GF_WC	-	85	-	68
SF_BREAKOUT SPACE	-	100	-	109
SF_CLUB ROOM	-	90	-	306
SF_CLUB ROOM	-	90	-	325
SF_DIS WC	-	85	-	89
SF_DIS. WC	-	85	-	85
SF_DRY CHANGING	-	85	-	454
SF_DRY CHANGING	-	85	-	454
SF_ESCAPE CORRIDOR	-	100	-	306
SF_LOBBY	-	100	-	94
SF_PLANT	77	-	-	1964
SF_PLANT	77	-	-	1080
SF_SHOWER	-	85	-	183
SF_STAIR	-	100	-	119
SF_STAIR	-	100	-	142
SF_STUDIO 02	-	85	-	498
SF_STUDIO 03	-	85	-	621
SF_STUDIO 01	-	85	-	499

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
SF_STUDIO STORE 03	90	-	-	62
SF_STUDIO STORE 01	90	-	-	47
SF_STUDIO STORE 02	90	-	-	46
SF_WC	-	100	-	70
SF_WC	-	100	-	92
SF_WC	-	100	-	92
GF_RECEPTION	-	60	15	418
GF_ FOYER	-	60	-	1197
GF_SERVERY/CAFE	90	-	-	1751
B00:PLANT ROOM	77	-	-	458
SF_CIRCULATION SPACE	-	100	-	802
GF_WET CHANGING	-	85	-	1766
GF_WET CHANGING	-	85	-	956

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
FF_GYM	YES (+111.2%)	NO
FF_GYM OFFICE	N/A	N/A
FF_PARTY ROOM	N/A	N/A
FF_PARTY ROOM	N/A	N/A
GF_FIRST AID	N/A	N/A
GF_FUN POOL	YES (+202.3%)	NO
GF_OFFICE	N/A	N/A
GF_OFFICE	N/A	N/A
GF_POOL	YES (+489.8%)	NO
GF_SOFT PLAY	YES (+232.3%)	NO
SF_CLUB ROOM	N/A	N/A
SF_CLUB ROOM	N/A	N/A
SF_STUDIO 02	NO (-53.1%)	NO
SF_STUDIO 03	NO (-60%)	NO
SF_STUDIO 01	NO (-53.1%)	NO
GF_RECEPTION	YES (+68.7%)	NO
GF_SERVERY/CAFE	YES (+165.5%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m^2]	9794	9794
External area [m^2]	9954.6	9954.6
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	4	3
Average conductance [W/K]	3401.74	2875.11
Average U-value [W/m^2K]	0.34	0.29
Alpha value* [%]	12.28	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
100	**D2 General Assembly and Leisure, Night Clubs, and Theatres**
	Others: Passenger terminals
	Others: Emergency services
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

Energy Consumption by End Use [kWh/m^2]

	Actual	Notional
Heating	9.2	7.26
Cooling	1.41	1.88
Auxiliary	19.02	15.98
Lighting	8.41	16.04
Hot water	170.45	128.29
Equipment*	89.93	89.93
TOTAL**	**166.81**	**169.45**

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m^2]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	41.68	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	52.78	48.21
Primary energy* [kWh/m^2]	177.56	266.84
Total emissions [kg/m^2]	31.8	46.4

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

HVAC Systems Performance

System Type		Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Central heating using air distribution, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	30.4	0	4.5	0	20.1	0.87	0	0.9	0
	Notional	0	0	0	0	0	0	0	----	----
[ST] Central heating using water: floor heating, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	0	0	0	0	9.7	0.85	0	0.9	0
	Notional	67	0	21.6	0	21.1	0.86	0	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	32.5	0	4.5	0	12.6	0.85	0	0.9	0
	Notional	0	0	0	0	5.1	0.86	0	----	----
[ST] Fan coil systems, [HS] LTHW boiler, [HFT] Electricity, [CFT] Electricity										
	Actual	0.8	100.2	0.1	4.5	49.2	0.82	6.15	0.9	8
	Notional	36.8	0	11.8	0	4.9	0.86	0	----	----
[ST] Central heating using water: floor heating, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	134.4	0	20	0	12.3	0.85	0	0.9	0
	Notional	1.2	117	0.4	8.6	40.8	0.86	3.79	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	40.8	0	6.3	0	47.5	0.85	0	0.9	0
	Notional	8.6	0	2.8	0	4.4	0.86	0	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	13.7	0	2.1	0	2.8	0.85	0	0.9	0
	Notional	28.7	0	9.3	0	55	0.86	0	----	----
[ST] Fan coil systems, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	0	397.6	0	18	25.7	0.82	6.15	0.9	8
	Notional	21.2	0	6.8	0	1.7	0.86	0	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	0.9	0	0.1	0	11.1	0.85	0	0.9	0
	Notional	1.5	156.8	0.5	11.5	17.4	0.86	3.79	----	----
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	1.3	0	0.4	0	4.3	0.86	0	----	----

Key to terms

Heat dem [MJ/m2] = Heating energy demand
Cool dem [MJ/m2] = Cooling energy demand
Heat con [kWh/m2] = Heating energy consumption
Cool con [kWh/m2] = Cooling energy consumption
Aux con [kWh/m2] = Auxiliary energy consumption
Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER = Cooling system seasonal energy efficiency ratio
Heat gen SSEFF = Heating generator seasonal efficiency
Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
ST = System type
HS = Heat source
HFT = Heating fuel type
CFT = Cooling fuel type

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.12	FF000002:Surf[0]
Floor	0.2	0.12	RM00001F:Surf[0]
Roof	0.15	0.1	GF000003:Surf[1]
Windows, roof windows, and rooflights	1.5	0.56	GF000003:Surf[16]
Personnel doors	1.5	2	RM000014:Surf[1]
Vehicle access & similar large doors	1.5	-	No Vehicle access doors in building
High usage entrance doors	1.5	-	No High usage entrance doors in building

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]

* There might be more than one surface where the minimum U-value occurs.

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	4

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

GURNELL LEISURE CENTRE GREEN

As designed

Date: Tue Oct 30 13:11:20 2018

Administrative information

Building Details

Address: City,

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.10

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.10

BRUKL compliance check version: v5.4.b.0

Owner Details

Name:

Telephone number:

Address: , City,

Certifier details

Name: COUCH PERRY AND WILKES

Telephone number: 01217096600

Address: INTERFACE 100 ARLESTON WAY, SOLIHULL, B90 4LH

Criterion 1: The calculated CO_2 emission rate for the building must not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	46.4
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	46.4
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	27.5
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.17	0.22	RM000023:Surf[0]
Floor	0.25	0.12	0.12	RM00001F:Surf[0]
Roof	0.25	0.13	0.25	RM000037:Surf[0]
Windows***, roof windows, and rooflights	2.2	1.08	1.4	RM00001F:Surf[2]
Personnel doors	2.2	2	2	RM000014:Surf[1]
Vehicle access & similar large doors	1.5	-	-	No Vehicle access doors in building
High usage entrance doors	3.5	-	-	No High usage entrance doors in building

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(m²K)]

$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m²K)]

$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [W/(m²K)]

* There might be more than one surface where the maximum U-value occurs.

** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

*** Display windows and similar glazing are excluded from the U-value check.

N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	4

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- System 1&2(Swimming Pool)- Heating Via Air + Mech Vent(PHE-95%)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	-	0	1.7	0.95
Standard value	0.91	N/A	N/A	1.5^	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

2- System 12- Heating via Radiator + Mech Vent (TW-80%)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	-	0.3	0	0.8
Standard value	0.91*	N/A	N/A	N/A	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

3- System 7- Heating Via Radiator + Toilet Extract

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	-	0.3	0	0.8
Standard value	0.91*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

4- System 5(Gym/Studio)- Heating & Cooling Via FCU + Mech Vent(TW-80%)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	8	0	1.9	0.89
Standard value	N/A	3.9	N/A	1.6^	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

5- System 9- Heating Via Radiator + Natural Ventilation

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	-	0.3	0	-
Standard value	0.91*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

6- System 6(Main Entrance/Offices)- Underfloor Heating + Mech Vent(TW-80%)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	-	0.5	0	0.8
Standard value	0.91*	N/A	N/A	N/A	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

7- System 10(Soft Plays)- Heating & Cooling Via FCU + Mech Vent(TW-80%)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	8	0	1.9	0.89
Standard value	0.91*	3.9	N/A	1.6^	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

8- System 4(Dry Changing Room)- Heating Via Rdaiant Panels + Mech Vent(PHE-70%)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	-	0.63	0	0.7
Standard value	0.91*	N/A	N/A	N/A	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

9- System 3(Wet Changing Room)- Underfloor Heating + Mech Vent(PHE-90%)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	-	-	0	0.9
Standard value	0.91*	N/A	N/A	N/A	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

"No HWS in project, or hot water is provided by HVAC system"

1- CHECK2-CHP

	CHPQA quality index	CHP electrical efficiency
This building	0	0.35
Standard value	105	0.2

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide
A	Local supply or extract ventilation units serving a single area
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
FF_CIRCULATION	-	-	-	1.9	-	-	-	-	-	-	N/A
FF_DIS WC	-	-	0.5	-	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
FF_GYM	-	-	-	-	-	-	-	0.3	-	-	N/A
FF_GYM OFFICE	-	-	-	-	-	-	-	0.3	-	-	N/A
FF_PARTY ROOM	-	-	-	-	-	-	-	0.3	-	-	N/A
FF_PARTY ROOM	-	-	-	-	-	-	-	0.3	-	-	N/A
FF_WC	-	-	0.5	-	-	-	-	-	-	-	N/A
FF_WC	-	-	0.5	-	-	-	-	-	-	-	N/A
GF_BABY CHANGE	-	-	0.5	-	-	-	-	-	-	-	N/A
GF_CIRCULATION	-	-	-	1.9	-	-	-	-	-	-	N/A
GF_DIS WC	-	-	0.5	-	-	-	-	-	-	-	N/A
GF_OFFICE	-	-	-	-	-	-	-	0.3	-	-	N/A
GF_OFFICE	-	-	-	-	-	-	-	0.3	-	-	N/A
GF_SOFT PLAY	-	-	-	-	-	-	-	0.3	-	-	N/A
GF_STAIR LOBBY	-	-	-	1.9	-	-	-	-	-	-	N/A
GF_WC	-	-	0.5	-	-	-	-	-	-	-	N/A
SF_CLUB ROOM	-	-	-	-	-	-	-	0.3	-	-	N/A
SF_CLUB ROOM	-	-	-	-	-	-	-	0.3	-	-	N/A
SF_DIS WC	-	-	0.5	-	-	-	-	-	-	-	N/A
SF_DIS. WC	-	-	0.5	-	-	-	-	-	-	-	N/A
SF_DRY CHANGING	-	-	-	1.7	-	-	-	-	-	-	N/A
SF_DRY CHANGING	-	-	-	1.7	-	-	-	-	-	-	N/A
SF_LOBBY	-	-	-	1.7	-	-	-	-	-	-	N/A
SF_SHOWER	-	-	-	1.7	-	-	-	-	-	-	N/A
SF_STUDIO 02	-	-	-	-	-	-	-	0.3	-	-	N/A
SF_STUDIO 03	-	-	-	-	-	-	-	0.3	-	-	N/A
SF_STUDIO 01	-	-	-	-	-	-	-	0.3	-	-	N/A
SF_WC	-	-	0.5	-	-	-	-	-	-	-	N/A
SF_WC	-	-	0.5	-	-	-	-	-	-	-	N/A
SF_WC	-	-	0.5	-	-	-	-	-	-	-	N/A
GF_ FOYER	-	-	-	1.9	-	-	-	-	-	-	N/A
GF_SERVERY/CAFE	-	-	-	1.9	-	-	-	-	-	-	N/A
SF_CIRCULATION SPACE	-	-	-	1.7	-	-	-	-	-	-	N/A
GF_WET CHANGING	-	-	-	1.7	-	-	-	-	-	-	N/A
GF_WET CHANGING	-	-	-	1.7	-	-	-	-	-	-	N/A

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
FF_CIRCULATION	-	100	-	527
FF_CIRCULATION	-	100	-	375
FF_DIS WC	-	100	-	56
FF_GYM	-	85	-	2589
FF_GYM OFFICE	81	-	-	246
FF_PARTY ROOM	-	85	-	440

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
FF_PARTY ROOM	-	85	-	438
FF_PLANT	77	-	-	1958
FF_STAIR	-	100	-	114
FF_WC	-	85	-	196
FF_WC	-	85	-	234
GF_BABY CHANGE	-	85	-	56
GF_CIRCULATION	-	100	-	410
GF_DIS WC	-	85	-	70
GF_ESCAPE CORRIDOR	-	100	-	149
GF_FIRST AID	77	-	-	209
GF_FUN POOL	-	100	-	3612
GF_LOBBY	-	100	-	38
GF_OFFICE	77	-	-	302
GF_OFFICE	77	-	-	163
GF_PLANT	77	-	-	898
GF_PLANT	77	-	-	1561
GF_POOL	-	100	-	10112
GF_POOL STORE	77	-	-	117
GF_POOL STORE	77	-	-	99
GF_SAUNA	-	100	-	54
GF_SOFT PLAY	-	100	-	1722
GF_STAIR	-	100	-	67
GF_STAIR LOBBY	-	100	-	99
GF_STAIR LOBBY	-	100	-	93
GF_STEAM ROOM	-	85	-	67
GF_WC	-	85	-	68
SF_BREAKOUT SPACE	-	100	-	109
SF_CLUB ROOM	-	90	-	306
SF_CLUB ROOM	-	90	-	325
SF_DIS WC	-	85	-	89
SF_DIS. WC	-	85	-	85
SF_DRY CHANGING	-	85	-	454
SF_DRY CHANGING	-	85	-	454
SF_ESCAPE CORRIDOR	-	100	-	306
SF_LOBBY	-	100	-	94
SF_PLANT	77	-	-	1964
SF_PLANT	77	-	-	1080
SF_SHOWER	-	85	-	183
SF_STAIR	-	100	-	119
SF_STAIR	-	100	-	142
SF_STUDIO 02	-	85	-	498
SF_STUDIO 03	-	85	-	621
SF_STUDIO 01	-	85	-	499

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
SF_STUDIO STORE 03	90	-	-	62
SF_STUDIO STORE 01	90	-	-	47
SF_STUDIO STORE 02	90	-	-	46
SF_WC	-	100	-	70
SF_WC	-	100	-	92
SF_WC	-	100	-	92
GF_RECEPTION	-	60	15	418
GF_ FOYER	-	60	-	1197
GF_SERVERY/CAFE	90	-	-	1751
B00:PLANT ROOM	77	-	-	458
SF_CIRCULATION SPACE	-	100	-	802
GF_WET CHANGING	-	85	-	1766
GF_WET CHANGING	-	85	-	956

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
FF_GYM	YES (+111.2%)	NO
FF_GYM OFFICE	N/A	N/A
FF_PARTY ROOM	N/A	N/A
FF_PARTY ROOM	N/A	N/A
GF_FIRST AID	N/A	N/A
GF_FUN POOL	YES (+202.3%)	NO
GF_OFFICE	N/A	N/A
GF_OFFICE	N/A	N/A
GF_POOL	YES (+489.8%)	NO
GF_SOFT PLAY	YES (+232.3%)	NO
SF_CLUB ROOM	N/A	N/A
SF_CLUB ROOM	N/A	N/A
SF_STUDIO 02	NO (-53.1%)	NO
SF_STUDIO 03	NO (-60%)	NO
SF_STUDIO 01	NO (-53.1%)	NO
GF_RECEPTION	YES (+68.7%)	NO
GF_SERVERY/CAFE	YES (+165.5%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m^2]	9794	9794
External area [m^2]	9954.6	9954.6
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	4	3
Average conductance [W/K]	3401.74	2875.11
Average U-value [W/m^2K]	0.34	0.29
Alpha value* [%]	12.28	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
100	**D2 General Assembly and Leisure, Night Clubs, and Theatres**
	Others: Passenger terminals
	Others: Emergency services
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

Energy Consumption by End Use [kWh/m^2]

	Actual	Notional
Heating	9.19	7.26
Cooling	1.41	1.88
Auxiliary	19.02	15.98
Lighting	8.41	16.04
Hot water	170.46	128.29
Equipment*	89.93	89.93
TOTAL**	**166.81**	**169.45**

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m^2]

	Actual	Notional
Photovoltaic systems	8.19	0
Wind turbines	0	0
CHP generators	41.67	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	52.78	48.21
Primary energy* [kWh/m^2]	177.62	266.84
Total emissions [kg/m^2]	27.5	46.4

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

HVAC Systems Performance

System Type		Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Central heating using air distribution, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	30.4	0	4.5	0	20.1	0.87	0	0.9	0
	Notional	0	0	0	0	0	0	0	----	----
[ST] Central heating using water: floor heating, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	0	0	0	0	9.7	0.85	0	0.9	0
	Notional	67	0	21.6	0	21.1	0.86	0	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	32.5	0	4.4	0	12.6	0.85	0	0.9	0
	Notional	0	0	0	0	5.1	0.86	0	----	----
[ST] Fan coil systems, [HS] LTHW boiler, [HFT] Electricity, [CFT] Electricity										
	Actual	0.8	100.2	0.3	4.5	49.2	0.82	6.15	0.9	8
	Notional	36.8	0	11.8	0	4.9	0.86	0	----	----
[ST] Central heating using water: floor heating, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	134.4	0	20	0	12.3	0.85	0	0.9	0
	Notional	1.2	117	0.4	8.6	40.8	0.86	3.79	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	40.8	0	6.3	0	47.5	0.85	0	0.9	0
	Notional	8.6	0	2.8	0	4.4	0.86	0	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	13.7	0	2.1	0	2.8	0.85	0	0.9	0
	Notional	28.7	0	9.3	0	55	0.86	0	----	----
[ST] Fan coil systems, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	0	397.6	0	18	25.7	0.82	6.15	0.9	8
	Notional	21.2	0	6.8	0	1.7	0.86	0	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	0.9	0	0.1	0	11.1	0.85	0	0.9	0
	Notional	1.5	156.8	0.5	11.5	17.4	0.86	3.79	----	----
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	1.3	0	0.4	0	4.3	0.86	0	----	----

Key to terms

Heat dem [MJ/m2] = Heating energy demand
Cool dem [MJ/m2] = Cooling energy demand
Heat con [kWh/m2] = Heating energy consumption
Cool con [kWh/m2] = Cooling energy consumption
Aux con [kWh/m2] = Auxiliary energy consumption
Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER = Cooling system seasonal energy efficiency ratio
Heat gen SSEFF = Heating generator seasonal efficiency
Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
ST = System type
HS = Heat source
HFT = Heating fuel type
CFT = Cooling fuel type

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.12	FF000002:Surf[0]
Floor	0.2	0.12	RM00001F:Surf[0]
Roof	0.15	0.1	GF000003:Surf[1]
Windows, roof windows, and rooflights	1.5	0.56	GF000003:Surf[16]
Personnel doors	1.5	2	RM000014:Surf[1]
Vehicle access & similar large doors	1.5	-	No Vehicle access doors in building
High usage entrance doors	1.5	-	No High usage entrance doors in building

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]

* There might be more than one surface where the minimum U-value occurs.

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	4

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

GURNELL LEISURE CENTRE LEAN

As designed

Date: Fri Oct 26 14:48:52 2018

Administrative information

Building Details

Address: City,

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.10

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.10

BRUKL compliance check version: v5.4.b.0

Owner Details

Name:

Telephone number:

Address: , City,

Certifier details

Name: COUCH PERRY AND WILKES

Telephone number: 01217096600

Address: INTERFACE 100 ARLESTON WAY, SOLIHULL, B90 4LH

Criterion 1: The calculated CO_2 emission rate for the building must not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	46.4
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	46.4
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	44.6
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.17	0.22	RM000023:Surf[0]
Floor	0.25	0.12	0.12	RM00001F:Surf[0]
Roof	0.25	0.13	0.25	RM000037:Surf[0]
Windows***, roof windows, and rooflights	2.2	1.08	1.4	RM00001F:Surf[2]
Personnel doors	2.2	2	2	RM000014:Surf[1]
Vehicle access & similar large doors	1.5	-	-	No Vehicle access doors in building
High usage entrance doors	3.5	-	-	No High usage entrance doors in building

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(m²K)]

$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m²K)]

$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [W/(m²K)]

* There might be more than one surface where the maximum U-value occurs.

** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

*** Display windows and similar glazing are excluded from the U-value check.

N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	4

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- System 1&2(Swimming Pool)- Heating Via Air + Mech Vent(PHE-95%)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	-	0	1.7	0.95
Standard value	0.91	N/A	N/A	1.5^	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

2- System 12- Heating via Radiator + Mech Vent (TW-80%)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	-	0.3	0	0.8
Standard value	0.91*	N/A	N/A	N/A	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

3- System 7- Heating Via Radiator + Toilet Extract

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	-	0.3	0	0.8
Standard value	0.91*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

4- System 5(Gym/Studio)- Heating & Cooling Via FCU + Mech Vent(TW-80%)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	8	0	1.9	0.89
Standard value	N/A	3.9	N/A	1.6^	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

5- System 9- Heating Via Radiator + Natural Ventilation

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	-	0.3	0	-
Standard value	0.91*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

6- System 6(Main Entrance/Offices)- Underfloor Heating + Mech Vent(TW-80%)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	-	0.5	0	0.8
Standard value	0.91*	N/A	N/A	N/A	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

7- System 10(Soft Plays)- Heating & Cooling Via FCU + Mech Vent(TW-80%)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	8	0	1.9	0.89
Standard value	0.91*	3.9	N/A	1.6^	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

8- System 4(Dry Changing Room)- Heating Via Rdaiant Panels + Mech Vent(PHE-70%)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	-	0.63	0	0.7
Standard value	0.91*	N/A	N/A	N/A	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

9- System 3(Wet Changing Room)- Underfloor Heating + Mech Vent(PHE-90%)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	-	-	0	0.9
Standard value	0.91*	N/A	N/A	N/A	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

"No HWS in project, or hot water is provided by HVAC system"

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide
A	Local supply or extract ventilation units serving a single area
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
FF_CIRCULATION	-	-	-	1.9	-	-	-	-	-	-	N/A
FF_DIS WC	-	-	0.5	-	-	-	-	-	-	-	N/A
FF_GYM	-	-	-	-	-	-	-	0.3	-	-	N/A
FF_GYM OFFICE	-	-	-	-	-	-	-	0.3	-	-	N/A
FF_PARTY ROOM	-	-	-	-	-	-	-	0.3	-	-	N/A
FF_PARTY ROOM	-	-	-	-	-	-	-	0.3	-	-	N/A
FF_WC	-	-	0.5	-	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
FF_WC	-	-	0.5	-	-	-	-	-	-	-	N/A
GF_BABY CHANGE	-	-	0.5	-	-	-	-	-	-	-	N/A
GF_CIRCULATION	-	-	-	1.9	-	-	-	-	-	-	N/A
GF_DIS WC	-	-	0.5	-	-	-	-	-	-	-	N/A
GF_OFFICE	-	-	-	-	-	-	-	0.3	-	-	N/A
GF_OFFICE	-	-	-	-	-	-	-	0.3	-	-	N/A
GF_SOFT PLAY	-	-	-	-	-	-	-	0.3	-	-	N/A
GF_STAIR LOBBY	-	-	-	1.9	-	-	-	-	-	-	N/A
GF_WC	-	-	0.5	-	-	-	-	-	-	-	N/A
SF_CLUB ROOM	-	-	-	-	-	-	-	0.3	-	-	N/A
SF_CLUB ROOM	-	-	-	-	-	-	-	0.3	-	-	N/A
SF_DIS WC	-	-	0.5	-	-	-	-	-	-	-	N/A
SF_DIS. WC	-	-	0.5	-	-	-	-	-	-	-	N/A
SF_DRY CHANGING	-	-	-	1.7	-	-	-	-	-	-	N/A
SF_DRY CHANGING	-	-	-	1.7	-	-	-	-	-	-	N/A
SF_LOBBY	-	-	-	1.7	-	-	-	-	-	-	N/A
SF_SHOWER	-	-	-	1.7	-	-	-	-	-	-	N/A
SF_STUDIO 02	-	-	-	-	-	-	-	0.3	-	-	N/A
SF_STUDIO 03	-	-	-	-	-	-	-	0.3	-	-	N/A
SF_STUDIO 01	-	-	-	-	-	-	-	0.3	-	-	N/A
SF_WC	-	-	0.5	-	-	-	-	-	-	-	N/A
SF_WC	-	-	0.5	-	-	-	-	-	-	-	N/A
SF_WC	-	-	0.5	-	-	-	-	-	-	-	N/A
GF_ FOYER	-	-	-	1.9	-	-	-	-	-	-	N/A
GF_SERVERY/CAFE	-	-	-	1.9	-	-	-	-	-	-	N/A
SF_CIRCULATION SPACE	-	-	-	1.7	-	-	-	-	-	-	N/A
GF_WET CHANGING	-	-	-	1.7	-	-	-	-	-	-	N/A
GF_WET CHANGING	-	-	-	1.7	-	-	-	-	-	-	N/A

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
FF_CIRCULATION	-	100	-	527
FF_CIRCULATION	-	100	-	375
FF_DIS WC	-	100	-	56
FF_GYM	-	85	-	2589
FF_GYM OFFICE	81	-	-	246
FF_PARTY ROOM	-	85	-	440
FF_PARTY ROOM	-	85	-	438
FF_PLANT	77	-	-	1958
FF_STAIR	-	100	-	114
FF_WC	-	85	-	196
FF_WC	-	85	-	234

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
GF_BABY CHANGE	-	85	-	56
GF_CIRCULATION	-	100	-	410
GF_DIS WC	-	85	-	70
GF_ESCAPE CORRIDOR	-	100	-	149
GF_FIRST AID	77	-	-	209
GF_FUN POOL	-	100	-	3612
GF_LOBBY	-	100	-	38
GF_OFFICE	77	-	-	302
GF_OFFICE	77	-	-	163
GF_PLANT	77	-	-	898
GF_PLANT	77	-	-	1561
GF_POOL	-	100	-	10112
GF_POOL STORE	77	-	-	117
GF_POOL STORE	77	-	-	99
GF_SAUNA	-	100	-	54
GF_SOFT PLAY	-	100	-	1722
GF_STAIR	-	100	-	67
GF_STAIR LOBBY	-	100	-	99
GF_STAIR LOBBY	-	100	-	93
GF_STEAM ROOM	-	85	-	67
GF_WC	-	85	-	68
SF_BREAKOUT SPACE	-	100	-	109
SF_CLUB ROOM	-	90	-	306
SF_CLUB ROOM	-	90	-	325
SF_DIS WC	-	85	-	89
SF_DIS. WC	-	85	-	85
SF_DRY CHANGING	-	85	-	454
SF_DRY CHANGING	-	85	-	454
SF_ESCAPE CORRIDOR	-	100	-	306
SF_LOBBY	-	100	-	94
SF_PLANT	77	-	-	1964
SF_PLANT	77	-	-	1080
SF_SHOWER	-	85	-	183
SF_STAIR	-	100	-	119
SF_STAIR	-	100	-	142
SF_STUDIO 02	-	85	-	498
SF_STUDIO 03	-	85	-	621
SF_STUDIO 01	-	85	-	499
SF_STUDIO STORE 03	90	-	-	62
SF_STUDIO STORE 01	90	-	-	47
SF_STUDIO STORE 02	90	-	-	46
SF_WC	-	100	-	70
SF_WC	-	100	-	92

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
SF_WC	-	100	-	92
GF_RECEPTION	-	60	15	418
GF_ FOYER	-	60	-	1197
GF_SERVERY/CAFE	90	-	-	1751
B00:PLANT ROOM	77	-	-	458
SF_CIRCULATION SPACE	-	100	-	802
GF_WET CHANGING	-	85	-	1766
GF_WET CHANGING	-	85	-	956

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
FF_GYM	YES (+111.2%)	NO
FF_GYM OFFICE	N/A	N/A
FF_PARTY ROOM	N/A	N/A
FF_PARTY ROOM	N/A	N/A
GF_FIRST AID	N/A	N/A
GF_FUN POOL	YES (+202.3%)	NO
GF_OFFICE	N/A	N/A
GF_OFFICE	N/A	N/A
GF_POOL	YES (+489.8%)	NO
GF_SOFT PLAY	YES (+232.3%)	NO
SF_CLUB ROOM	N/A	N/A
SF_CLUB ROOM	N/A	N/A
SF_STUDIO 02	NO (-53.1%)	NO
SF_STUDIO 03	NO (-60%)	NO
SF_STUDIO 01	NO (-53.1%)	NO
GF_RECEPTION	YES (+68.7%)	NO
GF_SERVERY/CAFE	YES (+165.5%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m²]	9794	9794
External area [m²]	9954.6	9954.6
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	4	3
Average conductance [W/K]	3401.74	2875.11
Average U-value [W/m²K]	0.34	0.29
Alpha value* [%]	12.28	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
100	**D2 General Assembly and Leisure, Night Clubs, and Theatres**
	Others: Passenger terminals
	Others: Emergency services
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	7.04	7.26
Cooling	1.41	1.88
Auxiliary	19.02	15.98
Lighting	8.41	16.04
Hot water	131.83	128.29
Equipment*	89.93	89.93
TOTAL**	**167.7**	**169.45**

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	52.78	48.21
Primary energy* [kWh/m²]	255.81	266.84
Total emissions [kg/m²]	44.6	46.4

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

HVAC Systems Performance

System Type		Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Central heating using air distribution, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	30.4	0	9.7	0	20.1	0.87	0	0.9	0
	Notional	0	0	0	0	0	0	0	----	----
[ST] Central heating using water: floor heating, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	0	0	0	0	9.7	0.85	0	0.9	0
	Notional	67	0	21.6	0	21.1	0.86	0	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	32.5	0	10.7	0	12.6	0.85	0	0.9	0
	Notional	0	0	0	0	5.1	0.86	0	----	----
[ST] Fan coil systems, [HS] LTHW boiler, [HFT] Electricity, [CFT] Electricity										
	Actual	0.8	100.2	0.3	4.5	49.2	0.82	6.15	0.9	8
	Notional	36.8	0	11.8	0	4.9	0.86	0	----	----
[ST] Central heating using water: floor heating, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	134.4	0	44.2	0	12.3	0.85	0	0.9	0
	Notional	1.2	117	0.4	8.6	40.8	0.86	3.79	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	40.8	0	13.4	0	47.5	0.85	0	0.9	0
	Notional	8.6	0	2.8	0	4.4	0.86	0	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	13.7	0	4.5	0	2.8	0.85	0	0.9	0
	Notional	28.7	0	9.3	0	55	0.86	0	----	----
[ST] Fan coil systems, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	0	397.6	0	18	25.7	0.82	6.15	0.9	8
	Notional	21.2	0	6.8	0	1.7	0.86	0	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	0.9	0	0.3	0	11.1	0.85	0	0.9	0
	Notional	1.5	156.8	0.5	11.5	17.4	0.86	3.79	----	----
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	1.3	0	0.4	0	4.3	0.86	0	----	----

Key to terms

Heat dem [MJ/m2] = Heating energy demand
Cool dem [MJ/m2] = Cooling energy demand
Heat con [kWh/m2] = Heating energy consumption
Cool con [kWh/m2] = Cooling energy consumption
Aux con [kWh/m2] = Auxiliary energy consumption
Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER = Cooling system seasonal energy efficiency ratio
Heat gen SSEFF = Heating generator seasonal efficiency
Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
ST = System type
HS = Heat source
HFT = Heating fuel type
CFT = Cooling fuel type

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.12	FF000002:Surf[0]
Floor	0.2	0.12	RM00001F:Surf[0]
Roof	0.15	0.1	GF000003:Surf[1]
Windows, roof windows, and rooflights	1.5	0.56	GF000003:Surf[16]
Personnel doors	1.5	2	RM000014:Surf[1]
Vehicle access & similar large doors	1.5	-	No Vehicle access doors in building
High usage entrance doors	1.5	-	No High usage entrance doors in building

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]

* There might be more than one surface where the minimum U-value occurs.

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	4

GURNELL LEISURE CENTRE, - CIBSE TM52 Overheating Assessment

Weather File: London_LHR_DSY1_2020High50.epw

The TM52 Adaptive Comfort analysis tool within IES is capable of assessing the overheating criteria of a building based on the following three criteria.

Criteria 1:

The first criterion sets a limit for the number of hours that the operative temperature can exceed the threshold comfort temperature (upper limit of the range of comfort temperature) by 1°C or more during the occupied hours of a typical non-heating season (1st May to 30th September).

The number of hours during which ΔT is greater than or equal to one degree during the period May to September inclusive shall not be more than **3 per cent** of occupied hours.

Criteria 2:

The second criterion deals with the severity of overheating within any one day, which can be as important as its frequency, the level of which is a sum of both temperature rise and its duration. This criterion sets a daily limit for acceptability.

To allow for the severity of overheating the weighted exceedance shall be less than or equal to **6 in any one day**.

Criteria 3:

The third criterion sets an absolute maximum daily temperature for a room, beyond which the level of overheating is unacceptable.

To set an absolute maximum value for the indoor operative temperature the value of ΔT shall not exceed **4K**.

In order to show that the proposed space will not suffer overheating two of these three criteria must be met.

Room Name	Occupied days (%)	Criteria 1	Criteria 2	Criteria 3	Which Criteria failing?	TM52 Criteria met ?
PASS						
FF_GYM	100	0	0.00	0.00	-	PASS
FF_GYM OFFICE	100	0	0.00	0.00	-	PASS
FF_PARTY ROOM 01	100	0	0.00	0.00	-	PASS
FF_PARTY ROOM 02	100	0	0.00	0.00	-	PASS
GF_FIRST AID	100	0	0.00	0.00	-	PASS
GF_OFFICE	100	0	0.00	0.00	-	PASS
GF_OFFICE	100	0	0.00	0.00	-	PASS
GF_RECEPTION	100	0	0.00	0.00	-	PASS
GF_SERVERY/CAFE	100	0	0.00	0.00	-	PASS
GF_SOFT PLAY	100	0	0.00	0.00	-	PASS
GF_WET CHANGING	100	0	0.00	0.00	-	PASS
SF_CLUB ROOM	100	0	0.00	0.00	-	PASS
SF_CLUB ROOM	100	0	0.00	0.00	-	PASS
SF_DRY CHANGING (F)	100	0	0.00	0.00	-	PASS
SF_DRY CHANGING (M)	100	0	0.00	0.00	-	PASS
SF_STUDIO 01	100	0	0.00	0.00	-	PASS
SF_STUDIO 02	100	0	0.00	0.00	-	PASS
SF_STUDIO 03	100	0	0.00	0.00	-	PASS

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GURNELL LEISURE CENTRE, - CIBSE TM52 Overheating Assessment

Weather File: London_LHR_DSY2_2020High50.epw

The TM52 Adaptive Comfort analysis tool within IES is capable of assessing the overheating criteria of a building based on the following three criteria.

Criteria 1:

The first criterion sets a limit for the number of hours that the operative temperature can exceed the threshold comfort temperature (upper limit of the range of comfort temperature) by 1°C or more during the occupied hours of a typical non-heating season (1st May to 30th September).

The number of hours during which ΔT is greater than or equal to one degree during the period May to September inclusive shall not be more than **3 per cent** of occupied hours.

Criteria 2:

The second criterion deals with the severity of overheating within any one day, which can be as important as its frequency, the level of which is a sum of both temperature rise and its duration. This criterion sets a daily limit for acceptability.

To allow for the severity of overheating the weighted exceedance shall be less than or equal to **6 in any one day**.

Criteria 3:

The third criterion sets an absolute maximum daily temperature for a room, beyond which the level of overheating is unacceptable.

To set an absolute maximum value for the indoor operative temperature the value of ΔT shall not exceed **4K**.

In order to show that the proposed space will not suffer overheating two of these three criteria must be met.

Room Name	Occupied days (%)	Criteria 1	Criteria 2	Criteria 3	Which Criteria failing?	TM52 Criteria met ?
PASS						
FF_GYM	100	0	0.00	0.00	-	PASS
FF_GYM OFFICE	100	0	0.00	0.00	-	PASS
FF_PARTY ROOM 01	100	0	0.00	0.00	-	PASS
FF_PARTY ROOM 02	100	0	0.00	0.00	-	PASS
GF_FIRST AID	100	0	0.00	0.00	-	PASS
GF_OFFICE	100	0	0.00	0.00	-	PASS
GF_OFFICE	100	0	0.00	0.00	-	PASS
GF_RECEPTION	100	0	0.00	0.00	-	PASS
GF_SERVERY/CAFE	100	0	0.00	0.00	-	PASS
GF_SOFT PLAY	100	0	0.00	0.00	-	PASS
GF_WET CHANGING	100	0	0.00	0.00	-	PASS
SF_CLUB ROOM	100	0	0.00	0.00	-	PASS
SF_CLUB ROOM	100	0	0.00	0.00	-	PASS
SF_DRY CHANGING (F)	100	0	0.00	0.00	-	PASS
SF_DRY CHANGING (M)	100	0	0.00	0.00	-	PASS
SF_STUDIO 01	100	0	0.00	0.00	-	PASS
SF_STUDIO 02	100	0	0.00	0.00	-	PASS
SF_STUDIO 03	100	0	0.00	0.00	-	PASS
Fail						
-	-	-	-	-	-	-

GURNELL LEISURE CENTRE, - CIBSE TM52 Overheating Assessment

Weather File: London_LHR_DSY3_2020High50.epw

The TM52 Adaptive Comfort analysis tool within IES is capable of assessing the overheating criteria of a building based on the following three criteria.

Criteria 1:

The first criterion sets a limit for the number of hours that the operative temperature can exceed the threshold comfort temperature (upper limit of the range of comfort temperature) by 1°C or more during the occupied hours of a typical non-heating season (1st May to 30th September).

The number of hours during which ΔT is greater than or equal to one degree during the period May to September inclusive shall not be more than **3 per cent** of occupied hours.

Criteria 2:

The second criterion deals with the severity of overheating within any one day, which can be as important as its frequency, the level of which is a sum of both temperature rise and its duration. This criterion sets a daily limit for acceptability.

To allow for the severity of overheating the weighted exceedance shall be less than or equal to **6 in any one day**.

Criteria 3:

The third criterion sets an absolute maximum daily temperature for a room, beyond which the level of overheating is unacceptable.

To set an absolute maximum value for the indoor operative temperature the value of ΔT shall not exceed **4K**.

In order to show that the proposed space will not suffer overheating two of these three criteria must be met.

Room Name	Occupied days (%)	Criteria 1	Criteria 2	Criteria 3	Which Criteria failing?	TM52 Criteria met ?
PASS						
FF_GYM	100	0	0.00	0.00	-	PASS
FF_GYM OFFICE	100	0	0.00	0.00	-	PASS
FF_PARTY ROOM 01	100	0	0.00	0.00	-	PASS
FF_PARTY ROOM 02	100	0	0.00	0.00	-	PASS
GF_FIRST AID	100	0.6	1.00	1.00	-	PASS
GF_OFFICE	100	0	0.00	0.00	-	PASS
GF_OFFICE	100	0	0.00	0.00	-	PASS
GF_RECEPTION	100	0	0.00	0.00	-	PASS
GF_SERVERY/CAFE	100	0.2	2.00	1.00	-	PASS
GF_SOFT PLAY	100	0	0.00	0.00	-	PASS
GF_WET CHANGING	100	0	0.00	0.00	-	PASS
SF_CLUB ROOM	100	0	0.00	0.00	-	PASS
SF_CLUB ROOM	100	0	0.00	0.00	-	PASS
SF_DRY CHANGING (F)	100	0	0.00	0.00	-	PASS
SF_DRY CHANGING (M)	100	0	0.00	0.00	-	PASS
SF_STUDIO 01	100	0	0.00	0.00	-	PASS
SF_STUDIO 02	100	0	0.00	0.00	-	PASS
SF_STUDIO 03	100	0	0.00	0.00	-	PASS
Fail						
-	-	-	-	-	-	-

GURNELL LEISURE CENTRE, - CIBSE TM52 Overheating Assessment

Weather File: London/Heathrow Airport DSY1

The TM52 Adaptive Comfort analysis tool within IES is capable of assessing the overheating criteria of a building based on the following three criteria.

Criteria 1:

The first criterion sets a limit for the number of hours that the operative temperature can exceed the threshold comfort temperature (upper limit of the range of comfort temperature) by 1°C or more during the occupied hours of a typical non-heating season (1st May to 30th September).

The number of hours during which ΔT is greater than or equal to one degree during the period May to September inclusive shall not be more than **3 per cent** of occupied hours.

Criteria 2:

The second criterion deals with the severity of overheating within any one day, which can be as important as its frequency, the level of which is a sum of both temperature rise and its duration. This criterion sets a daily limit for acceptability.

To allow for the severity of overheating the weighted exceedance shall be less than or equal to **6 in any one day**.

Criteria 3:

The third criterion sets an absolute maximum daily temperature for a room, beyond which the level of overheating is unacceptable.

To set an absolute maximum value for the indoor operative temperature the value of ΔT shall not exceed **4K**.

In order to show that the proposed space will not suffer overheating two of these three criteria must be met.

Room Name	Occupied days (%)	Criteria 1	Criteria 2	Criteria 3	Which Criteria failing?	TM52 Criteria met ?
PASS						
FF_GYM	100	0	0.00	0.00	-	PASS
FF_GYM OFFICE	100	0	0.00	0.00	-	PASS
FF_PARTY ROOM 01	100	0	0.00	0.00	-	PASS
FF_PARTY ROOM 02	100	0	0.00	0.00	-	PASS
GF_FIRST AID	100	0	0.00	0.00	-	PASS
GF_OFFICE	100	0	0.00	0.00	-	PASS
GF_OFFICE	100	0	0.00	0.00	-	PASS
GF_RECEPTION	100	0	0.00	0.00	-	PASS
GF_SERVERY/CAFE	100	0	0.00	0.00	-	PASS
GF_SOFT PLAY	100	0	0.00	0.00	-	PASS
GF_WET CHANGING	100	0	0.00	0.00	-	PASS
SF_CLUB ROOM	100	0	0.00	0.00	-	PASS
SF_CLUB ROOM	100	0	0.00	0.00	-	PASS
SF_DRY CHANGING (F)	100	0	0.00	0.00	-	PASS
SF_DRY CHANGING (M)	100	0	0.00	0.00	-	PASS
SF_STUDIO 01	100	0	0.00	0.00	-	PASS
SF_STUDIO 02	100	0	0.00	0.00	-	PASS
SF_STUDIO 03	100	0	0.00	0.00	-	PASS

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GURNELL LEISURE CENTRE, - CIBSE TM52 Overheating Assessment

Weather File: London/Heathrow Airport DSY2

The TM52 Adaptive Comfort analysis tool within IES is capable of assessing the overheating criteria of a building based on the following three criteria.

Criteria 1:

The first criterion sets a limit for the number of hours that the operative temperature can exceed the threshold comfort temperature (upper limit of the range of comfort temperature) by 1°C or more during the occupied hours of a typical non-heating season (1st May to 30th September).

The number of hours during which ΔT is greater than or equal to one degree during the period May to September inclusive shall not be more than **3 per cent** of occupied hours.

Criteria 2:

The second criterion deals with the severity of overheating within any one day, which can be as important as its frequency, the level of which is a sum of both temperature rise and its duration. This criterion sets a daily limit for acceptability.

To allow for the severity of overheating the weighted exceedance shall be less than or equal to **6 in any one day**.

Criteria 3:

The third criterion sets an absolute maximum daily temperature for a room, beyond which the level of overheating is unacceptable.

To set an absolute maximum value for the indoor operative temperature the value of ΔT shall not exceed **4K**.

In order to show that the proposed space will not suffer overheating two of these three criteria must be met.

Room Name	Occupied days (%)	Criteria 1	Criteria 2	Criteria 3	Which Criteria failing?	TM52 Criteria met ?
PASS						
FF_GYM	100	0	0.00	0.00	-	PASS
FF_GYM OFFICE	100	0	0.00	0.00	-	PASS
FF_PARTY ROOM 01	100	0	0.00	0.00	-	PASS
FF_PARTY ROOM 02	100	0	0.00	0.00	-	PASS
GF_FIRST AID	100	0	0.00	0.00	-	PASS
GF_OFFICE	100	0	0.00	0.00	-	PASS
GF_OFFICE	100	0	0.00	0.00	-	PASS
GF_RECEPTION	100	0	0.00	0.00	-	PASS
GF_SERVERY/CAFE	100	0	0.00	0.00	-	PASS
GF_SOFT PLAY	100	0	0.00	0.00	-	PASS
GF_WET CHANGING	100	0	0.00	0.00	-	PASS
SF_CLUB ROOM	100	0	0.00	0.00	-	PASS
SF_CLUB ROOM	100	0	0.00	0.00	-	PASS
SF_DRY CHANGING (F)	100	0	0.00	0.00	-	PASS
SF_DRY CHANGING (M)	100	0	0.00	0.00	-	PASS
SF_STUDIO 01	100	0	0.00	0.00	-	PASS
SF_STUDIO 02	100	0	0.00	0.00	-	PASS
SF_STUDIO 03	100	0	0.00	0.00	-	PASS
Fail						
-	-	-	-	-	-	-

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GURNELL LEISURE CENTRE, - CIBSE TM52 Overheating Assessment

Weather File: London/Heathrow Airport DSY3

The TM52 Adaptive Comfort analysis tool within IES is capable of assessing the overheating criteria of a building based on the following three criteria.

Criteria 1:

The first criterion sets a limit for the number of hours that the operative temperature can exceed the threshold comfort temperature (upper limit of the range of comfort temperature) by 1°C or more during the occupied hours of a typical non-heating season (1st May to 30th September).

The number of hours during which ΔT is greater than or equal to one degree during the period May to September inclusive shall not be more than **3 per cent** of occupied hours.

Criteria 2:

The second criterion deals with the severity of overheating within any one day, which can be as important as its frequency, the level of which is a sum of both temperature rise and its duration. This criterion sets a daily limit for acceptability.

To allow for the severity of overheating the weighted exceedance shall be less than or equal to **6 in any one day**.

Criteria 3:

The third criterion sets an absolute maximum daily temperature for a room, beyond which the level of overheating is unacceptable.

To set an absolute maximum value for the indoor operative temperature the value of ΔT shall not exceed **4K**.

In order to show that the proposed space will not suffer overheating two of these three criteria must be met.

Room Name	Occupied days (%)	Criteria 1	Criteria 2	Criteria 3	Which Criteria failing?	TM52 Criteria met ?
PASS						
FF_GYM	100	0	0.00	0.00	-	PASS
FF_GYM OFFICE	100	0	0.00	0.00	-	PASS
FF_PARTY ROOM 01	100	0	0.00	0.00	-	PASS
FF_PARTY ROOM 02	100	0	0.00	0.00	-	PASS
GF_FIRST AID	100	0	0.00	0.00	-	PASS
GF_OFFICE	100	0	0.00	0.00	-	PASS
GF_OFFICE	100	0	0.00	0.00	-	PASS
GF_RECEPTION	100	0	0.00	0.00	-	PASS
GF_SERVERY/CAFE	100	0	0.00	0.00	-	PASS
GF_SOFT PLAY	100	0	0.00	0.00	-	PASS
GF_WET CHANGING	100	0	0.00	0.00	-	PASS
SF_CLUB ROOM	100	0	0.00	0.00	-	PASS
SF_CLUB ROOM	100	0	0.00	0.00	-	PASS
SF_DRY CHANGING (F)	100	0	0.00	0.00	-	PASS
SF_DRY CHANGING (M)	100	0	0.00	0.00	-	PASS
SF_STUDIO 01	100	0	0.00	0.00	-	PASS
SF_STUDIO 02	100	0	0.00	0.00	-	PASS
SF_STUDIO 03	100	0	0.00	0.00	-	PASS
Fail						
-	-	-	-	-	-	-

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Wornington Greens - CIBSE TM59 Overheating Assessment

Weather File: London_LHR_DSY1_2020High50.epw

Criteria for homes predominantly naturally ventilated

Compliance is based on passing both of the following two criteria:
Criteria 1:
For living rooms, kitchens and bedrooms: the number of hours during which ΔT is greater than or equal to one degree (K) during the period May to September inclusive shall not be more than **3 per cent** of occupied hours. (CIBSE TM52 Criterion 1: Hours of exceedance).
Criteria 2:
*For bedrooms only: t*o guarantee comfort during the sleeping hours the operative temperature in the bedroom from 10 pm to 7 am shall not exceed 26°C for more than 1% of annual hours. (Note: 1% of the annual hours between 22:00 and 07:00 for bedrooms is 32 hours, so 32 or more hours above 26°C will be recorded as a fail)

The overheating test for corridors is based on the number of annual hours for which the operative temperature exceeds 28°C should not be more than 3%.While there is no mandatory target to meet for corridors but if the number of hours exceeds then this should be identified as a significant risk.

Criteria for homes predominantly naturally ventilated

Compliance is based on passing both of the following two criteria:
Criteria 1:
For living rooms, kitchens and bedrooms: the number of hours during which ΔT is greater than or equal to one degree (K) during the period May to September inclusive shall not be more than **3 per cent** of occupied hours. (CIBSE TM52 Criterion 1: Hours of exceedance).
Criteria 2:
*For bedrooms only: t*o guarantee comfort during the sleeping hours the operative temperature in the bedroom from 10 pm to 7 am shall not exceed 26°C for more than 1% of annual hours. (Note: 1% of the annual hours between 22:00 and 07:00 for bedrooms is 32 hours, so 32 or more hours above 26°C will be recorded as a fail)

The overheating test for corridors is based on the number of annual hours for which the operative temperature exceeds 28°C should not be more than 3%.While there is no mandatory target to meet for corridors but if the number of hours exceeds then this should be identified as a significant risk.

BUILDING A (BA)

Room Name	Criteria 1	Criteria 2		Which Criteria failing?	TM59 Criteria met ?
		No. of Hours	% of Hours		
Bedroom					
L02:BA_01_1BED DOUBLE BEDROOM	0.3	30	0.91	-	PASS
L02:BA_02_2BED_ DOUBLE BEDROOM	0.8	23	0.70	-	PASS
L02:BA_02_2BED_ SINGLE BEDROOM	1.2	24	0.73	-	PASS
L08:BA_01_2BED_ SINGLE BEDROOM 2	0.9	21	0.64	-	PASS
L08:BA_01_2BED_ DOUBLE BEDROOM 1	0.7	21	0.64	-	PASS
L08:BA_02_2BED_ DOUBLE BEDROOM	0.9	21	0.64	-	PASS
L08:BA_02_2BED_ SINGLE BEDROOM	1.2	23	0.70	-	PASS
L08:BA_06_3BED_ DOUBLE BEDROOM 1	1.1	23	0.70	-	PASS
L08:BA_06_3BED_ DOUBLE BEDROOM 2	1.3	24	0.73	-	PASS
L08:BA_06_3BED_ SINGLE BEDROOM	1	26	0.79	-	PASS
L08:BA_07_3BED_ DOUBLE BEDROOM 1	0.9	23	0.70	-	PASS
L08:BA_07_3BED_ SINGLE BEDROOM 2	0.8	22	0.67	-	PASS
L08:BA_07_3BED_ SINGLE BEDROOM 3	0.8	25	0.76	-	PASS
L13:BA_01_2BED_ SINGLE BEDROOM 2	1.1	17	0.52	-	PASS
L13:BA_01_2BED_ DOUBLE BEDROOM 1	0.8	18	0.55	-	PASS
L13:BA_02_2BED_ DOUBLE BEDROOM 1	0.9	17	0.52	-	PASS
L13:BA_02_2BED_ SINGLE BEDROOM 2	1.3	18	0.55	-	PASS
L13:BA_06_3BED_ DOUBLE BEDROOM 1	1.1	22	0.67	-	PASS
L13:BA_06_3BED_ DOUBLE BEDROOM 2	1.3	22	0.67	-	PASS
L13:BA_06_3BED_ SINGLE BEDROOM 3	0.9	24	0.73	-	PASS
L13:BA_07_3BED_ DOUBLE BEDROOM 1	1	20	0.61	-	PASS
L13:BA_07_3BED_ SINGLE BEDROOM 2	0.9	20	0.61	-	PASS
L13:BA_07_3BED_ SINGLE BEDROOM 3	0.9	22	0.67	-	PASS

Room Name	Criteria 1	TM59 Criteria met ?
Living Room and Kitchen		
L02:BA_01_1BED KITCHEN DINNING LIVING	0.6	PASS
L02:BA_02_2BED KITCHEN DINNING LIVING	2.8	PASS
L08:BA_01_2BED_ KITCHEN DINNING LIVING	2.3	PASS
L08:BA_02_2BED_ KITCHEN DINNING LIVING	2.8	PASS
L08:BA_06_3BED_ KITCHEN DINNING LIVING	2.4	PASS
L08:BA_07_3BED_ KITCHEN DINNING LIVING	2.7	PASS
L13:BA_01_2BED_ KITCHEN DINNING LIVING	2.4	PASS
L13:BA_02_2BED_ KITCHEN DINNING LIVING	2.6	PASS
L13:BA_06_3BED_ KITCHEN DINNING LIVING	2.6	PASS
L13:BA_07_3BED_ KITCHEN DINNING LIVING	3.0	PASS

BUILDING B (BB)

Room Name	Criteria 1	Criteria 2		Which Criteria failing?	TM59 Criteria met ?
		No. of Hours	% of Hours		
Bedroom					
L02:BB_02_2BED_ DOUBLE BEDROOM	0.7	23	0.70	-	PASS
L02:BB_02_2BED_ SINGLE BEDROOM	1	22	0.67	-	PASS
L08:BB_02_2BED_ DOUBLE BEDROOM	0.8	23	0.70	-	PASS
L08:BB_02_2BED_ SINGLE BEDROOM	1	21	0.64	-	PASS
L08:BB_06_2BED_ DOUBLE BEDROOM 1	0.7	22	0.67	-	PASS
L08:BB_06_2BED_ DOUBLE BEDROOM 2	0.8	22	0.67	-	PASS
L08:BB_07_2BED_ DOUBLE BEDROOM 1	0.8	21	0.64	-	PASS
L08:BB_07_2BED_ DOUBLE BEDROOM 2	1.1	25	0.76	-	PASS
L14:BB_02_2BED_ DOUBLE BEDROOM 1	0.8	17	0.52	-	PASS
L14:BB_02_2BED_ SINGLE BEDROOM 2	1	19	0.58	-	PASS
L14:BB_06_2BED_ DOUBLE BEDROOM 1	0.8	18	0.55	-	PASS
L14:BB_06_2BED_ DOUBLE BEDROOM 2	1	17	0.52	-	PASS
L14:BB_07_2BED_ DOUBLE BEDROOM 1	1	17	0.52	-	PASS
L14:BB_07_2BED_ DOUBLE BEDROOM 2	1.2	18	0.55	-	PASS

Room Name	Criteria 1	TM59 Criteria met ?
Living Room and Kitchen		
L02:BB_02_2BED KITCHEN DINNING LIVING	2.4	PASS
L08:BB_02_2BED_ KITCHEN DUNNING LIVING	2.4	PASS
L08:BB_06_2BED_ KITCHEN DUNNING LIVING	2.1	PASS
L08:BB_07_2BED_ KITCHEN DUNNING LIVING	2.8	PASS
L14:BB_02_2BED_ KITCHEN DUNNING LIVING	2.6	PASS
L14:BB_06_2BED_ KITCHEN DUNNING LIVING	2.4	PASS
L14:BB_07_2BED_ KITCHEN DUNNING LIVING	2.6	PASS
		PASS

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Wornington Greens - CIBSE TM59 Overheating Assessment

Weather File: London_LHR_DSY1_2020High50.epw

Criteria fro homes predominantly naturally ventilated

Compliance is based on passing both of the following two criteria:
Criteria 1:
For living rooms, kitchens and bedrooms: the number of hours during which ΔT is greater than or equal to one degree (K) during the period May to September inclusive shall not be more than **3 per cent** of occupied hours. (CIBSE TM52 Criterion 1: Hours of exceedance).
Criteria 2:
For bedrooms only: to guarantee comfort during the sleeping hours the operative temperature in the bedroom from 10 pm to 7 am shall not exceed 26°C for more than 1% of annual hours. (Note: 1% of the annual hours between 22:00 and 07:00 for bedrooms is 32 hours, so 32 or more hours above 26°C will be recorded as a fail)

The overheating test for corridors is based on the number of annual hours for which the operative temperature exceeds 28°C should not be more than 3%.While there is no mandatory target to meet for corridors but if the number of hours exceeds then this should be identified as a significant risk.

BUILDING CD

Room Name	Criteria 1	Criteria 2		Which Criteria failing?	TM59 Criteria met ?
		No. of Hours	% of Hours		
Bedroom					
L02:CD 01_2BED_DOUBLE BEDROOM 02	1.1	24	0.73	-	PASS
L02:CD 01_2BED_DOUBLE BEDROOM 01	0.9	24	0.73	-	PASS
L02:CD 02_1BED_DOUBLE BEDROOM	0.9	25	0.76	-	PASS
L02:CD 05_3BED_DOUBLE BEDROOM 02	0.8	21	0.64	-	PASS
L02:CD 05_3BED_SINGLE BEDROOM	0.8	24	0.73	-	PASS
L02:CD 05_3BED_DOUBLE BEDROOM 01	0.8	19	0.58	-	PASS
L02:CD 04_2BED_DOUBLE BEDROOM 02	0.7	23	0.70	-	PASS
L02:CD 04_2BED_DOUBLE BEDROOM 01	0.9	15	0.46	-	PASS
L02:CD 03_STUDIO_BEDROOM/KITCHEN	0.5	19	0.58	-	PASS
L05:CD 01_2BED_DOUBLE BEDROOM 02	1.1	24	0.73	-	PASS
L05:CD 01_2BED_DOUBLE BEDROOM 01	0.9	23	0.70	-	PASS
L05:CD 02_1BED_DOUBLE BEDROOM	1	25	0.76	-	PASS
L05:CD 05_3BED_DOUBLE BEDROOM 02	0.7	21	0.64	-	PASS
L05:CD 05_3BED_SINGLE BEDROOM	0.8	25	0.76	-	PASS
L05:CD 05_3BED_DOUBLE BEDROOM 01	0.8	19	0.58	-	PASS
L05:CD 04_2BED_DOUBLE BEDROOM 02	1	22	0.67	-	PASS
L05:CD 04_2BED_DOUBLE BEDROOM 01	1	18	0.55	-	PASS
L05:CD 03_STUDIO_BEDROOM/KITCHEN	0.6	19	0.58	-	PASS
L12:CD 01_2BED_DOUBLE BEDROOM 02	1	20	0.61	-	PASS
L12:CD 01_2BED_DOUBLE BEDROOM 01	1	17	0.52	-	PASS
L12:CD 05_3BED_DOUBLE BEDROOM 02	0.9	19	0.58	-	PASS
L12:CD 05_3BED_SINGLE BEDROOM	0.9	23	0.70	-	PASS
L12:CD 05_3BED_DOUBLE BEDROOM 01	0.9	19	0.58	-	PASS
L12:CD 04_2BED_DOUBLE BEDROOM 02	1.1	21	0.64	-	PASS
L12:CD 04_2BED_DOUBLE BEDROOM 01	1.1	16	0.49	-	PASS
L12:CD 03_STUDIO_BEDROOM/KITCHEN	0.6	19	0.58	-	PASS
L16:CD 05_3BED_DOUBLE BEDROOM 02	0.8	16	0.49	-	PASS
L16:CD 05_3BED_SINGLE BEDROOM	0.9	19	0.58	-	PASS
L16:CD 05_3BED_DOUBLE BEDROOM 01	1	15	0.46	-	PASS
L16:CD 04_2BED_DOUBLE BEDROOM 02	1.3	19	0.58	-	PASS
L16:CD 04_2BED_DOUBLE BEDROOM 01	1.2	15	0.46	-	PASS
L16:CD 03_STUDIO_BEDROOM/KITCHEN	0.8	17	0.52	-	PASS
L12:CD 02_3BED_DOUBLE BEDROOM 01	1.1	15	0.46	-	PASS
L12:CD 02_3BED_DOUBLE BEDROOM 02	1.1	20	0.61	-	PASS
L12:CD 02_3BED_SINGLE BEDROOM	1.1	19	0.58	-	PASS

Room Name	Criteria 1	TM59 Criteria met ?
Living Room and Kitchen		
L02:CD 01_2BED_LIVING/ KITCHEN	2.8	PASS
L02:CD 02_1BED_LIVING/KITCHEN	1	PASS
L02:CD 05_3BED_LIVING/ KITCHEN	2	PASS
L02:CD 04_2BED_LIVING/ KITCHEN	2.4	PASS
L05:CD 01_2BED_LIVING/ KITCHEN	2.8	PASS
L05:CD 05_3BED_LIVING/ KITCHEN	2.1	PASS
L05:CD 04_2BED_LIVING/ KITCHEN	2.7	PASS
L12:CD 01_2BED_LIVING/ KITCHEN	2.7	PASS
L12:CD 05_3BED_LIVING/ KITCHEN	2.2	PASS
L12:CD 04_2BED_LIVING/ KITCHEN	2.8	PASS
L16:CD 05_3BED_LIVING/ KITCHEN	2.4	PASS
L16:CD 04_2BED_LIVING/ KITCHEN	2.7	PASS
L12:CD 02_3BED_LIVING / KITCHEN	2.5	PASS
L05:CD 02_1BED_LIVING/KITCHEN	1	PASS

Criteria for homes predominantly naturally ventilated

Compliance is based on passing both of the following two criteria:
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For living rooms, kitchens and bedrooms: the number of hours during which ΔT is greater than or equal to one degree (K) during the period May to September inclusive shall not be more than **3 per cent** of occupied hours. (CIBSE TM52 Criterion 1: Hours of exceedance).
Criteria 2:
For bedrooms only: to guarantee comfort during the sleeping hours the operative temperature in the bedroom from 10 pm to 7 am shall not exceed 26°C for more than 1% of annual hours. (Note: 1% of the annual hours between 22:00 and 07:00 for bedrooms is 32 hours, so 32 or more hours above 26°C will be recorded as a fail)

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BUILDING EF

Room Name	Criteria 1	Criteria 2		Which Criteria failing?	TM59 Criteria met ?
		No. of Hours	% of Hours		
Bedroom					
L02:EF 03_2BED_DOUBLE BEDROOM 01	0.6	25	0.76	-	PASS
L02:EF 03_2BED_SINGLE BEDROOM	0.5	19	0.58	-	PASS
L02:EF 01_2BED_DOUBLE BEDROOM 01	0.9	25	0.76	-	PASS
L02:EF 01_2BED_DOUBLE BEDROOM 02	1.1	19	0.58	-	PASS
L02:EF 02_1BED_DOUBLE BEDROOM	0.6	19	0.58	-	PASS
L05:EF 03_2BED_DOUBLE BEDROOM 01	0.4	30	0.91	-	PASS
L05:EF 03_2BED_SINGLE BEDROOM	0.5	18	0.55	-	PASS
L05:EF 01_2BED_DOUBLE BEDROOM 01	0.8	26	0.79	-	PASS
L05:EF 01_2BED_DOUBLE BEDROOM 02	1.1	19	0.58	-	PASS
L05:EF 02_1BED_DOUBLE BEDROOM	0.7	19	0.58	-	PASS
L09:EF 02_2BED_DOUBLE BEDROOM 02	1.1	16	0.49	-	PASS
L09:EF 02_2BED_DOUBLE BEDROOM 01	1	19	0.58	-	PASS
L09:EF 01_2BED_DOUBLE BEDROOM 01	1.2	17	0.52	-	PASS
L09:EF 01_2BED_DOUBLE BEDROOM 02	1	20	0.61	-	PASS

Room Name	Criteria 1	TM59 Criteria met ?
Living Room and Kitchen		
L02:EF 03_2BED_LIVING / KITCHEN	1	PASS
L02:EF 01_2BED_LIVING / KITCHEN	2.7	PASS
L02:EF 02_1BED_LIVING / KITCHEN	1.1	PASS
L05:EF 03_2BED_LIVING / KITCHEN	1.1	PASS
L05:EF 01_2BED_LIVING / KITCHEN	2.8	PASS
L05:EF 02_1BED_LIVING / KITCHEN	1.2	PASS
L09:EF 02_2BED_LIVING / KITCHEN	2.5	PASS
L09:EF 01_2BED_LIVING / KITCHEN	2.5	PASS

GURNELL LEISURE CENTRE

FULL PLANNING APPLICATION

RESIDENTIAL TRAVEL PLAN

DECEMBER 2018

ECOWORLD INTERNATIONAL
CREATING TOMORROW & BEYOND

Ealing

GURNELL LEISURE CENTRE, EALING
RESIDENTIAL TRAVEL PLAN

SYSTRA

GURNELL LEISURE CENTRE, EALING

RESIDENTIAL TRAVEL PLAN

IDENTIFICATION TABLE	
Client/Project Owner	BE:HERE EALING LIMITED
Project	Gurnell Leisure Centre, Ealing
Study	Residential Travel Plan
Type of Document	Final Report
Date	14/12/2018
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APPROVAL

Version	Name		Position	Date	Modifications
1	Author	Peter May	Consultant	19/10/2017	Draft for Review
	Checked by	David Watson	Principal	19/10/2017	
	Approved by	Jamshid Soheili	Project Director	21/11/2017	
2	Author	James Rhodes/ Emma Jolly	Senior Consultant	10/12/2018	Updated Draft for Review
	Checked by	Jamshid Soheili	Project Director	10/12/2018	
	Approved by	Jamshid Soheili	Project Director	10/12/2018	
3	Author	James Rhodes/ Emma Jolly	Senior Consultant	14/12/2018	Final Report
	Checked by	Jamshid Soheili	Project Director	14/12/2018	
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1. INTRODUCTION

1.1 General

1.1.1 SYSTRA Ltd (SYSTRA) has been commissioned to provide transport and highways advice in relation to a Proposed Development at Gurnell Leisure Centre, Ruislip Road East, London, W13 0AL

1.1.2 This document has been prepared by SYSTRA on behalf of BE:HERE EALING LIMITED ("the Applicant") in support of a Full Planning Application for the demolition of the existing Gurnell Leisure Centre ("the Application Site") and the construction of a new leisure centre alongside enabling residential uses.

1.1.3 The Local Planning Authority and Highways Authority is the London Borough of Ealing (LBE). The Site is located in close proximity to the A40, which is part of the Transport for London Road Network (TLRN) and maintained by TfL. The Site itself is set within an area of Metropolitan Open Land (MOL).

1.1.4 The Site is bordered by the River Brent to the north and west, Argyle Road to the east and Ruislip Road East to the south. Pearl Gardens cul-de-sac is also located to the east of the Site, west of Argyle Road.

1.2 Existing Site & Proposed Development

1.2.1 Gurnell Leisure Centre currently occupies the Site to the southwest with ground level on-site car parking to the southeast. Located further north between the leisure centre and car park is a BMX track, concrete skate park and children's play area; there is a sports field in the north of the Site. A public right of way follows the bank of the River Brent within the site to the west. Access to the leisure centre and car park is from Ruislip Road East, where a new Quietway has recently been constructed along the northern footway.

1.2.2 This planning application for the redevelopment of the Application Site seeks full planning permission for:

> "Demolition of all existing buildings and re-provision of leisure centre, car and coach parking, BMX track and skate park, alongside enhancements and access to the existing park; and the erection of up to 498 sqm retail floorspace (Class A1-A3) and 615 residential units, with associated landscaping, playspace, cycle and car parking, refuse storage, access and servicing." (The Proposed Development).

1.3 Report Scope

1.3.1 This Travel Plan (TP) has been prepared in accordance with the Communities and Local Government Planning Practice Guidance and the general requirements of the Transport for London (TfL) 'Travel Planning Guidance', Transport for London (2013) and local policy.

1.3.2 The TP aims to demonstrate a commitment to creating a sustainable development which promotes the use of walking, cycling and public transport and will reduce reliance on the private car.

1.3.3 It should be noted that this TP will cover the residential elements of the Site. The TP will be updated upon completion of the project in order to include the results of the baseline surveys undertaken at the Site.

1.4 Travel Plan Structure

1.4.1 Following this introduction, the TP is structured as follows:

- **Section 2: Baseline Conditions** – Provides an overview of the existing transport conditions prevailing at the site and in the immediate surrounding area;
- **Section 3: Development Overview** – Describes the development proposals at the Site;
- **Section 4: Aim, Objectives & Targets** – Outlines the aim, objectives and targets associated with the TP, as well as the existing travel patterns;
- **Section 5: Travel Plan Measures –** Outlines the proposed measures that will be implemented for the residential Site elements;
- **Section 6: Monitoring Strategy** – Describes how the success of the TP will be monitored over time;
- **Section 7: Action Plan** – Sets out the Action Plan for delivering the TP; and
- **Section 8: Summary and Conclusions** – Outlines the main conclusions drawn from the TP.

2. BASELINE CONDITIONS

2.1 General

2.1.1 This section of the TP describes the existing or baseline conditions currently prevailing at the Site and in the surrounding area.

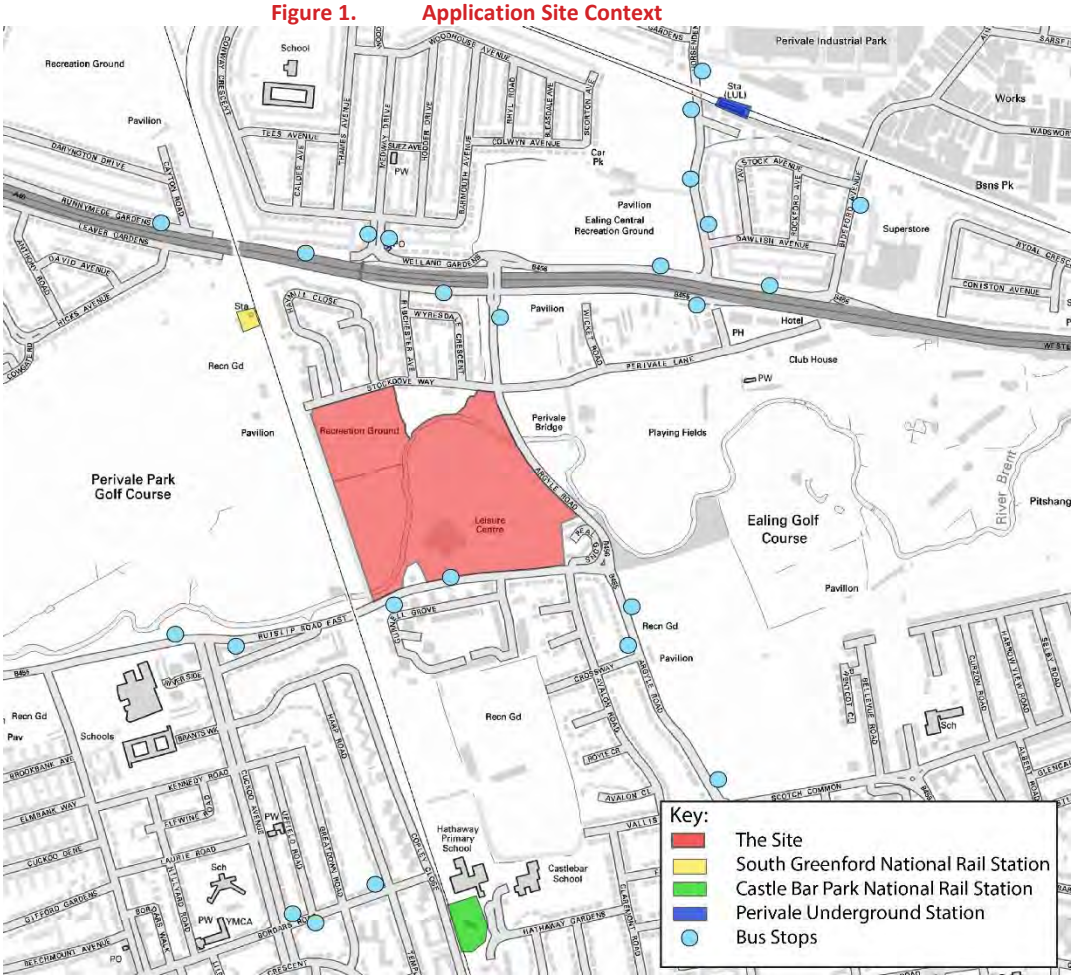
2.1.2 Baseline conditions are needed to accurately establish and fully understand the context of the Proposed Development and associated traffic and transport implications.

2.2 Site Location & Description

2.2.1 The Application Site is located within the London Borough of Ealing, between Greenford to the west and Perivale to the east. The Application Site is bound to the north by Stockdove Way and the River Brent, to the west via the footpath adjacent to the Greenford Railway line, to the east via Argyle Road (B456), as well as residential dwellings on Pearl Gardens to the south east. Playing fields and Ealing golf course are located further east. Ruislip Road East (B455) forms the southern boundary of the Application Site with residential dwellings beyond.

2.2.2 A map showing the Site location in context can be seen in **Figure 1** below.

Figure 1. Application Site Context



2.3 Existing Site

2.3.1 The Site is currently occupied by Gurnell Leisure Centre towards the south west with ground level car parking in the south east corner. There is also a BMX track, concrete skate park and children's play area and sports field to the north of the existing Site.

2.3.2 The Leisure Centre is approximately 8m above existing ground levels and has the provision for a 50m six lane Olympic swimming pool, 25m recreation pool, sauna and steam rooms, exercise studios, gym, changing rooms and staff facilities. There are also three outdoor football pitches, one 11-a-side, one 9-a-side and one 7-a-side. It currently accommodates 45 staff members.

2.3.3 The leisure centre is open 06:30-22:00 Monday to Friday and 08:00-20:00 on Saturday and Sunday.

Cycle Parking

2.3.4 There are currently 15 cycle parking spaces on Site, situated in clusters adjacent to the leisure centre and skate park facilities. The next nearest available cycle parking is located at Castle Bar Park to the south of the Site.

Car Parking

2.3.5 There are two car parks present at the existing Site, the main public car park has 175 parking spaces as well as four coach bay spaces. The second private car park, for staff, permit holders and deliveries only, has 19 car parking spaces as well as two turning areas.

Access

2.3.6 Pedestrian and vehicular access to the Site is from the south off Ruislip Road East. There are two vehicular access points, one into the main public car park and one for staff use only. It is noted that the staff only access is shared by a residential dwelling to the west. Surveys were undertaken of the existing access points to assess the current demand for parking, the results can be seen below.

2.4 Highway Network

Ruislip Road East

2.4.1 Ruislip Road East (B455) is a single carriageway two-way street which provides main access to the Site. The road widens to provide two eastbound lanes directly outside the leisure centre for approximately 330 metres. The speed limit is 30mph and there is car parking along the southern edge of the road in front of residential properties.

2.4.2 In September 2017 the Ruislip Road East Quietway was installed, narrowing the available carriageway. It runs from Clifton Road to Argyle Road, improving the opportunity for active travel through the area. This is a shared cycle route for pedestrians and cyclists and runs directly outside Gurnell Leisure Centre and past the two access points.

Argyle Road

2.4.3 Argyle Road (B456) is a 30mph, single carriageway road with flares on the approach to the junction with Ruislip Road East.

2.4.4 It connects Ruislip Road East with the A40 to the north of the Site. To the south, Argyle Road connects the Site to Ealing Town Centre as well as West Ealing Station and Ealing Broadway.

2.5 On-Street Parking

2.5.1 Parking is limited along the stretch of Ruislip Road East directly in front of the Site owing to double yellow lines. The Site is not located within a CPZ and is unrestricted outside residential properties on the south side of the carriageway.

2.5.2 The Site is not located within a Controlled Parking Zone (CPZ).

2.6 Public Transport Accessibility & Services

2.6.1 Public Transport Accessibility Levels (PTALs) are 'a detailed and accurate measure of the accessibility of a point to the public transport network, taking into account walk access time and service availability. The method is essentially a way of measuring the density of the public transport network at any location within Greater London' (TfL; Measuring Public Transport Accessibility Levels, April 2010). The ratings range from 1a (very poor) to 6b (excellent).

2.6.2 The PTAL rating for the Site has been calculated using the TfL "WebCAT assessment tool. The Application Site is located within a PTAL area of 2 - 3, with the development itself wholly within PTAL 3 land which is classified as 'Moderate' and reflects the range of public transport services present in the vicinity of the Site. The full PTAL report can be found at **Appendix A**.

Bus Services

2.6.3 The nearest bus stops to the Site are approximately 65 metres away on Ruislip Road East and serve routes E2, E9, E5, E10 and E7 with a frequency per hour of 8, 5, 5, 4 and 5 respectively. The next available bus stops are located 490 metres away and serves route 297 with a frequency of 6 vehicles per hour. The nearest stop on Ruislip Road East can be seen in **Figure 2**.

Figure 2. Ruislip Road East Bus Stop

National Rail Services

2.6.4 Castle Bar Park National Rail Station is located to the southwest of the Site, approximately a 10 minute walk, providing direct trains to Greenford and West Ealing which is operated by Great Western Railway. These stations then go on to provide direct access to London Paddington.

2.6.5 South Greenford National Rail Station is located to the north of the Site, approximately a 20 minute walk. It is served by Great Western Railway and serves the same lines as Castle Bar National Rail Station. It is located within zone 4 of London's Travelcard zones.

Elizabeth Line (Crossrail)

2.6.6 A new Crossrail station is currently being constructed at West Ealing National Rail Station, approximately a 25 minute walk or seven minute bus journey away. This will provide connections into Central London (Bond Street) in approximately 12 minutes along with Heathrow and Berkshire. It is located within zone 4 of London's Travelcard zones. The upgrade is due to be opened for December 2019.

London Underground Services

2.6.7 Perivale underground station is located approximately a mile to the north of the Site and serves the central line on the West Ruislip branch. It is located within zone 4 of London's Travelcard zones. Bus 297 from Perivale station enables drop off at Ruislip Road East, a six minutes walking distance from Gurnell Leisure Centre.

2.7 Pedestrian & Cycle Access

2.7.1 A new cycle lane has been implemented along Ruislip Road East, which forms part of the Ruislip Road East Quietway. This is a shared segregated route for pedestrians and cyclists and runs from Clifton Road to Argyle Road. From Clifton Road the cycle route connects to residential streets and routes to the north toward Greenford; from Argyle Road cyclists can join routes through Pitshanger Park toward Hangar Lane and Park Royal.

2.7.2 There is a Santander Cycle docking station located at Castle Bar Park; this is within a 10 minute walk from the Site.

2.7.3 Public cycle parking is provided on Site with a total of 15 cycle parking spaces. The nearest cycle parking outside the Site is located at Castle Bar Park.

2.7.4 Pedestrian access to the Site is excellent with footways along all roads in the locality. Footways appear to be of good quality, particularly fronting the Site. Gurnell Leisure Centre, which is located on Metropolitan Open Land (MoL), also has a number of public rights of way connecting to the north, providing pedestrians with high quality green routes through the Site.

3. DEVELOPMENT OVERVIEW

3.1 General

3.1.1 This section of the report sets out the context of the Proposed Development including the landuse, access and parking proposals of the development.

3.1.2 It is noted that there are currently several existing public rights of way interacting with the Site, most notably the public footpaths through the Metropolitan Open Land (MoL) and the Ruislip Road East Quietway at the access points. Throughout the design process careful consideration has been given to their retention and, any rights of way associated with this scheme or any future scheme have been considered in the access design.

3.2 Development Proposals

3.2.1 The Proposed Development comprises:

> "Demolition of all existing buildings and re-provision of leisure centre, car and coach parking, BMX track and skate park, alongside enhancements and access to the existing park; and the erection of up to 498 sqm retail floorspace (Class A1-A3) and 615 residential units, with associated landscaping, playspace, cycle and car parking, refuse storage, access and servicing."

Residential Tenure

3.2.2 The development will provide private "for sale" units across a range of sizes (from studio to three bed), the percentage split of the units can be seen in **Table 1** below.

Table 1. Residential Unit Size Split

UNIT SIZE	NUMBER OF UNITS	%
Total		
Studio	61	10%
1Bed	276	45%
2 Bed	243	40%
3 Bed	35	6%
Total	**615**	**100%**

3.3 Access Strategy

Vehicular Access

3.3.1 The existing vehicular accesses into the Site will be retained in their current locations as part of the development. The eastern access includes some widening to accommodate coach manoeuvres when exiting the Site, with the majority of the widening being on the eastern side of the access junction given that coaches only exit from this junction.

3.3.2 The western access has been widened to accommodate coaches tuning into the Site and to allow two-way movement of vehicles through this access junction (coaches are prohibited from exiting via the eastern access). The majority of widening has occurred on the eastern side of the access junction to avoid conflict with the existing zebra crossing on the western side of the access junction on Ruislip Road.

3.3.3 The vehicle access and egress movements throughout the Site are shown in **Figure 3** below.

3.3.4 The eastern access junction is two–way operation and will be the main point of entry for the Site. This access serves entry and exit from the basement car park serving both the residential and leisure centre land uses. Additionally, coaches enter via the eastern access and exit via the western access via a one-way route through the Site, enabling drop-off within the designated drop-off zone. Refuse collection for the leisure centre and deliveries can also occur within the drop-off zone utilising the eastern access junction for entry and the western access junction for exit.

3.3.5 The western access junction is two-way operation providing the entry and exit for residential servicing including refuse collection, drop off and deliveries. Additionally, as stated above, coaches exit the Site via the western access junction.

Pedestrian Access

3.3.6 Pedestrian access to the Site will be gained from Ruislip Road East for both residents and leisure users. Paths will be created through the MoL, guiding site users to their destination and providing an attractive route for members of the public wishing to access the MoL to the north.

3.4 Parking

Car Parking

3.4.1 There will be a total of 344 car parking spaces on Site, 175 for staff/visitors and 169 for residents. The basement parking will provide space for 335 parking spaces and 9 are located at ground level. This provision is lower than the maximum residential car parking standards specified in the New Draft London Plan 2018.

3.4.2 The New Draft London Plan with minor suggested changes (August 2018) requires 3% of the total residential unit numbers to be provided with a parking space for the disabled, with 615 units this equates to 19 spaces for the disabled. Additionally, to accommodate changing needs in the future, there is a requirement for a future adaption strategy to allow an additional 7% of dwellings to be provided with a designated disabled persons parking space in the future if the demand did arise, equating to 43 additional parking spaces for the disabled.

3.4.3 In addition, car parking for disabled users ("blue badge parking") for the leisure centre should be determined according to usage of the sports facility. Sport England's publication "Accessible Sports Facilities 2010" recommends a minimum of 8 spaces or 8% of the total provision.

3.4.4 In line with Sport England policy 15 parking spaces for the disabled will be located in the centre basement car park (8%).

Cycle Parking

3.4.5 Cycle parking stores will be located on the ground floor of the residential building and the leisure centre, they will be secure, covered and are highly accessible by being located at ground floor with level access.

3.4.6 Based on minimum standards stipulated within the London Plan, the Site is required, and is providing, the following cycle parking:

- **C3 Residential (615 dwellings)** = 1,031 Long Stay and 17 Short Stay Spaces;
  - TOTAL = 1,048 spaces;
- **D2: Sports (11,354 sqm and 45 staff)** = 6 Long Stay and 114 Short Stay;
  - TOTAL = 120 spaces.
- **Total Spaces** = 1,037 Long Stay Spaces and 131 Short Stay.

3.5 Delivery & Servicing

3.5.1 All delivery and servicing activity will be accommodated on-site via the western access for the leisure centre and via the eastern access for residential land uses. The internal roads have been designed to a sufficient width to enable these movements to occur. Deliveries for the leisure centre can occur within the drop-off zone outside the leisure centre. Residential deliveries will occur via the drop-off zone in proximity to residential entrances. The zones will allow for multiple small delivery vehicles (3.5t) or 3 larger rigid delivery vehicles (7.5t) to service the development simultaneously.

Refuse Strategy

3.5.2 Ealing's SPG 4 'Storing Waste for Recycling and Disposal' states that "stands and enclosures must be located not more than 25m from the nearest access point for the collection vehicle, and wheeled refuse containers not more than 10m away from the vehicle access point, preferably on a level surface". Part H of the Building Regulations (2000) states that residents should not be required to carry waste more than 30m horizontally and waste collection vehicles should be able to get within 25m of the storage point.

3.5.3 All refuse activity will take place off-street, with refuse collection for the leisure centre taking place on the western loop within the coach parking bays.

3.5.4 Refuse collection for the residential uses will take place on the eastern loop with the refuse vehicle entering via the eastern access. A managed solution will be in place to move the bins on collection day from individual refuse stores within each block to the larger bin store located within Block E in order to ensure that the distances in paragraphs 5.4.2 remain true. To ensure the refuse collection can occur within 10m of the main bin store at Block E, the refuse vehicle will reverse to the southern side of Block E. As the route to the south side of Block E is not a primary vehicle route, no conflict with other vehicles will occur.

4. AIMS, OBJECTIVES AND TARGETS

4.1 General

4.1.1 This section of the TP sets out the aims and objectives for the Site. The objectives of the TP are in accordance with TfL and LBE goals, as well as contributing to the London Plan's aims of developing:

> *"…A city where it is easy, safe and convenient for everyone to access jobs, opportunities and facilities with an efficient and effective transport system that actively encourages more walking and cycling… and supports delivery of all the objectives of this Plan"*

4.2 Aim

4.2.1 The aim of this TP is to support the essential travel needs of the residents of the Proposed Development, and to encourage all users to adopt healthy and sustainable travel choices through walking, cycling and public transport, and subsequently reduce single occupancy vehicle trips.

4.3 Travel Plan Potential

4.3.1 The benefits of a well-managed TP will extend beyond Site users and contribute to improvements to local air quality, noise and vibration reduction, congestion and journey times. A reduction in car usage especially single occupancy vehicles, has a role in the wider health agenda to reduce public obesity levels and associated illnesses caused by sedentary lifestyles.

4.3.2 The objectives set therefore relate to all these benefits associated with the development of a TP.

4.4 Objectives

4.4.1 Objectives are the high-level aims of the TP. They help to give the TP direction and provide a clear focus. The specific objectives that focus this TP are:

- To raise awareness of sustainable 'smarter travel' modes available to all residents of the Site;
- To encourage active modes of travel, particularly walking and cycling, and to emphasise the health and financial benefits of these modes;
- To reduce the amount of single occupancy car trips to/from the Site; and
- To encourage good urban design that increases the permeability and vitality of the Site in order to improve the environment for walking and cycling.

4.5 Targets

4.5.1 Targets are measurable goals by which the progress of the TP will be assessed. Targets are essential for monitoring progress and success of the TP. Targets should be 'S.M.A.R.T' (Specific, Measurable, Achievable, Realistic and Time-bound) and are widely adopted in travel planning good practice.

4.5.2 The monitoring and review programmes will enable progress of the plan to be checked, but progress must be assessed in the context of specific targets, both short term and longer term increases in active travel by Site users. **Table 2** sets out the objectives and targets for the residential element of the Site.

Table 2. Objectives and Targets

OBJECTIVE NO.	OBJECTIVE	TARGETS
1	To raise awareness of sustainable 'smarter travel' modes available to all residents of the Site.	Ensure all residents are made aware of the TP through a resident welcome pack and public information.
2	To encourage active modes of travel, particularly walking and cycling, and to emphasise the health benefits of these modes.	Ensure welcome packs have a cost calculator and weight loss calculation for travel modes such as walking and cycling.
3	To reduce the amount of single occupancy car trips to/from the Site.	Reduce single occupancy vehicle use from its current mode share, and increase levels of public transport, walking and cycling use within the first five years of the TP.
4	To encourage good urban design that increases permeability and vitality of the Site in order to improve the environment for walking and cycling.	Implement the proposed public realm improvements within and around the Site.

4.6 Predicted Travel Patterns and Mode Share Targets

4.6.1 In order to understand the likely travel patterns of the daytime population at the Site, Census data has been used to provide a baseline modal split. The 2011 Census 'Travel to Work' dataset has been interrogated to obtain data for the Middle Super Output Area (MSOA) 'Ealing 016' where the Site is located.

4.6.2 The predicted modal split data for residents of the Proposed Development, extracted from the 2011 Census, is shown in **Table 3**.

Table 3. Method of Travel to Work Data for Residents

MODE	%
Underground, Metro, Light Rail, Tram	20%
Train	8%
Bus, Minibus or Coach	22%
Taxi	0%
Motorcycle, scooter or moped	1%
Driving a car or van	37%
Passenger in a car or van	2%
Bicycle	3%
On Foot	7%
Total	**100%**

Source: www.nomisweb.co.uk

4.6.3 It can be seen from **Table 3** that around a third of the population in the area surrounding the Site currently travel to work by driving a car or van (37%). Commuting by bus and London Underground are popular choices, at 22% and 20% of the population respectively. Cycling to work (3%) and traveling on foot (7%) make up relatively small proportions of the modal split.

4.6.4 It should be noted that while the above data provides a good indication of likely travel patterns, a full travel survey will be undertaken upon occupation of 50% of the residential units becoming occupied. Nevertheless, interim targets have been set based on the above data taking into account the Site's location and sustainable travel characteristics.

4.6.5 The interim targets for years 1, 3 and 5 are shown in **Table 4** for the residents at the Site.

Table 4. Residents Modal Split Targets

MODE	CENSUS DATA	YEAR 1	YEAR 3	YEAR 5
Underground, Metro, Light Rail, Tram	20%	20%	20%	20%
Train	8%	8%	9%	9%
Bus, Minibus or Coach	22%	23%	23%	24%
Taxi	0%	0%	0%	0%
Motorcycle, scooter or moped	1%	1%	1%	1%
Driving a car or van	37%	35%	34%	32%
Passenger in a car or van	2%	2%	2%	2%
Bicycle	3%	4%	4%	4%
On Foot	7%	7%	7%	8%
Total	**100%**	**100%**	**100%**	**100%**

4.6.6 **Table 4** shows targeted increases of shows targeted increases of public transport usage as well as walking and cycling levels for the future residents of the Site, away from car and van use over the first five years of the TP.

4.6.7 A 5% reduction in car or van use will be targeted in line with Objective 3 of this TP, in favour of a 2% increase to commuting by bus, and a 1% increase in train usage, cycling and walking to work. Increases in commuting by bus and train have been included due to the Site's accessibility to several services and stations, and that they are already established as popular modes of travel within the borough (Objective 1). Nominal increases to cycling and walking levels are also included, which coincides with Objectives 2 and 4 of this TP.

4.6.8 The targets represent what is considered to be an achievable increase in sustainable travel as a result of the introduction of the TP, along with the proposed measures as outlined in **Section 5**.

4.6.9 The targets also acknowledge that the baseline year will be the year where most modal shift gains can be made, due to the fact that the best time to influence travel behaviour at a new site is from the outset.

5. TRAVEL PLAN MEASURES

5.1 General

5.1.1 The aim of the TP is to provide information and to increase awareness of the options for travel available to residents of the Site, and to secure and promote incentives that encourage all Site users to actively choose sustainable travel wherever practical.

5.2 General Site Measures

Travel Plan Co-ordinator

5.2.1 All Travel Plans are dependent on a nominated individual being allocated the time and resources for successful implementation. The role will not require full time involvement and would therefore be combined with the individual's other day to day activities.

5.2.2 The Travel Plan Co-ordinator (TPC) for the development will be a named individual, and LBE will be contacted at least six months prior to first occupation with the chosen person's contact details. The TPC is expected to be a member of the managerial staff for the Site, which will allow them to provide a consistent approach to implementation of the TP across the employment elements of the Site.

5.2.3 The TPC will act as the day-to-day point of contact for enquiries, helping to develop and implement the measures proposed in this TP, and taking a lead role in the monitoring process.

5.2.4 The TPC will specifically be responsible for:

- Delivering TP initiatives across the Proposed Development;
- Reviewing data such as use of cycling facilities;
- Arranging for the submission of the full TP and TP reviews in years 1, 3, and 5.
- Reporting the findings of the travel surveys to LBE and for updating and refreshing the TP to take account of travel survey results; and
- Provision of information to residents prior to occupation (through the sales office/estate agent or similar); at occupation through the welcome pack; and throughout the duration of the TP by way of regular newsletters and noticeboard displays informing residents of local travel arrangements, road works, travel events etc.

5.2.5 It is not expected that the time spent by the TPC will be uniform throughout the lifespan of the TP, with the time varying from pre-occupation through to the organisation of travel planning activities and monitoring of the TP.

5.2.6 The provision of ongoing support and management are critical, and the provision of information and guidance to support sustainable travel choices will be an important element of the TPC's role.

Site-Wide Public Realm

5.2.7 To ensure that the Proposed Development can be considered sustainable it is critical that sustainable transport principles are incorporated into the development strategy from the outset.

5.2.8 The Proposed Development will therefore benefit from an attractive, well-lit and high quality public realm around the Site in order to encourage walking and cycling trips both during the day and at night.

5.2.9 Good transport infrastructure provides the foundation on which the remainder of the development is built. In addition to the provision of efficient public transport network, good cycle routes and pedestrian connectivity around the Site are paramount to encourage walking and cycling throughout the Site and to nearby services and amenities.

Notice Board

5.2.10 A notice board will be provided on Site specifically for disseminating information relating to sustainable travel promotion and the TP. The notice board will be placed within a communal area of the residential part of the Site to ensure visibility.

5.2.11 This measure will help ensure that Site users are continually made aware of the TP and its objectives, which will assist with meeting the mode share targets set for the Site. The regular updating of the notice boards by the TPC will be crucial to ensuring the information remains relevant.

Newsletter

5.2.12 The TPC will produce a Travel Plan newsletter annually which will be distributed electronically and in paper format to residents of the Site.

5.2.13 The newsletter will detail the progress of the Travel Plan, including against targets when travel surveys have been undertaken. The newsletter will also provide an opportunity to:

- Further encourage residents to travel sustainably;
- Promote upcoming travel events;
- Inform residents of any promotional offers and discounts;
- Make residents aware of any scheduled changes to public transport services, scheduled road works etc.; and
- Make residents aware of any new or improved sustainable travel facilities in the area.

5.3 Resident Measures

Open Day

5.3.1 The TP will also affect the existing residents in the immediate vicinity of the Site. In order to engage and consult with them, an open day will be arranged at a local centre to promote the measures identified in the TP. Any identified future residents of the Site will also be welcome to attend.

Welcome Packs

5.3.2 A resident's welcome pack will be developed which will be issued to all new residents. The TPC will provide travel information to be included. Providing this information in advance ensures that residents become aware of the various modes of transport and existing services that are available to them at the earliest opportunity.

5.3.3 It is anticipated that the packs would include the following information:

- Awareness of the health, economic and environmental benefits of walking and cycling;
- Safe and secure walking and cycling route maps, which will also highlight the walking distances from local public transport interchanges;
- Promotion of local cycle incentives: information about the availability of local cycle shops and any discounts or offers that may be available; and
- Information on third party car share and car club schemes, and links to websites.

5.3.4 The TPC will ensure that the above travel information is provided to each new resident through their welcome pack and the cost of this will be borne by the Client.

5.4 Pedestrian Measures

Site Infrastructure

5.4.1 Walking is a relaxing and enjoyable way to keep healthy, meet others and avoid the stress associated with car journeys. Through provision of route information, maps, personal travel planning and promotion of walking events, the TPC will promote the use of the local footway and public rights of way networks. Walking will be promoted as a way to access local facilities within Ealing and further afield including local recreation areas and other attractions which are not easily accessible on foot.

5.4.2 The Proposed Development has been designed to retain the Metropolitan Open Land and public rights of way surrounding the Site, and this will ensure attractive routes for pedestrian movement are maintained.

Information provision

5.4.3 The www.walkit.com walking route planner is an extremely useful tool and can plot a journey from postcode to postcode using a 'direct' or 'less busy' option. Route maps also include journey time, calorie burn, step count and carbon saving.

5.4.4 The TPC will promote national and international events such as Walk to Work week and World Car Free Day. These events would highlight the benefits of travelling via alternative modes to the car.

5.5 Cycle Measures

5.5.1 Regular cycling can help weight loss, stress reduction and improvements to fitness levels. Cycling is also one of the easiest ways to fit exercise into the daily routine. As a mode of transport it is the third most popular recreation activity in the UK according to NHS Choices. It is a low impact exercise which is better for joints than running or other high-impact aerobic exercise.

Cycle Parking

5.5.2 Secure cycle parking will be provided for residents at the Site. A key issue for cyclists is the safe and convenient storage of bicycles, and therefore this measure aims to meet this and encourage greater use of this mode.

Bicycle Purchase Schemes

5.5.3 The TPC will contact local bicycle shops to investigate opportunities for discounts on cycle equipment. Halfords, located near Ealing Broadway station, operate a tax-free Cycle2Work scheme which could be advertised to residents.

5.5.4 Residents will be informed about international and national events specifically related to cycling by the TPC.

Cycle Training

5.5.5 LBE offers up to 4 hours of free cycle training through www.cycletraining.co.uk for those who live, work or study in the borough. The scheme is available to beginners, advanced cyclists and families and is designed to give cyclists the skills and confidence to ride their bikes on local roads.

5.5.6 Dr Bike sessions also run throughout Ealing to check that people's bikes are roadworthy by looking at the brakes, gears and air pressure. Dates of the sessions can be found on the website.

TfL Cycle Maps

5.5.7 TfL produce free local cycling guides which show different types of cycle routes, all of which have been ridden and recommended by cyclists. The colours on or beside the roads and paths show the different route types.

5.5.8 A copy of Local Cycle Guide 6 which covers the Site and surrounding areas will be made available to all residents via the welcome pack. A link will also be provided by the TPC so that people can order additional guides.

TfL Journey Planner

5.5.9 The Site is located in close proximity to cycle routes, public transport options and amenities within comfortable walking and cycling distance.

5.5.10 TfL has developed a journey planner which can be filtered by mode: walk/cycle/drive/public transport, and also by speed: direct/flattest/quietest routes.

5.5.11 The journey planner gives point to point directions, approximate journey time, and step-free access information. The journey planner is located at www.tfl.gov.uk/plan-a-journey.

5.5.12 A link to the journey planner will be provided in the resident welcome pack and notice board.

5.6 Public Transport Measures

5.6.1 Publicity, marketing and promotion of the public transport services will inform residents of the benefits of travelling by bus and train in preference to private car. The TPC will ensure that residents are aware of bus routes and train timetables for public transport services operating in the vicinity of the development.

5.6.2 As outlined in Section 2, the Site is located within walking distance of six bus services. In addition, the TPC will seek to maximise the use of public transport in the following ways:

- Seek information from residents using public transport on ways in which services may be improved and feed this back to the service provider and the local authority through the regular liaisons which form part of the TPC's role.

- Obtain public transport 'taster' tickets in order to allow residents to test different travel options for free. This will seek to demonstrate the convenience of public transport options to residents who would normally drive to work.

5.7 Car Sharing

5.7.1 Whilst the TP includes objectives and targets to achieve an increase in travel by more sustainable travel modes, there will always be a proportion of journeys for which sustainable travel modes do not provide a suitable alternative and for which car-based travel is necessary. Accordingly, the TPC will promote car sharing for these journeys, meeting the objective for reducing single-occupancy car journeys from the development.

5.8 Marketing and Publicity

5.8.1 Sustainable travel information will be prominently displayed in the development. Maps will be displayed on the travel notice board showing the sustainable travel routes and opportunities available from the development along with the benefits of sustainable travel to residents. Thus, residents will be encouraged to be engaged with the TP and sustainable travel from first contact with the development.

5.8.2 Marketing and publicity will be undertaken by the TPC to:

- Raise awareness of the health and environmental benefits associated with the use of sustainable modes of travel;
- Promote local and national sustainable travel events and encourage residents to get involved;
- Promote the measures within this TP;
- Draw attention to improved sustainable travel routes, facilities, maps and timetables available in the local area; and
- Maintain awareness of the TP objectives and targets and the progress being made towards these.

5.8.3 The TPC will be responsible for devising suitable marketing materials and campaigns in order that the development makes progress towards the objectives and targets outline within the TP.

5.9 Travel Events

5.9.1 Travel events are a way of encouraging residents to try alternative modes of transport that they may not currently use – specifically walking and cycling. A well promoted travel event can encourage sustainable modal shift away from public transport towards active modes of travel which is in line with TfL policy.

5.9.2 The TPC will contact LBE for information on events happening in the local area and promote these to Site users. The following events are some that will be promoted:

Walk to Work Week

5.9.3 Walk to Work Week is a nationwide event developed by Living Streets which takes place annually in May. Living Streets has developed a website and a Commuter Challenge interface for Walk to Work Week, which is hosted at www.walktoworkweek.org.uk.

5.9.4 The TPC will also encourage uptake of Walk to Work Week Commuter Challenge.

Bike Week

5.9.5 TfL's Bike Week takes place as part of the National Bike Week annually in June. The 2017 event featured the following free events: bike breakfasts, Dr Bikes, bike marking and cycling classes to promote cycling in the borough.

5.9.6 The TPC will promote events being held during Bike Week. The TPC will register with Bike Week as an event organiser. Once registered, the TPC will be able to download Bike Week promotional material and access event organiser guides.

5.9.7 The TPC will promote the annual Bike Week to all Site users via TfL publicity documents, the welcome pack and the travel notice board.

Ealing Women on Wheels ('WOW')

5.9.8 LBE has launched a campaign to encourage more women to cycle as part of its new WOW campaign. The campaign features women who live and work in the borough who love to cycle. Activities include women-only cycle rides, cycle maintenance classes, free cycle training, social rides and free bike health checks across the borough.

5.10 Promotion of Sustainable and Healthy Travel

5.10.1 The Travel Plan Co-ordinator should make residents aware of contact telephone numbers and websites which provide information on access to the Site by non-car modes of travel. The main relevant websites are listed below:

- www.tfl.gov.uk: offerings information on travel choices and public transport journey planning;
- www.traveline.org.uk: national travel helpline to provide up to date public transport information; and
- www.networkrail.co.uk: provides the full mainline rail timetable and will provide journey times and will plan your mainline rail journey from origin to destination;
- www.thetrainline.com: permits rail tickets to be purchased over the internet;
- www.liftshare.com: free car-sharing and transport information service. The online matching service to find travel companions;
- www.travelwise.org.uk: background information on the content and operation of Travel Plans and safe travel to school;
- www.cyclecityguides.co.uk: this site hosts a cycle map database, which will enable residents to find cycle maps available for the chosen area.

5.11 Reducing the Need to Travel

Broadband Provision

5.11.1 All residential units will be provided with the appropriate infrastructure for enabling a broadband connection. This will ensure that residents have the option of working from home where appropriate.

Home Shopping Delivery

5.11.2 The TPC will promote home shopping delivery in order to reduce the number of vehicular trips made by users of the Site. This will also ensure that residents who are less mobile, or require large items, are able to have these delivered without relying on use of a private vehicle. The Delivery and Servicing Plan that accompanies this TP sets out the proposed management strategy for accommodating deliveries at the Site.

5.12 Summary

5.12.1 The measures outlined above are provided in order to encourage modal shift towards walking, cycling and public transport use through providing appropriate and attractive infrastructure, information provision and initiative promotion.

6. MONITORING STRATEGY

6.1 General

6.1.1 An important part of the TP is the continual monitoring and review of its effectiveness. It is essential that a TP is not a one-off event, but a continually evolving process.

6.1.2 Regular monitoring and reviewing will help to gauge progress towards targets and objectives, and, if necessary, enable the TP to be refined and adapted in order to improve its progression.

6.2 Targets

6.2.1 The success of the TP will be determined by whether it succeeds in meetings its stated targets. The predicted modal split has been extracted from the 2011 Census Method of Travel to Work Data, and has been discussed in **Section 4**. Targets will be updated following the baseline travel survey detailed below.

6.3 Monitoring

6.3.1 For the TP to be fully successful, its effects need to be recorded and assessed over time. The Client has agreed to pay the monitoring fee contributions required by LBE to cover officer time spent reviewing monitoring reports.

6.3.2 A methodology for the monitoring of the TP is detailed below.

6.3.3 The approach is in accordance with the TfL Travel Planning Guidance 2013 which states that:

> *'A clear monitoring programme should be provided detailing what and how frequently surveys will be undertaken (usually a baseline survey, and at years one, three and five), who will be responsible and how this information will be reported.'*

Baseline Travel Survey

6.3.4 Monitoring surveys will be undertaken within three months of 50% of the residential units being occupied using either a face-to-face or online travel survey. This will be the responsibility of the TPC.

6.3.5 The format, timing and results of the survey will be agreed in advance and reported to the LBE Travel Planning officers.

6.3.6 The surveys will be analysed in order to establish the effectiveness of the TP in achieving the aims and targets stated within it and will be used to identify any required modifications.

6.4 Frequency & Reporting

Repeat Surveys

6.4.1 As emphasised previously, TP monitoring is an important process to check that the TP is effective and progressing. Sufficient time and resources will be allocated to carry out the necessary surveys and the Client commits to arranging the monitoring surveys as and when necessary. The baseline survey will be conducted within three months of full occupation of the Site.

6.4.2 Further monitoring will take place in years 3 and 5 after the year 1 baseline in order to assess changes in accordance with TfL methodology. Further monitoring surveys will take place in the same month as the year 1 monitoring in order to ensure consistency.

6.4.3 The results of these TP monitoring surveys will be submitted to LBE through reports for review. These results will be submitted immediately following analysis of the data for each survey period.

6.4.4 It is noted that surveys can be undertaken using the iTRACE or TRICS methods, outlined below, TRICS surveys are usually appropriate for larger and more complex sites where the borough considers that the absolute numbers of vehicles coming onto site may be as important as the mode split. All developments for which a full TP is required should have a TRICS compliant monitoring survey, and TfL recommend that all other TPs should have iTRACE compliant surveys. The type of survey should be agreed at planning and will be specified in the Section 106 or planning condition.

iTRACE

6.4.5 iTRACE is an online tool, supported by TfL, which contains a range of online tools and standardised reports covering a range of topics from project management to performance monitoring. iTRACE compliance means that the following activities must be undertaken as part of the TP:

- An iTRACE compliant baseline survey (usually within six months of first occupation or at 75% occupancy if end user is unknown, whichever is sooner) to establish the baseline modal split. For developments where the end occupier is known at application stage, iTRACE compliant surveys should be undertaken where possible (eg where a workforce from the same company exists at a different site) to inform the travel plan to be submitted as part of the planning application;
- Periodic (one, three and five years post implementation) iTRACE compliant monitoring surveys. This enables modal shift to be identified;
- An organisation may wish to develop its own tailored questionnaire to meet the specific requirements of its site. This is acceptable as long as main mode data is collected. The main mode of travel is the mode that the respondent uses for the longest distance on any journey leg. So, while respondents may be asked to provide information for all legs of their journey, and to record time spent travelling on each leg, this is not a prerequisite to ensure compliancy;
- The answers to the main mode question should be used to identify the mode split for the site;
- Other data collected might include:
  - Personal information such as home postcode, job type, nature of work and working hours
  - Reasons for choice of travel mode and barriers to travel by sustainable modes
  - Attitudinal information about measures which are likely to encourage a switch to sustainable alternatives
  - The amount of business travel undertaken during the working day and opportunities for switching to alternatives
- Surveys should ideally be undertaken at a similar time each year and in a 'neutral' month, avoiding school holidays

6.4.6 Surveys may be undertaken online or via hardcopy and organisations should aim to achieve a response rate of at least 30% to provide assurance to the local authority that the same is representative.

TRICS

6.4.7 TRICS is the national standard system of trip generation and analysis in the UK and Ireland and contains over 6,500 directional transport surveys at over 110 types of development. It is recommended by TfL as the standard method of measuring the likely trips generated by new developments.

6.4.8 Inclusion of travel plan monitoring information in TRICS will enable future transport assessments to incorporate more accurate predictions. This may clarify the impact that a travel plan will have on trip generation when introduced as part of a development proposal, such as the influence of the specific travel plan measures on mode shift.

6.5 Enforcement

6.5.1 The TP will be secured via a S106 Agreement or planning condition for the Proposed Development. The TPC will monitor the success of the TP through the results of the TP monitoring surveys. In the case of the TP not meeting the modal shift targets set out in Section 4, the TPC will adopt further measures for increasing sustainable and active travel to work.

7. ACTION PLAN

7.1 General

7.1.1 This section draws together the proposals for TP implementation, monitoring and review. The actions which will be undertaken are summarised in the Action Plan, which indicates how the various elements of the plan will be come forward and how measures will be prioritised. Details of those responsible for each action and when they are due are also provided.

7.2 Funding

7.2.1 Sufficient budget and funding streams have been identified to carry out the measures in this TP, including the TPC post and monitoring programme. This will be fully funded by the Client.

7.2.2 The Action Plan for the residential parts of the Site is detailed in **Table 5**.

Table 5. Action Plan - Residential Element of Site

ACTION REF.	MODE	MEASURE	TASK	WHEN	BY WHOM
R1	All	Travel Plan Co-ordinator	Identify and appoint a Travel Plan Co-ordinator for the residential element of the Site to carry forward all tasks within the Action Plan.	Pre-occupation	Client
R2	All	Welcome Pack	Collate travel information (cycle maps, timetables, routes and fares etc.) for all sustainable modes of transport and put into a welcome pack for all new residents.	Pre-occupation	TPC
R3	Cycling	Cycle Parking Provision	Provide long-stay cycle parking for residents.	Pre-occupation	Client
R4	Car	Car Share Scheme	Promote existing car club and car share schemes to residents.	Upon occupation	TPC
R5	All	Notice Board	Provide and install a travel notice board in a visible area of the residential building.	Upon occupation	TPC
R6	All	Travel Events	TPC to arrange promotion of annual travel events including Bike Week, Walk to Work and TfL Commuter Challenge.	Upon occupation and annually thereafter.	TPC
R7	All	Baseline Monitoring and TP update	Undertake monitoring over a period of five years.	Within 3 months of 50% of the residential dwellings becoming occupied.	TPC

8. SUMMARY

8.1.1 This document has been prepared by SYSTRA on behalf of BE:HERE EALING LIMITED ("the Applicant") in support of a Full Planning Application for the demolition of the existing Gurnell Leisure Centre ("the Application Site") and the construction of a new leisure centre alongside enabling residential uses.

8.1.2 The Proposed Development comprises the "demolition of all existing buildings and re-provision of leisure centre, car and coach parking, BMX track and skate park, alongside enhancements and access to the existing park; and the erection of up to 510 sqm retail floorspace (Class A1-A3) and 615 residential units, with associated landscaping, playspace, cycle and car parking, refuse storage, access and servicing."

8.1.3 This Framework Travel Plan covers the residential elements of the Site, and aims to demonstrate the commitment to creating a sustainable development in Ealing which promotes the use of walking, cycling and public transport. The measures contained in the TP should remain implemented at all times.

8.1.4 The TP has been prepared in accordance with national, regional and local policies by seeking to ensure sustainable transport to and from the Site is possible.

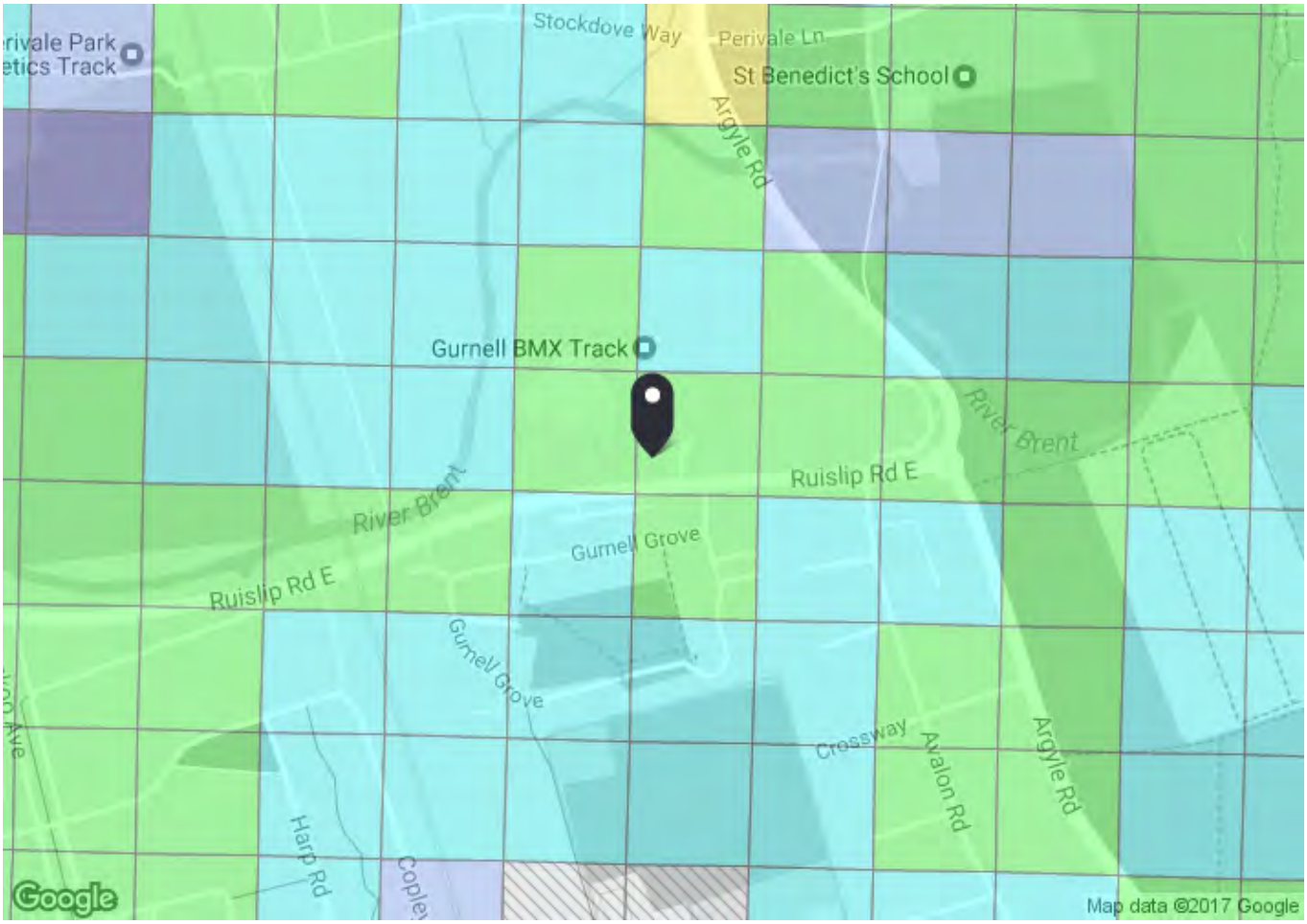
8.1.5 Targets have been set for each mode of transport based on the predicted modal split of the Site. The actual baseline mode share will be determined following travel surveys that will take place within three months of 50% of the residential units becoming occupied. The targets will need to be revised in light of these surveys and agreed with the LBE Travel Planning Team.

8.1.6 A package of measures has been developed to ensure the targets can be met. The measures will include travel information to be included in a resident welcome pack, cycle parking, regular promotion of sustainable travel options and events via newsletter and a travel noticeboard, and a Travel Plan Co-ordinator.

8.1.7 The TP's progress will be monitored in accordance with LBE requirements.

Appendix A: PTAL Report

TRANSPORT FOR LONDON



PTAL output for Base Year
3

31 Ruislip Rd E, London W13 0HT, UK
Easting: **515911**, Northing: **182422**

Grid Cell: 90270

Report generated: 03/04/2017

Map key - PTAL

0 (Worst)	1a
1b	2
3	4
5	6a
6b (Best)	

Map layers

PTAL (cell size: 100m)

Calculation Parameters

Day of Week	M-F
Time Period	AM Peak
Walk Speed	4.8 kph
Bus Node Max. Walk Access Time (mins)	8
Bus Reliability Factor	2.0
LU Station Max. Walk Access Time (mins)	12
LU Reliability Factor	0.75
National Rail Station Max. Walk Access Time (mins)	12
National Rail Reliability Factor	0.75

Calculation data

Mode	Stop	Route	Distance (metres)	Frequency(vph)	Walk Time (mins)	SWT (mins)	TAT (mins)	EDF	Weight	AI
Bus	RUISLIP RD E SWIM. POOL	E2	158.31	8	1.98	5.75	7.73	3.88	1	3.88
Bus	RUISLIP RD E SWIM. POOL	E9	158.31	5	1.98	8	9.98	3.01	0.5	1.5
Bus	RUISLIP RD E SWIM. POOL	E5	158.31	5	1.98	8	9.98	3.01	0.5	1.5
Bus	RUISLIP RD E SWIM. POOL	E10	158.31	4	1.98	9.5	11.48	2.61	0.5	1.31
Bus	RUISLIP RD E SWIM. POOL	E7	158.31	5	1.98	8	9.98	3.01	0.5	1.5
Bus	ARGYLE RD RUISLIP R EAST	297	388.47	6	4.86	7	11.86	2.53	0.5	1.27
									Total Grid Cell AI:	**10.96**

SYSTRA provides advice on transport, to central, regional and local government, agencies, developers, operators and financiers.

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SYSTRA

GURNELL LEISURE CENTRE

FULL PLANNING APPLICATION

SUSTAINABILITY STATEMENT

DECEMBER 2018

ECOWORLD INTERNATIONAL
CREATING TOMORROW & BEYOND

Ealing

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engineering change

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Gurnell Leisure Centre

Sustainability Statement

DOCUMENT REVISION HISTORY			Ref:	16191
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Executive Summary

The Sustainability Statement has been prepared in response to the relevant local, regional and national policies to support the planning application for the proposed Gurnell Leisure Centre and Residential Development, Ealing. This report details how the design has considered the potential environmental impacts and how these impacts can be managed and mitigated in line with the relevant planning policies.

The proposed development has targeted sustainability throughout the lifetime of the building. In particular, energy, pollution and water efficiency measures will be integral to the building's design as their contribution to retaining sustainability is highly significant.

The proposed energy solution for the development follows and responds to the London Plan - Be Lean, Be Clean, Be Green principles and includes various energy efficiency measures as well as renewable technologies.

In order to deliver an environmentally responsible development, an exemplar approach is being proposed based on low energy design principles. In summary, this approach involves energy demand minimisation through effective building form and orientation, good envelope design and proficient use of services before considering the use of CHP-led district heating and LZC technologies to decarbonise the energy supply – in line with the GLA Energy Hierarchy.

All dwellings within the proposed development will be provided with water efficient fixtures and fittings to reduce water consumption to comply with regulatory requirements.

Environmentally friendly and responsibly sourced materials will be specified, where possible.

From the EA Flood maps, the proposed development is shown to sit within Flood Zones 2 & 3. The development proposals have been designed in accordance with Environment Agency requirements for developments within the Flood Zones 2 & 3 and including a range of mitigation measures.

To minimise air quality impacts during construction a number of good practice mitigation measures will be implemented by the contractors. Furthermore, the energy strategy proposes a decentralised energy system powered by a gas boiler system generating low NOx emissions.

The scheme will include good practice design standards in regard to light and pollution.

Health and wellbeing of the occupants will be improved by providing good daylight levels, sufficient private outdoor space and indoor comfort.

An Ecological Assessment recommends that a total of 8 out of 13 BREEAM credits for ecology may be currently awarded.

In general, the proposed development will be constructed using good standards of sustainability which will meet Ealing's Framework sustainability planning policy requirements.

1.0 Introduction

1.1 Background

This document has been prepared by Couch Perry Wilkes LLP on behalf of BE:HERE EALING LIMITED ("the Applicant") in support of a Full Planning Application for the demolition of the existing Gurnell Leisure Centre ("the Application Site") and the construction of a new leisure centre alongside enabling residential uses.

This planning application for the redevelopment of the Application Site seeks full planning permission for:

Gurnell Leisure Centre (GLC) opened in 1981 and is now one of London's busiest leisure centres, providing one of only four indoor 50m swimming pools in London.

> ***"Demolition of all existing buildings and re-provision of leisure centre, car and coach parking, BMX track and skate park, alongside enhancements and access to the existing park; and the erection of up to 498sqm retail floorspace (Class A1-A3) and 615 residential units, with associated landscaping, playspace, cycle and car parking, refuse storage, access and servicing."*** (The Proposed Development).

The number of users have been increasing in recent years, however the centre is in need of a significant level of repair and investment. Following a review of the options available and with an understanding that the cost of renovating the existing centre was prohibitive, in March 2015 the London Borough of Ealing (LBE) Cabinet made the decision to demolish the existing centre and replace it with a new state-of-the-art facility.

The new leisure centre, designed to be a flagship facility of regional importance is proposed to be re-provided generally on the footprint of the existing leisure centre in order to mitigate impacts on the wider parkland, which is designated as Metropolitan Open Land (MOL). The leisure centre building will be part funded by LBE with the remaining cost be to funded through enabling residential development. These new residential units will be located both above the new leisure centre and generally within the footprint of the current adjacent car park, which is considered Previously Developed Land (PDL).

Alongside the provision of a new flagship leisure centre and residential units, the adjacent open space and amenity provisions to the north will be enhanced for improved public use and access. The proposal therefore represents an opportunity to create a genuinely mixed-use and complementary development for use by not just the local community, but by residents throughout the borough and beyond.

The main aim of this report is to provide an assessment of the sustainability credentials for the proposed development and to describe how the applicable sustainability policies and standards can be met by the proposed design.

The information provided in this report should be treated as indicative at this stage and should be used to inform the planning application for the proposed development with respect to relevant planning policies.

1.2 Description of the Development

Demolition of all existing buildings and re-provision of leisure centre, car and coach parking, BMX track and skate park, a new public square and improvements to the existing park; and the erection of 498sqm retail floor space (Class A1/A3) and 613 residential units with associated landscaping, play space, cycle and car parking, refuse storage, access and servicing.

Planning Requirements

This section summarises the relevant sustainability and energy policy context for the proposed development. The relevant policies and regulations related to energy and sustainability are summarised below.

1.3 National Planning Policy Framework (2018)

The National Planning Policy Framework (NPPF) document sets out the Government's planning policies for England and was published on the 27th March 2012.

The NPPF is designed to consolidate all policy statements, circulars and guidance documents into a single, simpler National Planning Policy Framework, making the planning system more user-friendly and transparent. The frameworks primary objective is a sustainable development, therefore focussing on the 3 pillars of sustainability. The framework is split into three sections; planning for prosperity (Economic), planning for people (Social) and planning for places (Environmental), each of which outline guidance to tackle issues such as housing, transport infrastructure, climate change, and business and economic development etc.

In regard to climate change, the NPPF supports a reduction in greenhouse gas emissions and the delivery of renewable and low carbon energy. Climate change is covered in Section 10 'Meeting the challenge of climate change, flooding and coastal change'. In summary the framework advises:

To support the move to a low carbon future, local planning authorities should:

- plan for new developments in locations and ways which reduce greenhouse gas emissions;
- actively support energy efficiency improvements to existing buildings; and
- when setting any local requirement for a building's sustainability by adopting nationally described standards.
- In determining planning applications, local planning authorities should expect a new development to:
- comply with adopted Local Plan policies on local requirements for decentralised energy supply, unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable; and
- take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption.

1.4 The London Plan (2011) further alterations to the London Plan published March 2016

The London Plan contains six key objectives that underlie all the policies within it. These include:

- To accommodate the cities' growth within its boundaries, without encroaching on open spaces;
- To make London a better city for people to live in;
- To make it a more prosperous city with strong and diverse economic growth;
- To uphold social inclusion and tackle deprivation and discrimination;
- To improve access to this city; and
- To make it a more attractive, well designed and a green place.

The London Plan requires all developments to actively tackle climate change through their design as an integral part of sustainable development. Chapter 5 (London's Response to Climate Change) of the London Plan contains the following relevant crosscutting key policies supporting London as an exemplar city in adapting to climate change.

1. Policy 5.1 - Climate Change Mitigation
2. Policy 5.2 - Minimising carbon dioxide emissions
3. Policy 5.3 - Sustainable design and construction
4. Policy 5.5 - Decentralised energy networks
5. Policy 5.6 - Decentralised energy in development proposals
6. Policy 5.7 - Renewable energy
7. Policy 5.8 - Innovative energy technologies
8. Policy 5.9 - Overheating and cooling
9. Policy 5.10 - Urban greening
10. Policy 5.11 - Green roofs and development site environs
11. Policy 5.12 - Flood risk management
12. Policy 5.13 - Sustainable drainage
13. Policy 5.15 - Water use and supplies

1.5 Ealing Planning Policy

In Ealing's Local Plan there are several policies to ensure the consideration of sustainability design to a development. The Development Strategy 2026 (April 2012) sets out the main drivers and objectives for energy and sustainability and the Development Management Plan DPD (December 2013) includes more specific aimed policies which are presented below.

1.5.1 Ealing Development Management Plan DPD (December 2013)

POLICY 5.2 Ealing Local Variation - Minimising Carbon Dioxide Emissions suggests that;

1. Major new-build residential developments are required to achieve the following standards under the Code for Sustainable Homes, or equivalent:

   i. 2012 onwards - Level 4

   ii. 2016 onwards - Level 5

   Other new residential development in Ealing must achieve Code for Sustainable Homes Level 4 as a minimum.

2. Major residential developments consisting of the refurbishment of existing buildings, including the conversion of existing buildings to form flats, are required to achieve a BREEAM Domestic Refurbishment Scheme rating of Excellent, or equivalent.

3. Major non-residential developments are required to achieve a minimum Very Good rating under the most up-to-date BREEAM or equivalent scheme and make reasonable endeavours to achieve Excellent and Outstanding.

4. Other new development including residential extensions and conversions should undertake energy efficiency improvements up to 10% of the value of the proposed works.

E-5.2.1 Major developments for the purposes of this policy are those equal to or more than 10 units or 1000 sq. m.

E-5.2.2 Sustainability and energy efficiency policy are in a state of continual evolution toward the achievement of zero carbon for both residential and non-residential development by 2016 and 2019 respectively and this policy is intended to facilitate that evolution. It is anticipated that this policy will be overtaken by revisions to standards and regulations and changes to National and Regional policy. Development should respond intelligently to any changes in order to satisfy the drive toward zero carbon.

E-5.2.3 The Council expects applicants to undertake post-construction monitoring to demonstrate the actual carbon dioxide savings achieved by development. This is in addition to any energy assessments submitted at the application stage. To fulfil this requirement, applicants should install equipment to monitor renewable/low carbon energy generation in their development and submit this data to the Council. This requirement applies to all major development and Ealing may also seek this form of monitoring from other schemes where appropriate.

1.6 BREEAM

Couch Perry and Wilkes LLP (CPW) has undertaken a BREEAM (Building Research Establishment's Environmental Assessment Method) pre-assessment of the Gurnell Leisure Centre This report details the performance of building against the BREEAM 2018 New Construction Other Buildings Assembly and Leisure Design Stage criteria. The building currently achieves a score of 61.40% which translates into a BREEAM rating of Very Good. The objective of the assessment was to establish a base score for the scheme against the current design and identify a route for improvement where possible.

BREEAM (Building Research Establishment's Environmental Assessment Method) is a standard assessment method established by the Building Research Establishment (BRE) which is used to assess the environmental impact of non-domestic buildings.

Overall BREEAM covers a range of issues and credits which are awarded where a building achieves a benchmark performance. BREEAM is a voluntary standard although central government and some planning authorities require compliance.

As per policy 5.2.I of Ealing Development Plan DPD presented above major non-residential developments are required to achieve a minimum Very Good rating under the most up-to-date BREEAM or equivalent scheme and make reasonable endeavours to achieve Excellent and Outstanding.

BREEAM Assessment Method

BREEAM is a voluntary scheme that aims to quantify and reduce the environmental burdens of buildings by rewarding those designs that take positive steps to minimise their environmental impacts. Projects are assessed using a system of credits. The credits are grouped within the following categories:

- Management
- Health and Wellbeing
- Energy
- Transport
- Water
- Materials
- Waste
- Land Use and Ecology
- Pollution

The assessment process results in a report covering the issues assessed together with a formal certification giving a rating on a scale of UNCLASSIFIED, PASS, GOOD, VERY GOOD, EXCELLENT and OUTSTANDING.

The diagram and text below describes how BREEAM scores and rates an assessed building:

BREEAM Rating	Score (%)
UNCLASSIFIED	<30
PASS	≥30
GOOD	≥45
VERY GOOD	≥55
EXCELLENT	≥70
OUTSTANDING	≥85

The BREEAM categories contain a number of environmental issues, which reflect the options available when designing, procuring and constructing a building.

Tradable Credits

Each environmental issue has a set number of 'credits' available and these credits are awarded where the building demonstrates that it complies with the requirements of that issue.

Minimum Standards

A number of issues within a category have set minimum standards, i.e. a minimum number of credits that must be achieved in order for a particular BREEAM rating level to be met.

Minimum Standards by BREEAM Rating Level					
BREEAM Issue	**Pass**	**Good**	**Very Good**	**Excellent**	**Outstanding**
Man 03: Responsible construction practices	None	None	None	One credit (responsible construction management)	Two credits (responsible construction management)
Man 04: Commissioning and handover	None	None	One credit (commissioning test schedule and responsibilities)	One credit (commissioning test schedule and responsibilities)	One credit (commissioning test schedule and responsibilities)

Minimum Standards by BREEAM Rating Level					
BREEAM Issue	**Pass**	**Good**	**Very Good**	**Excellent**	**Outstanding**
Man 05: Aftercare	None	None	None	One credit (commissioning implementation)	One credit (commissioning implementation)
Ene 01: Reduction of energy use and carbon emissions	None	None	None	Four Credits (energy Performance)	Six Credits (Energy performance) and Four credits (Energy modelling and reporting)
Ene 02: Energy monitoring	None	None	One Credit (First sub-metering credit)	One Credit (First sub-metering credit)	One Credit (First sub-metering credit)
Wat 01: Water consumption	None	One Credit	One Credit	One Credit	Two credits
Wat 02: Water monitoring	None	Criterion 1 Only	Criterion 1 Only	Criterion 1 Only	Criterion 1 Only
Mat 03: Responsible sourcing of materials	Criterion 1 Only	Criterion 1 Only	Criterion 1 Only	Criterion 1 Only	Criterion 1 Only
Wst 01: Construction waste management	None	None	None	None	One Credit
Wst 03: Operational waste	None	None	None	None	One Credit

Innovation Credits

Innovation credits provide additional recognition for a building that innovates in the field of sustainable performance, above and beyond the level that is currently recognised and rewarded by standard BREEAM issues. Innovation credits are awarded for either complying with pre-defined BREEAM issue exemplary level requirements, or via application to BRE Global to have a particular building feature, system or process recognised as ‘innovative’.

Within each of the BREEAM categories outlined above, there are a number of credit requirements that reflect the options available to designers and managers of buildings.

An environmental weighting is applied to the scores achieved under each category, as shown below, in order to calculate the final BREEAM score. The weighting factors have been derived from consensus based research with various groups such as government, material suppliers and lobbyists. This research was carried out by BRE Global to establish the relative importance of each environmental issue.

The environmental weightings are as follows:

BREEAM Section	Weighting (%)
Management	12.0
Health and Wellbeing	15.0
Energy	15.0
Transport	9.0
Water	7.0

BREEAM Section	Weighting (%)
Materials	13.5
Waste	8.5
Land Use and Ecology	10.0
Pollution	10.0

2.0 Proposed Sustainability Strategies and Measures

2.1 Energy

An Energy Assessment has been produced for the proposed redevelopment of the Gurnell Leisure Centre site in accordance with the requirements of Ealing Council. The project involves the delivery of a new leisure centre and associated facilities together with 613 new dwellings.

In order to deliver an environmentally responsible development, an exemplar approach is being proposed based on low energy design principles. In summary, this approach involves energy demand minimisation through effective building form and orientation, good envelope design and proficient use of services before considering the use of CHP-led district heating and LZC technologies to decarbonise the energy supply – in line with the Energy Hierarchy.

It has been shown via accredited computer modelling that, by incorporating best practice energy efficiency measures alone, results in a development that is Part L 2013 complaint without the use of CHP plant or renewable technologies (see tables/graphs below and accompanying BRUKL/SAP documents).

Opportunities to connect the planned development to existing or future decentralised heat distribution networks, including those featuring CHP plant, have been investigated with reference to the London Heat Map. No such networks exist or are planned in the vicinity of the proposed development.

Sustanability Statement

The design intention is to install site-wide district heating infrastructure connected to an energy centre featuring a gas-fired CHP engine, low NOx boilers and a thermal buffer store.

Having reviewed the feasibility of installing a range of LZC technology solutions at the proposed development, the inclusion of 850m^2 of solar PV panels is deemed the most appropriate to decarbonise the energy supply. Please refer to CPW energy assessment for further details.

The combined effect of the aforementioned measures in reducing CO_2 emissions by at least 35.0% compared to the notional development is shown below.

As domestic buildings are now required to achieve zero carbon in terms of regulated emissions, a cash in lieu contribution to the local authority of £**709,376** is necessary in this case to off-set the shortfall.

As part of the energy assessment, dynamic thermal modelling of the overheating risk associated with the leisure centre has been undertaken in accordance with CIBSE TM52 guidance utilising CIBSE TM49 data sets.

It has been shown that despite the introduction of passive measures as part of the design in accordance with the cooling hierarchy, the leisure centre still failed to pass the TM52 criteria and would overheat unless active cooling was deployed. As a result, peak-lop cooling and full comfort cooling via chillers will be provided to those specific areas of the leisure centre to combat the overheating risk.

Following discussions with the local authority, it was agreed to undertake dynamic thermal modelling of the overheating risk associated with representative dwellings across the development in line with the latest CIBSE TM59 guidance.

In accordance with the TM59 methodology, a single London Design Summer Years (DSY1) weather file has been used for the assessment for the 2020s, high emissions, 50% percentile scenario.

It has been shown that the living rooms, kitchens and bedrooms should pass the required criteria 1 standards, and the bedrooms should pass the required criteria 2 standards under TM59 for the representative flats across the development.

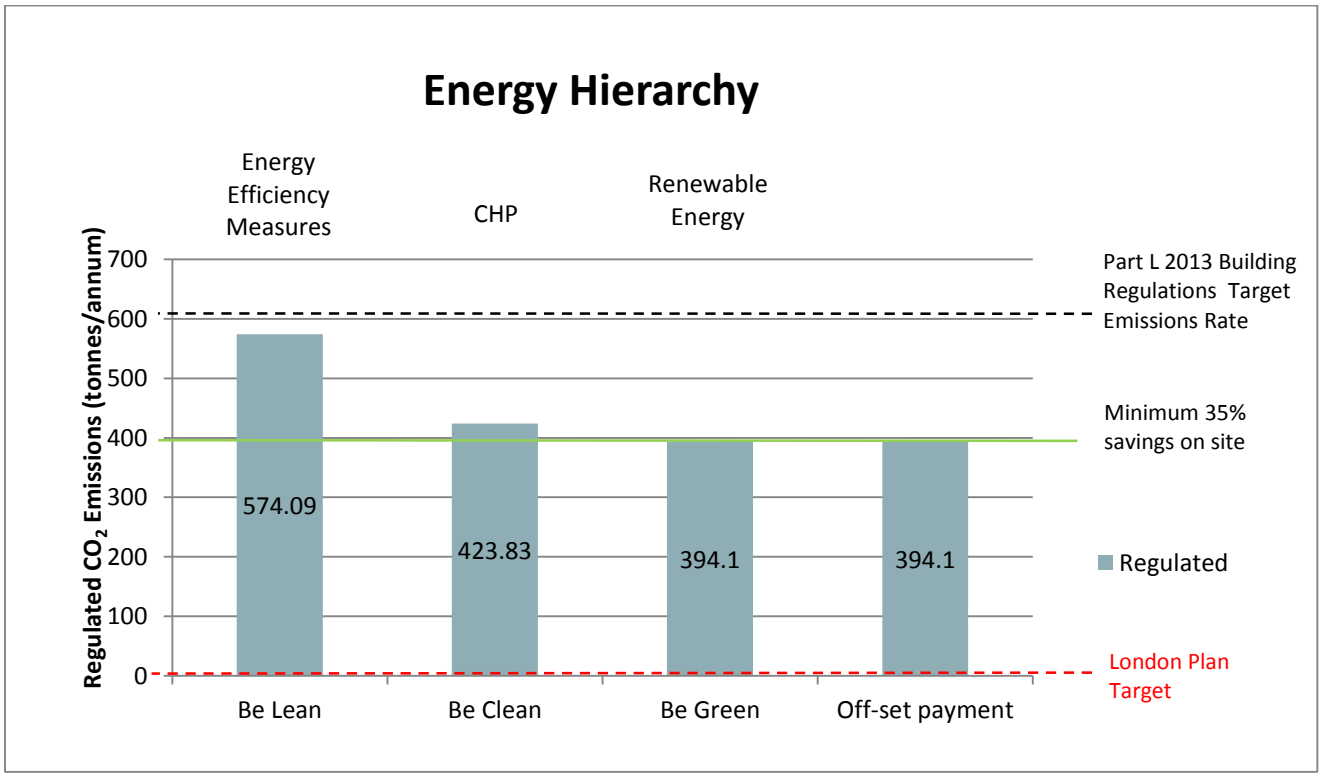

Figure 1. Regulated CO_2 Savings from each Stage of the Energy Hierarchy for Domestic Buildings

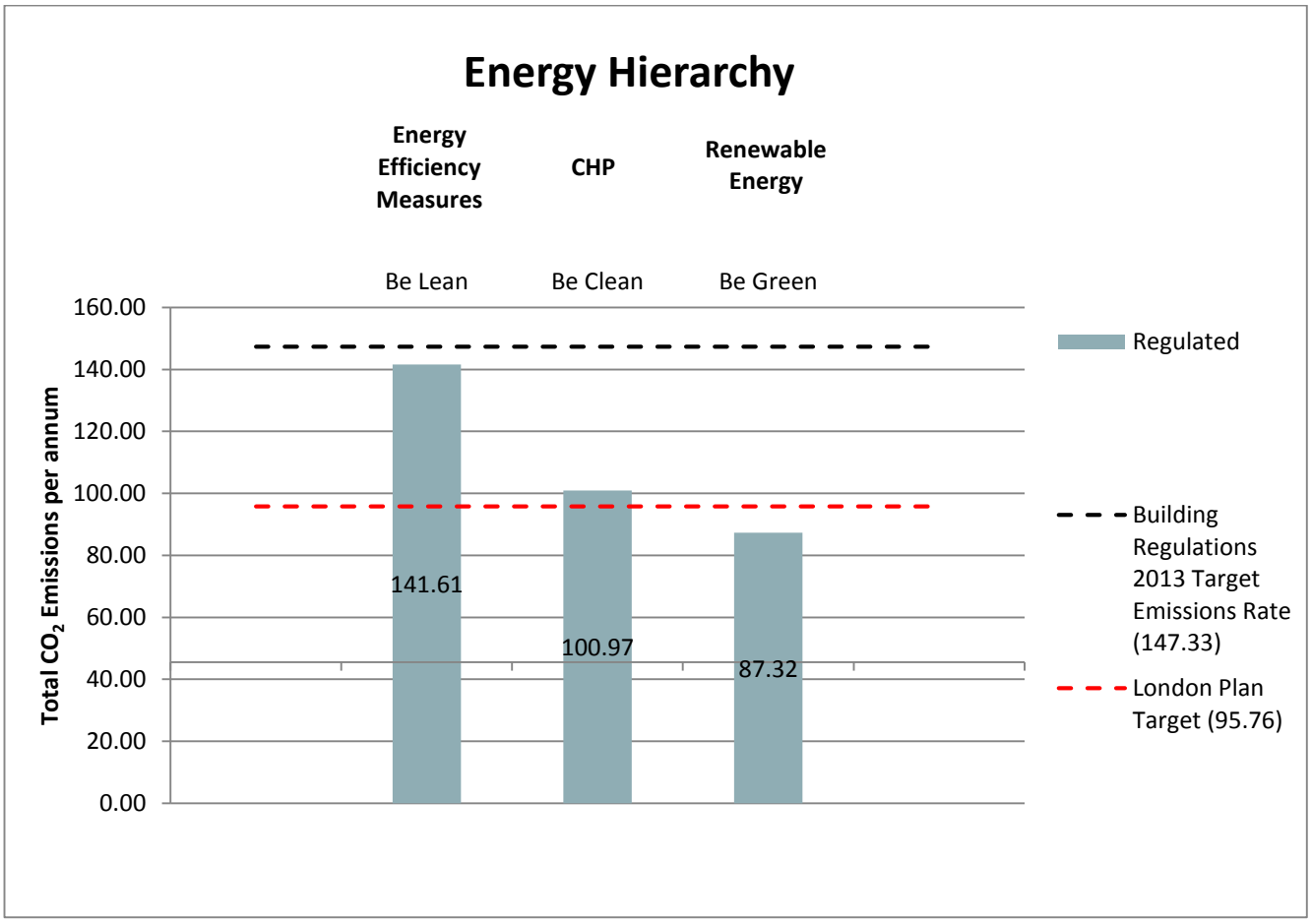

Figure 2. Regulated CO_2 Savings from each Stage of the Energy Hierarchy for Non-domestic Buildings

2.2 Water

In response to the London Plan Policy 5.15, all residential dwellings within the proposed development will be provided with water efficient fixtures and fittings to reduce water consumption and comply with the regulatory requirements. Potable water reduction measures such as flow restrictors to taps and showers and dual flush toilets can be provided to reduce consumption. These measures will help to place less of a burden on the fresh water infrastructure and reduce water bills for the homeowners.

2.3 Materials

The energy that has been used during manufacture, processing and transportation of materials to site comprises of embodied carbon emissions. These emissions will be decreased by the selection of materials for all building elements that are characterised by reduced environmental impact.

Preference will be given to the use of local materials and suppliers, where viable, to reduce transport distances and support the local economy.

Any opportunities to re-use and/or recycle materials will be identified and pursued, where feasible.

2.4 Flood Risk and Surface Water Management

Policy 5.12 and Policy 5.13 of the London Plan, require minimisation of flood risk and reduction of surface water flow the site. In response to these policies, a flood risk assessment was carried out in accordance with the Environmental Agency's requirements.

From the EA Flood maps, the proposed development is shown to sit within Flood Zones 2 & 3. The development proposals have been designed in accordance with Environment Agency requirements for developments within the Flood Zones 2 & 3 and including a range of mitigation measures.

- Maintaining the existing flood routes through the proposed development site by careful levels design and incorporating linear swale conveyance systems.
- Flood compensation will be provided within the development site to ensure that flood volumes are balanced within the development site boundary on a like for like basis thus ensuring that there will be no resultant impact to any existing development in the vicinity or further downstream.
- All internal FFLs will be set a min 300mm above the critical 1:100 year + climate change flood level thereby ensuring a safe and sustainable development.
- Surface water discharge to the existing outfall will be restricted to existing Greenfield Rates, thus reducing from the current Brownfield rates. Please refer to Flood Risk & Drainage Strategy Assessment for further details.
- SUDS drainage will be incorporated throughout the development to provide Amenity, water quality and water quantity benefits. In accordance with the Building Regulations and current SuDS best practise surface water should be disposed of according to the following hierarchy:
    - Into the ground (Infiltration)
    - Discharge to watercourse or surface water body
    - Discharge to surface water sewer, highway drain or another drainage system. •
    - Discharge to combined sewer.
- A Flood warning plan, including provision of means evacuation from the buildings to a safe refuge area will be provided as part of the development.

2.5 Waste

2.5.1 Waste Storage and Recycling Facilities

Sufficient space and provision has been allowed for waste storage and recycling facilities for the residential development.

Each building will be provided with a bin store at ground floor with a larger area at lower level of building D-G which will cater for the combined requirements of buildings D-G and partially C.

The capacity for onsite storage is based on the London Borough of Ealing's waste and recycling guidance.

Refuse Collection will take place from one of the servicing bays, depending on whether they are collecting the residential or leisure centre waste and recycling: all waste vehicles will be able to drive and park within 10m of the refuse stores.

2.5.2 Sustainable Construction Waste

Contractors will be required to minimise waste at source and maximise recycling and re-use of demolition and construction materials wherever possible and practicable; such situations will be dealt with in a manner that reduces environmental effects and maximises potential re-use of materials;

All wastes that cannot be reused or recycled, including contaminated soils and materials, will be disposed of in accordance with legislation and best practice;

The control and handling of any contaminated materials will also be carried out in accordance with the relevant legislation. Any ACMs will be surveyed prior to demolition and removed by an appropriately licensed contractor in accordance with the Control of Asbestos Regulations 2006.

QC employees will, where reasonably practicable, separate waste into relevant waste streams on site, for example metals, plaster board and timbers separated on site for recycling. Where impractical QC will employ a waste removal contractor to separate off-site and provide reports on quantities for BREEAM reporting requirements.

2.6 Pollution

2.6.1 Air Quality

The London Plan requires that developments should be designed to minimise the generation of air pollution and to minimise and mitigate against increased exposure to poor air quality. As part of this, developers are required to select plant that meets the London Plan standards for emissions from combined heat and power plants.

The Mayor is committed to improving air quality in London and has put in place a strategy of measures to reduce air pollution and minimise human exposure in order to improve Londoner's health and quality of life. The three pollutants of specific concern in London are Nitrogen Dioxide (NO2) and particulate matter with an aerodynamic diameter of less than 10µm and 2.5µm (PM10 and PM2.5).

Road vehicle exhaust emissions are responsible for the majority of NO2 and PM10 emissions in Greater London. Both NO2 and PM10 pollutant levels are concentrated at hotspots along the road network. Areas that do not meet national air quality objectives (AQO) for NO2 PM10 are likely to be designated as Air Quality Management Areas (AQMA), this can be a consequence of exceedances of either Annual, or Hourly AQOs.

The air quality impacts associated with the proposed mixed use development of the site have been investigated and modelled by air quality experts at REC and their detailed work is presented within the Air Quality Assessment. The Air Quality Assessment recognises proposed development includes sensitive land use and is located within an AQMA. As such, the proposals have the potential to introduce future site users into an area of existing poor air quality, as well as causing

adverse impacts to existing pollution concentrations at nearby sensitive receptors. Detailed dispersion modelling was therefore undertaken to quantify NO2, PM10, and Carbon Monoxide (CO) concentrations across the site to determine suitability for the proposed use.

No exceedances of the annual mean AQO for NO_2 PM_{10} or $PM_{2.5}$ were predicted at any of the proposed sensitive land uses across the proposed development site. In addition, predicted NO_2 concentrations at sensitive land uses were classified as APEC Category A (below 5% of the annual mean AQO for NO_2). As such air quality should not be considered as a constraint to planning.

It is also noted that the construction works have the potential to create fugitive dust impacts at human receptors. It is acknowledged that if good practice dust control mitigation measures are put in place this will minimise the risk of elevated PM_{10} concentrations and dust soiling in the surrounding area, such mitigation techniques will be employed during the construction phase of the proposed development.

2.6.2 Lighting

It is imperative that the lighting design philosophy provides the correct quality of lighting with minimum energy input and hence reduce internal heat gains. The latest low energy lighting technology will be employed throughout, including LED's, where appropriate. External lighting will be designed with consideration to security requirements and minimising nuisance glare and light pollution to the surrounding area.

2.7 Health and Wellbeing

2.7.1 Daylighting

High levels of natural daylight will be provided, wherever possible, through effective window design. The glazing specification for the new development will be optimised to ensure that the glazed elements provide excellent thermal performance combined with optimum solar reflectance to minimise summer solar heat gains along with high daylight transmittance factors to maximise daylight factors. Encouraging the correct quality and quantity of daylight to penetrate the building is key to reducing the amount of light required from artificial sources and hence energy requirements.

2.7.2 Noise and Vibration

The development site is exposed to modest noise levels due to road traffic and very low vibration levels from distant train lines. These noise and vibration levels have been quantified by surveys conducted at the site and all assessments have been completed against relevant national and local planning guidance and policy.

Vibration levels are very low with train lines over 150m away to the west. Worst case assessed levels, including both passenger and freight trains are within Ealing's own policy SPG10, and also within national guidance of BS7445. No specific mitigation is necessary to account for external vibration sources.

External noise levels are dominated by road traffic to the south. The proposed buildings are set back from the road, reducing the levels incident on the facades. For the proposed new residential accommodation internal noise levels have been assessed; glazing and ventilation design requirements have been set out.

Mechanical ventilation that includes heat recovery technology will be provided as well as acoustic double glazed windows to the residences to ensure suitable internal noise levels in line with BS8233 and Ealing SPG10 are provided for all future residents. Full design specifications have been provided in the acoustic assessment report.

Based upon the survey results, noise limits for future mechanical services plant (primarily from the leisure centre and energy centre) have been set. All mechanical services will be designed to ensure these noise limits are met at the proposed new residences as well as those existing in the community. All equipment installed will also have anti-vibration mounts to ensure no structure borne noise or vibration has a detrimental effect on any residences.

In terms of noise from the leisure centre and commercial sources potentially affecting existing and proposed new residences, the building envelope (i.e. façade, glazing and roof) have been designed with sufficient sound insulation to avoid such disturbance.

Internally, where party walls or floor are located between commercial (including leisure) uses and residential accommodation, the internal structures have been designed to protect the residences from both noise and vibration. This is based upon solid concrete floors with acoustic ceilings beneath (to an appropriate specification) where necessary. To the gym and studio areas proposed, impact resistant flooring will also be installed to ensure structure borne noise or vibration does not affect the amenity of residents above.

With all the above noted acoustic aspects taken into consideration, noise and vibration will be suitably controlled to and from all areas of the site, leisure, commercial and residential, to within appropriate standards in line with national and local planning policy.

2.7.3 Private Open Space

The provision of open space for residents is provided by adequately sized private balconies. This offers residents a valuable external space which has been shown to have significant effect on the quality of life.

The development also comprises of a main accessible roof terrace accessible to all residents, located at level 6 between building C and building D, and accessible from both C and D. The roof terrace, as well as the roof in building E level 6 provide also the opportunity for some of the apartments, facing the roof, to have some private defensible space.

2.8 Management

2.8.1 Construction Site Impacts

Construction has the potential for pollution, mostly through pollution to air (through dust emission) and to water via water courses and ground water. To minimise construction site impacts the contractor will adopt best practice policies in respect of air (dust) pollution and water (ground and surface) pollution.

Significant importance has been given to the security of the prospective occupants of the building. An Architectural Liaison Officer has been consulted at the design stage and the proposed development is designed to comply with Secured by Design standards.

2.9 Land Use, Ecology and Biodiversity

2.9.1 Ecological Assessment

The Ecology Consultancy has produced the following reports relating to the ecology on the proposed site and surrounding areas

- Preliminary Roost Assessment,
- Arboriculture Survey Report and the
- Preliminary Ecological Appraisal have provided

This base information has enabled the design team to target the following BREEAM Ecological credits:

Ecological Credit LE01: The proposed development is located within the footprint of previously occupied land; it is therefore recommended that 1 credit may be awarded. It is our understanding that the site does not contain contaminated land; it is therefore recommended that 0 credits may be awarded in this regard.

Ecological Credit LE02: The ecology consultancy has highlighted that there are a large number of trees surrounding the site but the proposed building and immediate surrounding area are contained within the footprint of the existing leisure centre thus the build site is of low ecological value and this credit has been targeted, plus the arboreal survey indicates that protection measures will be required to protect the plants and trees adjacent to the site so this credit has also been targeted.

Ecological Credit LE03: One of two credits have been targeted as there may be a slight reduction of trees on the site.

Ecological Credit LE04: It is recommended that 1 credit be awarded at present. A total of two credits are available within this section, however the LE04 credit is directly linked to LE03 and currently there is a slight reduction in ecology and the second credit can only be achieved if there is an increase in ecology.

Ecological Credit LE05: It is recommended that 0 credits are awarded at present. A total of 2 credits are available within this section. One credit may be awarded if all of the mandatory requirements and at least two of the additional requirements are met. Two credits may be awarded if the client meets all of the mandatory requirements plus at least four of the additional requirements.

2.10 Transport

The masterplan encourages pedestrian and cycling connectivity to the Site through provision of cycle parking to serve both the leisure and residential land uses as well as connectivity to MOL to the north of the Site. Promoting sustainable development is a consistent theme running across National, Regional and Local Policy and therefore the transport elements of the scheme have been designed to encourage active travel to and from the Site as well as the improved public realm enhancing pedestrian connectivity with the local area. Cycle parking is provided in line with the Draft New London Plan which includes excellent provision for both the leisure centre (79 short stay and 6 long-stay) and for residential use (1029 long stay and 17 short stay). In 2017, a cycle lane was implemented along Ruislip Road East, which forms part of the Ruislip Road East Quietway. This is a shared segregated route for pedestrians and cyclists and runs from Clifton Road to Argyle Road, and this infrastructure will encourage cycling to the Site.

For residential uses 170 car parking spaces are available of which 161 are located at basement level and 9 are located on street. This ratio equates to 0.28 spaces per unit, which is appropriate ratio given that proximity to public transport infrastructure and excellent cycling and walking connections within vicinity of the Site. 176 car parking spaces are provided to serve the leisure centre uses which is slightly lower than the existing parking provision of 175 visitor parking spaces and 19 spaces for staff members.

Further detail on the sustainable travel principles have been detailed within the Transport Assessment prepared by the Transport Consultancy, which is submitted in support of the planning application.

3.0 Summary and Conclusions

The proposed sustainability approach is developed to meet the targets and standards set by the relevant planning policies. The proposed development has incorporated a number of key sustainability measures and features which are tabulated below:

Issue	Proposed Key Sustainability Measures
Energy	• Good quality sustainable construction standards, along with good levels of insulation, a Combined Heat and Power (CHP) backed up by high efficiency gas boilers and renewable technologies (PVs) result in a 35% improvement over current Building Regulations Part L 2013.
Water	• All dwellings within the proposed development should be provided with water efficient fixtures and fittings to reduce water consumption and comply with the regulatory requirements.

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Materials	• The proposed development will specify materials with low environmental impacts, where feasible.
Surface Water Run-off	• From the EA Flood maps, the proposed development is shown to sit within Flood Zones 2 & 3. The development proposals have been designed in accordance with Environment Agency requirements for developments within the Flood Zones 2 & 3 and including a range of mitigation measures.
Waste	• The proposed development will incorporate appropriately sized and located external waste and recycling storage facilities.
Pollution	• The energy strategy proposes a decentralised energy system powered by a gas boiler system generating low NOx emissions • Sustainable travel measures will help to further reduce the air quality impacts • External light pollution will be minimised by incorporating daylight and presence detection as appropriate.
Health and Wellbeing	• It is anticipated that all main rooms in the apartments will achieve good daylight. • The proposed dwellings will be provided with private and semi-private open space • Sound insulation is expected to be provided on all separating walls and floors between habitable spaces to improve indoor comfort by reducing the likelihood of nuisance noise in line with Part E.
Management	• To minimise construction site impacts the contractor will adopt good practice policies in respect of air pollution and water pollution. • Secure by design consultation has been held to resolve, where possible, any impact the proposed development may have on crime and anti-social behaviour in the local area.

Land Use, Ecology and Biodiversity	• There are a large number of species surrounding the site but the proposed building and immediate surrounding area are contained within the footprint of the existing leisure centre thus the build site is considered to be of low ecological value.
Transport	• Encourage connectivity and sustainability • For residential uses 170 car parking spaces are available of which 161 are located at basement level and 9 are located on street. • 176 car parking spaces are provided to serve the leisure centre

This Sustainability Statement demonstrates that the proposed development is targeting good standards of design and build-quality. Much attention has been given to reducing the environmental impact throughout the lifetime of the development.

The BREEAM pre-assessment demonstrates that the proposed development can achieve a 'Very Good' rating with a 61.4% score. It should be noted that this pre-assessment has been undertaken early in the design process and is therefore subject to change. It is also important to note that the threshold for BREEAM 'Very Good' can be achieved by attaining other alternative credits within the BREEAM scheme, and not necessary achieving all those allocated in the present pre-assessment.

In conclusion, this report demonstrates that the proposed development can meet the sustainability planning policy requirements. The design team have carefully considered the site's potential environmental impacts, which will be managed and mitigated in line with the relevant planning policies.

Appendix: BREEAM Assessment

See accompanying documentation