

Planning Application

Project Name: ORL HUB, Manchester

Report Name: Planning Application- Supporting Information-
Environmental Standards and Energy Statement

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This technical paper has been prepared to present the planning application responses to each of the categories which have been defined as Rybka's responsibility to provide information on.

15. Environmental Standards and Energy Statement

The following headlines form part of the environmental standards and energy statement which has been prepared for the Our League Life, Manchester Project.

Baseline Information-

The proposed Our League Life training facility in Manchester commissioned by Rugby Football League is being designed with energy conservation as a key performance indicator. The new facility offers both changing room, training, teaching, admin offices and conference accommodation over a two-storey building. The building is split into distinct zones for each of the accommodation types. The development will be constructed in a single phase during an estimated 12-month construction period. The building will be designed and constructed to achieve RIBA 2025 Performance Standards in relation to the building's fabric performance. This approach will ensure that the best possible passive design measures are achievable prior to integrating active systems and low and zero carbon technologies, LZCT options. The passive design measures which have been implemented in the buildings design include for:

- Enhanced fabric U- values which exceed the minimum required to meet Building Regulations
- Taking advantage of thermal mass to reduce the reliance on comfort cooling
- Optimising glazing strategy where glazing has been designed to meet good day light factors whilst not adversely impacting overheating (as defined in policy EN8). Hence improving the

buildings fenestration performance. Refer to table below which notes the daylight factors being achieved at key spaces -

Room	ADF (%) Standard - 2%	Uniformity Standard – 0.4
Classroom	1.6	0.53
Seminar Room 1	2	0.59
Seminar Room 2	1.8	0.59
Tutorial Room 1	1.4	0.85
Tutorial Room 2	1.8	0.78
Tutorial Room 3	2.2	0.73
Tutorial Room 4	2.6	0.68
Conference/Social/Workspace	1.4	0.48

Daylighting Factor Table

- Artificial lighting design has accounted for natural daylight provision hence reduced reliance on artificial lighting throughout the day.
- Window G values have been optimised based on orientation and overheating requirements.
- External shading has been utilised on both main elevations, considerably reducing unwanted solar gains (as required to comply with EN 8 guidelines).

The energy strategies have not just been limited to the analysis of consumption or carbon emissions, as it also contains analysis of daylight, overheating and ventilation performances. To ensure the building design performs to RIBA 2025 and accords to MCC Core Strategy Policy EN 4 (reducing CO2 Emissions), EN 6 (Target Framework for CO2 Reductions from Low or Zero Carbon Energy Supplies) and Policy EN8 (Adaption to Climate Change), clear performance parameters were defined, as a basis refer to the Parameters Schedule below.

Parameter	Condition
Internal Winter Design Conditions	16 to 21 deg.C
External Summer Design Condition:	Current - CIBSE Manchester 2016 DSY1
Overheating Criteria:	BB101 / TM52 The Limits of Thermal Comfort: Avoiding Overheating in European Buildings to be used for all teaching spaces and office areas.
External Winter Design Condition:	-5°C
Winter (100% Fresh Air Plant):	-10°C
Infiltration Rates	As per CIBSE Guide A, 5m ³ /(hr.m ²) or below
Low Temperature Hot Water (secondary)	45°C Flow - 35°C Return – Maximum based on a ASHP system
Heating Installation (Primary and Secondary Circuits)	5 Bar
Maximum Pipe Velocity (Pipe sizes 15-50mmØ)	0.75 – 1.15m/sec, in accordance with CIBSE Guide C, table 4.6
Maximum Pipe Velocity (Pipework more than 50mmØ)	1.25 – 3.0m/sec, in accordance with CIBSE Guide C, table 4.6
Ductwork Velocity	Main Ducts less than 5.0m/sec where practicable. Branch Ducts less than 3.5m/sec where practicable.

Drainage Installations:	Drainage installation will be sized using the drainage demand units and methodology listed in BS EN 12056
Water Services Design	The water installation will be designed using the demand units and methodology indicated in CIBSE Guide G and BS EN 806
	Cold Water Storage will be based on 15 litres storage per user at 8 hours storage, 7 litres per meal
Lighting - Internal luminaire/ External Lighting	Efficient LED's with compatible high frequency electronic driver to the following criteria: Colour rendering index – CRI >80 min Rated Life – 50,000 hours @ L80/B10 – 25deg Chromatic tolerance – SDCM of 3 Efficiency - >100lm/w Colour temperature – 3000k to 4000k (area specific) Glare - <19 UGR in office areas and teaching spaced (at working plane) The lighting design illumination levels, recommended within CIBSE Lighting <u>Pitch Lighting</u> illumination levels of 500 lux on the pitch competition events the lighting levels will be at the more usual Class Two illumination of 300 lux. lighting scheme will be designed to comply with CIE 150:2017 Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations, 2nd Edition with reference to Table 1 Category E3 – Medium District Brightness

Building Basis Parameters



Proposed Design Energy Performance

The tables below document the review carried out on the building through the use of thermal modelling conducted during the concept design phase, this software enabled a review of various heating mediums, ventilation types and lighting designs to be tested in respect of carbon emissions performance.

Total Energy Demand of the completed proposed development-

The table below shows energy consumption by end of use for both the actual and notional buildings, this is from the fixed M&E Plant with compliance to Part L2A of the Building Regulations. An improvement of 10% in comparison to the notional building is being achieved.

Energy Consumption by End Use [kWh/m²]		
	Actual	Notional
Heating	4.01	8.47
Cooling	0.92	1.05
Auxiliary	12.21	6.63
Lighting	15.15	18.95
Hot water	96.37	108.43
Equipment*	52.13	52.13
TOTAL**	128.66	143.53

* 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.

Table 1, Improved Building Fabric and ASHP

Calculate the equivalent annual carbon emissions from the completed development-

The total carbon emissions have been calculated; this is displayed in the tables below. These tables show the buildings compliance ratings, with improvements to the building fabric and the integration of an air source heat pump (ASHP) array. Tables below are based on three building scenarios, table 2 is the building with Notional Building Fabric Performance and a Gas Boiler heating system, table 3 is Improved Building Fabric Figures and a Gas Boiler heating system and the final table, table 4 is improved Building Fabric and ASHP heating system as is being proposed for this project;



Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	136.49	153.01
Primary energy* [kWh/m ²]	514.45	521.32
Total emissions [kg/m ²]	90.5	91.7

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

Table 2, Building with Notional Building Fabric Performance and Gas Boiler Heating System

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	60.73	153.01
Primary energy* [kWh/m ²]	486.56	521.32
Total emissions [kg/m ²]	85.6	91.7

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

Table 3, Improved Building Fabric and Gas Boiler Heating System

Total emissions are improved by 5.5 % with improved building fabric alone. The inclusion of an air source heat pump further improves this figure by 24 %.

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	56.81	92.32
Primary energy* [kWh/m ²]	385.11	429.62
Total emissions [kg/m ²]	65.1	72.6

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

Table 4, Improved Building Fabric and ASHP heating system (the proposed building design)

Implementing an air source heat pump and improved building fabric, improves the notional building by 21%. Overall emissions are lowered significantly with the improvement of the building fabric and the use of an air source heat pump. When comparing the proposed design with the Building Regulations compliant baseline model total CO₂ emissions reduce from 90.5 kg/m² to 65.1kg/m² (18% reduction).

Apply the appropriate carbon emissions reduction target-

The development in Manchester for the Our League Life Hub will be an energy intensive type building and will therefore be categorised as a target 2 development as defined in the Manchester's Core strategy (2012) policy EN6.

The proposed building design meets this performance criteria. The minimum requirements for target 2 is to improve emissions by minimum 10% over Building Regulations, Part L 2010, which the design will be able to commit to, this reduction can be seen in table 4 (which details a 10.3% improvement when comparing the actual building with the notional of the part L 2013 regulation and 19% improvement of the Part L 2010 regulations).

- **Target 1 Network development areas:** Locations where the proximity of new and existing buildings, the mix of uses and density of development provide the right conditions to support district heating (and cooling).
- **Target 2 Electricity intense areas:** Locations where the predominant building type has an all electric fit-out such as retail units and leisure complexes.
- **Target 3 Micro-generation areas:** Locations where lower densities and a fragmented mix of uses tend to mean that only building scale solutions are practical.

Domestic CO₂ emissions reduction targets

Table 12.1

Target	% Minimum requirement
Target 1: Network development area	CHP/district heating anchor or connection or where not feasible a 15% increase on Part L 2010
Target 2: Electricity intense buildings	+15% increase on Part L 2010
Target 3: Micro generation area	+15% increase on Part L 2010

Non-domestic CO₂ emissions reduction targets

Table 12.2

Target	% Minimum requirement
Target 1: Network development area	CHP/district heating anchor or connection or where not feasible, a 15% increase on Part L 2010
Target 2: Electricity intense buildings (Applies to commercial uses with a high proportion of emissions from electricity use (>45 kg CO ₂ /m ²))	+10% increase on Part L 2010
Target 3: Micro generation area	+15% increase on Part L 2010

Image 1- abstract from the Manchester's Local Development Framework Core Strategy Development Plan Document.

Apply the Energy Hierarchy-

The building has applied the energy hierarchy (this forms part of Policy EN4) from initial concept design by:

- incorporating an enhanced building fabric performance design using low U-Values
- Incorporating passive heating and cooling through careful fenestration detailing
- Incorporating suitable low zero carbon technologies which have been carefully selected during feasibility assessments
- Non reliance on fossil fuels to serve the buildings energy systems and catering appliances (Building only uses electricity which is becoming zero carbon through the ongoing adaption of the National Grid.)

Improvements can be seen in table 6, as the heating demand decreases by 61% compared to table 5. This is further improved with the incorporation of the ASHP. Energy consumption will be controlled in the building using a comprehensive lighting design which will include a lighting control system through a combination of daylight linking, dimming scenes, absence/ presence detection and manual switching. In addition to lighting consideration the mechanical ventilation systems will be demand controlled, were feasible, controlled using sensors to optimise efficiency of the systems. The tables below show the effect of building fabric improvements on both actual and notional buildings.

Energy Consumption by End Use [kWh/m ²]		
	Actual	Notional
Heating	36.76	44.64
Cooling	0.43	0.72
Auxiliary	6.58	4.72
Lighting	14.97	18.95
Hot water	328.17	321.72
Equipment*	52.13	52.13
TOTAL **	386.91	390.76

* 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.

Table 5, Building with Notional Building Fabric Performance and Gas Boiler Heating System

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	14.18	44.64
Cooling	0.92	0.72
Auxiliary	6.57	4.72
Lighting	15.15	18.95
Hot water	328.17	321.72
Equipment*	52.13	52.13
TOTAL**	364.99	390.76

* 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.

Table 6, Improved Building Fabric Performance Figures,

Consider all appropriate low carbon, renewable and/or decentralised energy technologies-

Various options were considered to incorporate low carbon technologies into the building, the following table illustrates the various low carbon technologies appraised for this development-

low carbon, renewable and/or decentralised energy technologies options appraisal	
Low Carbon Option	Reason for adaption & against adaption
CHP/district heating -	CHP is fuelled by Natural Gas, client looking away from fossil fuels. District heating networks are not available to connect to the ORL building.
Solar Hot Water (SHW)	Due to the buildings required location and orientation this is not a suitable option. The roof slopes north.
Photovoltaics (PV)	Roof is required to be North facing to look onto the existing rugby pitch, which makes this an unsuitable option.

Wind	As the build is in an urban environment it is not possible to integrate this solution, due to space restrictions and possible noise created from this technology.
Ground Source Heat Pumps (GSHP)	External space for the bore hole array is not available as the pitch has already been developed.
Air Source Heat Pumps (ASHP)	Air source heat pump is suitable for the design proposed at Manchester Our League Life hub, as the air source heat pump when installed in a modular array will have the capacity to meet the developments seasonal demands. The implementation of these units also removes fossil fuel requirements. ASHP are located min 10m away from noise sensitive surrounding buildings openings (e.g., openable windows and doors). This system, for the reasons noted above, has been selected as our thermal energy generation for this project.
Biomass heating	Fuel delivery and storage are problematic for the location and size of the build. Issues associated with air pollution from biomass flues are a issue.
Gas Combined Heat and Power (Gas CHP)	Fuelled by Natural Gas, client looking away from fossil fuels.
Biomass Combined Heat and Power (Biomass CHP)	Fuel delivery and storage are problematic for the location and size of the build. Issues associated with air pollution from biomass flues are a issue.
Energy from Waste (EfW)	There is no sustainable waste source to provide a renewable form of energy.