Appendix B

Portsmouth City Council

Low Energy and Social Housing Design Requirements

March 2021

Contents

Guiding Principles

As a local authority, developer and social landlord, Portsmouth City Council plays the role of various stakeholders on housing projects. The Council's engagement with a housing project extends throughout the life of those buildings, and while the political landscape might change during this time, the fundamental requirements of our Social housing stock do not. In addition, the Council has declared a climate emergency and set a target of achieving carbon neutrality by the year 2030. This puts the focus on Portsmouth City Council to set the benchmark in housing provision within the city, and as a developer.

The Council needs to have a Social housing portfolio which provides economically, thermally and energy efficient homes which also promote wellbeing for its tenants. The development of new and redevelopment of existing housing is integral to maintaining this portfolio standard.

The three guiding principles in this set of requirements are:

GP1 Minimising the lifecycle carbon of the site (embodied and operational emissions)

GP2 Minimising the operational costs to the end user

GP3 Maximising the value of the project

GP1 Minimising the lifecycle carbon of the site (embodied and operational emissions)

In March 2019, the Council declared a climate emergency. It has since set an ambitious target of achieving carbon neutrality by the year 2030. For this reason, the carbon cost of any housing project must be (i) calculated and (ii) minimised as far as possible. The entire lifecycle carbon of the project should be considered, including the emissions caused by the extraction, manufacture/processing, transportation and assembly of all the materials used in the building (embodied carbon), and the operational emissions.

GP2 Minimising the operational costs to the end user

The Council needs to ensure that the Social housing stock provides thermally and energy efficient homes to its residents. The operational costs should be minimised to avoid fuel poverty and ensure basic necessities such as heat and electricity are Social for all. As the national electricity grid decarbonises over the coming years, electric heating solutions too will have lower operational carbon emissions, however, the cost of electricity is still significantly higher than mains gas, and is likely to increase in the immediate future.

GP3 Maximising the value of the project

As a local authority, the Council must ensure that it is spending public money in the most responsible way. Therefore a housing project will always need to consider the capital cost of the project in combination with the wider pressures for Social housing. The Council has a finite budget for the provision of Social housing and must responsibly balance the environmental measures used at on a development and the overall cost. In simplest terms, the higher cost of housing per dwelling, the fewer the Council can deliver each year. Furthermore, the Council has a standard dwelling payback period of 30 years, meaning higher build costs will result in higher rent charges to the tenants. This too should be considered with regards to project value.

This set of requirements details the holistic approach which the Council expects its housing projects to take.

Part 1 - Performance Standards

To set the benchmark for housing provision in the city, projects need to demonstrate their performance against each of the three guiding principles. It is believed that the most appropriate performance standard to maximise performance against the guiding principles is the Passive House Standard. However, at the initial concept stage, an energy and cost comparison should be undertaken using the following building performance standards.

1. **The Passive House standard**
2. **The PCC baseline standard**

All Portsmouth City Council housing projects should be designed to the Passive House Standard. Where a project targets only the Baseline level, significant justification must be provided.

The Passive House standard

Passive House is an internationally recognised low energy building standard that is increasingly becoming the European benchmark for ultra-efficient buildings. Passive House buildings have a very low heating demand and the subsequent operational costs should be equally low. The higher performance and construction standard of the dwellings will have an initial impact on the capital costs of the project compared to the baseline. This is expected to be in the region of 10-12% in year 1, however, as the Councils expertise in this area grows, it is believed that the cost gap should decrease, as has been the case in other Local Authorities with similar targets.

As all Portsmouth City Council projects will maximise the potential for PV, Passive House projects are therefore likely to exceed the requirements for Passive House 'Classic' and could achieve either of the Passive House 'Plus' or 'Premium' standards. The likely standard to be achieved should be reviewed as early as possible in the design process.

It is acknowledged that achieving the passive house standard may be a challenge for some individual units within a multi-unit site. However, all units on a scheme will be designed and built to the same specification (i.e. to achieve full Passive House certification), the units which cannot achieve final certification, for example, due to restrictions on orientation or building form, will subsequently achieve the Passive House Institute's Low Energy Building (LEB) Standard.

<u>PHI Low Energy Building Standard</u>

This standard requires building performance far in excess of UK Building Regulations but has lower standards than the full Passive House Standard, for example a maximum annual heating demand of 30kWh/m^2/yr or less in the LEB standard compared to 15kWh/m^2/yr for Passive House.

As a result, all units on a multi-unit scheme will be designed and constructed to the same specification and all will achieve some level of certification. Primarily, this will be to Passive House 'Classic' (or higher) or, failing that, the PHI Low Energy Building Standard as a minimum.

The PCC baseline standard

The PCC Baseline Standard provides an indication of the project performance against the three guiding principles, if the project were designed to the minimum standards as set out in the Portsmouth Plan and using the design standards set out in Part 2 of this report.

The Portsmouth Plan requires domestic buildings to achieve a minimum 19% improvement over Building Regulations. The PCC Baseline Standard model should therefore achieve this minimum improvement through the use of heat pumps, at a communal level where possible, otherwise at the individual level.

Traditional gas boilers are due to be banned from new-build schemes from 2025 in a bid to reduce the carbon emissions of the UK housing stock, in line with the UKs commitment to have net-zero

carbon emissions by 2050. Portsmouth City Council has a much more ambitious target of net-zero by 2030 and as such, will not include gas-fired heating in its housing stock from this point forward.

Direct electric panel and storage heaters must not be used in Portsmouth City Council developments. While these are likely to be the cheapest heating system to install, they are commonly the most expensive to operate, thus, are not appropriate for use in Social housing schemes.

Performance standards review process

The initial concept for any Social housing project should be designed using the above design guidance, once the initial concept is drawn up, the project should model and review each of the performance standards against the guiding principles indicators in Table 1.

These simple indicators will help Portsmouth City Council to make an informed decision on which performance standard the project should achieve.

Table 1 - Guiding principles indicator early design comparison by building performance standard

Building Standard	GP1 - Carbon emissions		GP2 - Operational costs (dwelling average)		GP3 - Project value		
	Improvement over BRegs (%)	Total Emissions (tCO2/yr)	Annual heating demand (kWh/dwelling/yr)	Annual cost of heating (£/dwelling/yr)	Build Cost (£/m^2)	Total project cost (£)	Total number of units
1. Passive House							
2. PCC Baseline							

Embodied carbon

An accurate lifecycle carbon assessment is essential to enable Portsmouth City Council to calculate its total emissions and adequately offset these to achieve net-carbon neutrality by 2030. A lifecycle carbon assessment should therefore be undertaken on every housing project.

There are many software packages available to undertake these calculations, with both free and paid solutions.

While only measurement of the embodied carbon is required, it is suggested that projects aim to reduce these where possible, considering the embodied carbon when specifying construction methods and materials. Portsmouth City Council does not specify a particular target, however the targets set out in the RIBA 2030 Climate Challenge could be used as a guide.

Part 2 - Design Guidance

Communal first

The Council would like to take a communal first approach to all multi-unit schemes. This includes both multi-dwelling blocks and, where possible, multiple individual dwellings. Similarly, where existing district heating is located within reasonable proximity of the project; it should be seriously considered and assessed that any new dwellings are connected to this existing system. Both heating and ventilation systems should take this approach and this is based on several reasons. First, centralising these systems makes access for maintenance and repair work much easier. Second, removing the main units from within properties reduces the ways in which the dwelling occupants can adversely interact with and compromise the performance of the systems. Apparent system failures or poor performance can often be attributed to incorrect operation of the systems, by limiting the access and control of these systems, the remaining controls that the occupants need to engage with should be simplified. Third, generally speaking, the greater number of dwellings connected to a centralised system, the more consistent and efficient that system should be. For example, the Council has the ability to secure power contracts at a lower cost than is available on individual domestic tariffs.

Building Form

A building's form has a huge influence on its energy demands. At the most basic level, the more compact the building's form then the less energy it will require. The Form Factor can be expressed as the ratio of the external surface area over the floor area. For example, a square building will have a lower Form Factor than an L shaped building of the same floor area, and will therefore be more energy efficient. The Form Factor should be considered early in the design process and where possible designers should aim for a Form Factor of ≤3.

Roof space

Roof space, form and layout possible at all new build schemes should be carefully considered. The opportunity for the addition of solar photovoltaic (PV) technology should be maximised in all possible circumstances. PV not only provides on-site renewable electricity generation but is an aesthetic indication to the public of the environmental credentials of the project. PV installed south-facing at a 30 degree angle will provide optimal electricity generation in the UK. Southerly pitched roofs will allow this optimal installation in the most space-efficient way. Alternatively, frame-mounting the PV on a flat roof can allow PV to face south, however, the angle of the panels is commonly reduced to minimise the distance required between rows of panels and therefore maximise the array capacity. Flat roofs can also allow plant for communal services to be installed while the internal area available for dwellings is maximised. Installation of plan using roof space can also limit the effects of noise producing technologies such as the air handling units for air source heat pumps and mechanical ventilation.

Fabric first

The simplest way to limit the operational costs of a building is to take a fabric first approach. Energy systems typically last for anywhere between 10 and 30 years, meaning they are will be replaced or changed several times during the life of the building. Designing the building form and fabric to minimise the specific heat demand will not only help to minimise operational costs but also ensure a greater variety of energy systems are feasible for the building. The Passive House standard is an obvious example of this, but projects meeting the PCC baseline standard only should also use this approach to meet the performance requirements of the standard.

Internal and external space

External spaces are an opportunity to create local neighbourhoods through private communal spaces which can promote community and improve inter-household relationships. External spaces can also provide individual households with private areas which can promote occupant wellbeing.

Communal plant should be incorporated within internal space of the built elements of the site and only where this is not possible should external space be used for energy infrastructure plant or centralised energy centres. This will likely include heat and ventilation plant, PV system infrastructure and battery storage, in addition to others, so adequate space should be made available within the internal layout from the outset. Only where sites have extreme constraints should 'available space' be justification for omission of suitable low-carbon and communal systems.

Where external plant such as air handling units for air source heat pumps and ventilation, and battery storage are included within a project, careful consideration should be given to their location and the impact they might have on communal and individual enjoyment of external spaces.

Accounting for centralised plant and key energy systems from the initial concept stage should allow a holistic approach to project and balance the external and internal spaces for low energy performance and social and environmental wellbeing. Effective use of internal and external spaces are key to the development of low carbon and socially cohesive housing.

Orientation, glazing, solar gains and solar shading

There is no substitute for natural light and the orientation of each element of a project can impact how effectively light can be used throughout the design. While sites can have similar offerings in terms of dwelling density, provision of external space, etc., orientation and layout can significantly impact social and environmental performance.

Designing the building form to maximise direct natural light to roof space will optimise the performance of a PV array benefitting environmental performance. The building form and orientation will impact the external spaces, particularly the type and times of use. Optimising the building form and glazing orientation to provide natural light to internal spaces for occupant health and wellbeing will promote social performance, but also to allow solar gains and reduce space heating requirements, improving environmental performance. Similarly, solar shading can be used to maximise solar gains in the winter months while limiting them in the summer months to reduce the risk of overheating. The application of solar PV may limit the use of in-roof glazing and vice-versa, which highlights the need for a holistic approach from the outset.

Summary

1. Communal systems should be prioritised for all multi-dwelling projects.
2. Roof space, form and layout should be tailored to maximise the PV potential and plant storage.
3. Where communal or individual systems will require internal space provision, adequate space should be considered from the initial concept stage of the project.
4. A fabric first approach should be taken, designing the building form and fabric to minimise the heat consumption
5. External space should be considered for heat and ventilation plant and/or battery storage if necessary. Only where sites have extreme constraints should 'available internal or external space' be justification for omission of low-carbon and communal systems.

Part 3 - Additional Guidance

Resident training and handover

A key factor in the successful implementation of a Passive House or LEB Standard project, is the tenant training and handover. This change in design and construction specification is likely to incorporate technologies or principles which tenants are not familiar with. Passive House projects will often feature no centralised heating system, commonly just a towel rail in a bathroom. This can often be difficult for tenants to understand. Similarly, the change from gas-fired central heating to ASHP sees a change from radiators heating up to around 80ºC to just 40ºC. ASHP also requires a shift in behaviour, from multiple on/off heating schedules, to constant on scenarios with fall-back set point temperatures for night-times and unoccupied periods.

Refuse storage

Over the coming years, the proportion of general household waste to recyclable materials is expected to change as the Council provides greater central recycling and recovery provision. This means that less waste will be classed as general household waste increasing the amount to be stored in segregation.

Segregation should begin within the dwelling. Thus, space for mixed-recyclable, food and general household waste should all be provided within the kitchen of each dwelling.

Projects with blocks housing multiple dwellings should allow for accessible communal waste storage, adequately sized to accommodate mixed-recycling, food waste and general household waste. Recyclable waste storage should be at least, equal in size to general household waste. Developments with over the relevant number of dwellings should also provide glass waste storage (as per PCC policy).

Projects with individual houses should allow for refuse storage at the front of the dwelling by allowing space for the standard PCC wheelie-bins. It is preferred, for the benefit of the end user, that provision is made for refuse storage at the front, or in another suitable location, to ensure that bins do not need to be transported from the storage location (e.g. the rear garden) through the dwelling prior to collection.

Ecology

All Council projects aim to maintain or improve the ecological value of the given site. The way this is done should be specifically tailored to the site in question, however, green roofs and walls should be considered where possible. Green roofs generally require an area of flat roof to be installed. These requirements state that roof space should be prioritised for solar PV and mechanical plant, but in instances where this is not possible, green roofs should be implemented.

Parking

The Council must provide greater housing provision within the local authority area over the coming years. This means that sites will often be used to increase housing capacity within a given residential area. An increase in housing provision within a city as densely populated as Portsmouth is likely to increase the stress placed on on-road parking provision within these areas. As such, the Council is working to promote the use of sustainable public transport within the city. Projects should therefore carefully consider the requirement for off-road parking to mitigate additional stress to on-road parking, in areas where public transport is less available.