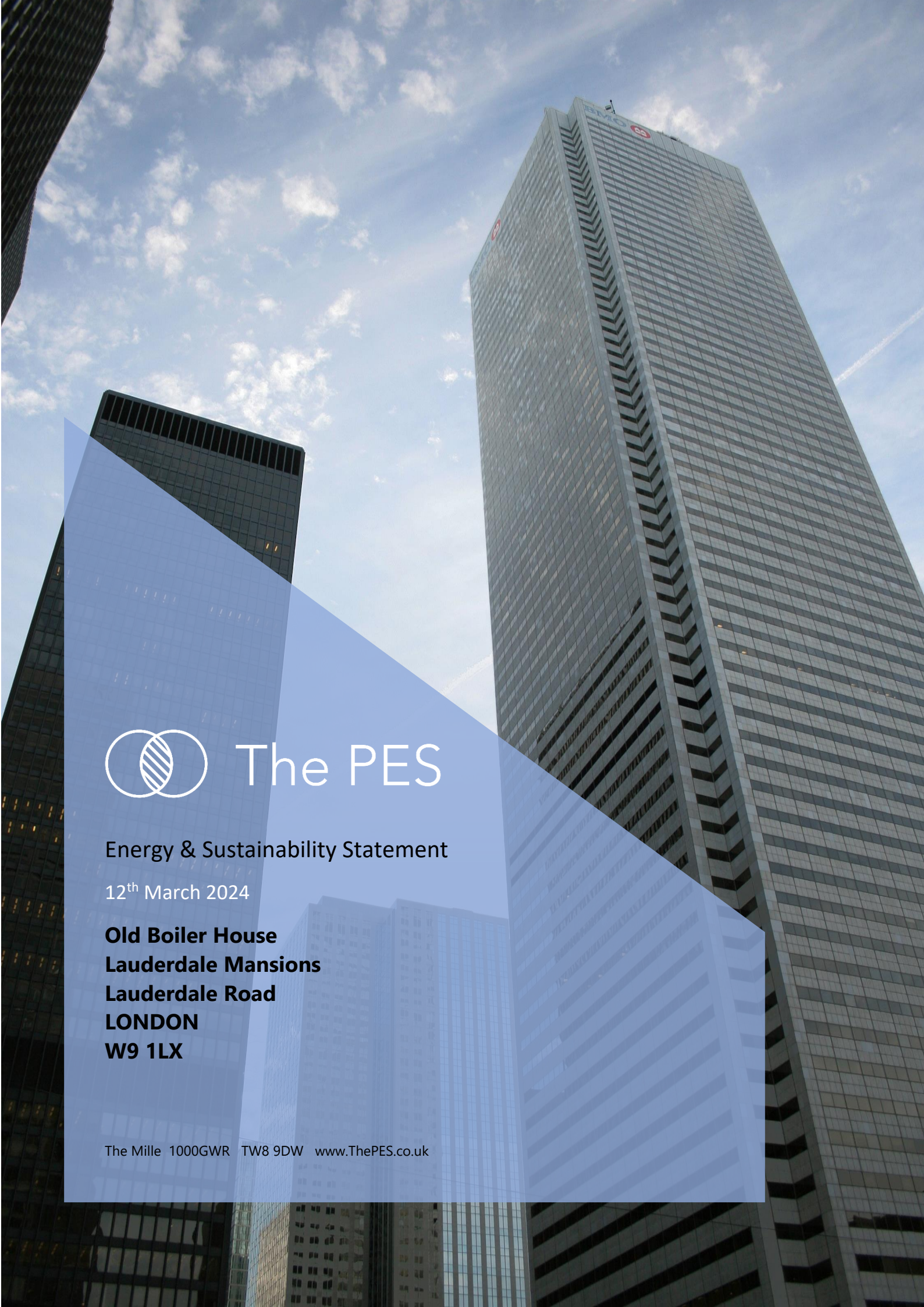

The PES

Energy & Sustainability Statement

12th March 2024

Old Boiler House
Lauderdale Mansions
Lauderdale Road
LONDON
W9 1LX

The Mille 1000GWR TW8 9DW www.ThePES.co.uk

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1.0 Introduction

This report sets out the sustainability issues and targets intended for the change of use and conversion and extension of the old boiler house at Lauderdale mansions to create a new 1 bedroom flat.

he applicants proposal includes:-

- New construction over the existing courtyard to create the bedroom area and store.
- Conversion of the existing building to create the lounge/hallway area
- A new enclosed courtyard and bin storage area.

The property sits within the Maide Vale Conservation area.

1.1 Planning Context

The site sits within the City of Westminster (Westminster).

Westminster's City Plan 2019-2040 was adopted in April 2021; key policies relevant to this report are set out below:-

36. Energy

A. The council will promote zero carbon development and expects all development to reduce on-site energy demand and maximise the use of low carbon energy sources to minimise the effects of climate change.

Carbon Reduction

B. All development proposals should follow the principles of the Mayor of London's energy hierarchy. Major development should be net zero carbon and demonstrate through an energy strategy how this target can be achieved.

38. Design Principles

Sustainable Design

D. Development will enable the extended lifetime of buildings and spaces and respond to the likely risks and consequences of climate change by incorporating principles of sustainable design, including:

1. use of high-quality durable materials and detail;

2. providing flexible, high quality floorspace;

3. optimising resource and water efficiency;

4. enabling the incorporation of, or connection to, future services or facilities; and

5. minimising the need for plant and machinery.

Further guidance is taken from Westminster's recently Adopted Environmental Supplementary Planning Document Adopted 2022, of particular relevance is the section on Retrofitting and Sustainable Design:-

Refurbishment and retrofit projects provide an excellent opportunity to improve the energy and water efficiency of existing buildings and reduce emissions, which is key to achieving carbon neutrality by 2040.

A large proportion of the building stock in Westminster has a heritage designation, so finding sensitive and effective ways to improve energy efficiency of historic buildings is of vital importance. Given the extent of its heritage assets, Westminster is uniquely placed to lead in work on the area of sensitively retrofitting historic buildings and this will be a priority in order to tackle climate change.

To reinforce the above, WCC have recently introduced a new Policy 43. Retrofit First

Prioritising Retrofitting Over Demolition

A. Development should adopt a retrofit-first approach, where options for retrofitting and retention of existing buildings are considered before demolition. Where substantial or total demolition is proposed, this should be fully justified through an appraisal of the construction options, assessing the carbon cost and public benefits of refurbishment, retrofit, deep retrofit or newbuild options. Development involving total demolition of a building which has more than a single storey will generally be resisted,

2.0 Sustainable Design & The Energy Hierarchy

Westminster City Councils guidance on Sustainable Buildings highlights key sustainable design features:

"Energy-efficient design, insulation and ventilation can help to keep a building warm in the winter and cool in the summer through, for example, site layout and form, natural ventilation and shading, passive solar design and thermal mass."

Energy efficient design is covered by the Building regulations, in the case of extension to existing properties; Approved Document Part L1 2021.

AD L1 requires existing thermal elements, if they are to be refurbished, to be refurbished to a minimum U-Value standard, and for new build element to meet a minimum U-Value standard as set out in the table below:

Element	AD L1 U -Value Standard
Retained Walls	0.30
New Walls	0.18
New (basement) Floor	0.18
Retained/New Roof	0.16/0.15
Replacement Windows	1.4
Replacement Doors	1.4

While the replacement of controlled services required to meet the following standards:

Controlled Service	AD L1 Compliance Requirement
Mains Gas Boiler	92% Efficient
Comfort Cooling	Cooling SEER > 4.0
Air to water heat pumps	Heating SCoP 3.0
MVHR Systems	SFP = 1.5

2.1 Energy Efficient Design

In order to meet the requirements of City policies, the scheme will be designed to limit the emissions of carbon dioxide to the atmosphere from the operation of the building services via the use of good building fabric, i.e. be lean – use less energy; step 1 of the energy hierarchy.

To achieve this, the development will adopt the principles of "best practice" u-values, above and beyond those set down by regulation for the new build extensions as well as following the retro-fitting guidance within Westminster's new Environmental SPD, whilst making allowance for conservation area constraints as noted below:

- Newly laid floor areas – u value = 0.12W/m^2k or better
- New walls – u value = 0.16W/m^2k or better

- New flat roof– u value = 0.11W/m^2k or better
- Glazing – u value = 1.1W/m^2k or better

To further improve fabric efficiency in the upper floor elements, the applicant will undertake the following retrofitting works:

- Existing walls will be internally insulated to achieve a minimum u value at 0.30W/m^2k

The design team are also proposing to air test the new dwelling, seeking to meet a rating at 10m^3/hr/m^2.

2.2 Efficient Building Services

The dwelling's HVAC systems are to be fully upgraded/replaced in order to maximise energy efficiency of the newly refurbished dwelling.

The new heating system will be heat pump based, with an air source unit mounted within the newly created store area.

The chosen emitters will be underfloor heating– subject to the limitations of the existing structure.

2.3 Energy Efficient Fixtures and Fittings

The guidance on Sustainable Buildings goes on to promote the reduction of consumption of unregulated energy – energy use not for under the regulations:-

"Energy-efficient fixtures and fittings can be installed to reduce energy consumption, for example, SMART meters, energy-efficient white goods, low-energy lighting."

Accordingly, the newly refurbished office space will incorporate:

- The use of LED low energy lighting will be adopted throughout the new dwelling
- Daylight controls and presence detection will be utilised for any external lighting.
- New white goods will be installed in kitchen and utility areas with high EU energy ratings.
- An energy display devices - to enable occupants to monitor, and thereby manage their energy use - will be installed in a prominent location.

2.4 Sustainable Energies

The guidance on Sustainable Buildings defines sustainable energies as:

"renewable and low-carbon energies resulting in either zero-carbon emissions or a significantly lowered carbon emissions due to energy-efficient technologies"

Therefore, this report will briefly consider the feasibility of the following technologies:

- Wind turbines
- Solar hot water

- Photovoltaic systems
- Biomass heating
- CHP (Combined heat and power)
- Ground source heating
- Air source heating

Clearly, the project's Conservation Area location will severely limit options, and these are highlighted below as appropriate.

Wind turbines

Wind turbines produce electricity from wind power – clearly they require an open aspect and thus are clearly more appropriate in rural areas and not within an urban centre and the conservation area location.

Solar hot water

Solar thermal systems harness the suns energy to heat hot water via roof mounted panels. There are appropriate areas of roof space at Lauderdale Mansions that could be utilised; however, solar thermal systems require a lot of "management" in order to optimise outputs

The Renewable Heat Incentive (RHI) has also been withdrawn as from March 2022, further impacting potential returns

It should also be noted that solar thermal displaces the emission from the gas fired boilers or efficient heat pumps; given the low emission levels from these systems the carbon savings will be limited.

Waste Water Heat Recovery (WWHR)

Waste water heat recovery systems can be readily installed to the new shower areas, harvesting as much as 35% of the heat from the shower wastes, thus minimising main heating system load with the associated reduction in energy demand and carbon emissions.

WWHR will be installed to the new en-suite showers space.

Photovoltaic systems

Solar "PV" systems are roof mounted panels with photocells that generate electricity from the sun's light. A relatively simple technology that is simple to install and offers a financial yield via the significant saving on grid based electricity

"PV" panels are more appropriate for horizontal/low-pitch mounting and therefore are a stronger candidate for use on this project.

However, there is a very significant overshadowing issue associated with the taller building of Lauderdale mansions themselves – rendering any roof mounts PV all but obsolete, so PV will not be an option for the boiler house conversion.

Biomass heating

Biomass heating uses plant matter as a fuel source. It requires a special boiler and storage space for the fuel – usually in a pelleted format. The major drawback for biomass is the much increased level of nitrous oxide and particulate matter emissions – which would be a considerable problem in dense urban and suburban areas such as the London Boroughs.

For this reason, such systems are not considered appropriate

CHP (Combined heat and power) & community/district heating systems

Under the renewables section, CHP refers to domestic micro CHP systems. A micro CHP system could be a consideration as part of a new heating system - a source of "clean" energy, which is step 2 of the Mayor's Energy Hierarchy.

However, CHP requires a significant base load to ensure that the unit is in operation for at least 60% of the year to ensure it meets the required efficiencies.

In this particular case – as a single residential building with limited hot water demand, and a heating demand for only 4/5 months of the year, the base load is just not available to justify CHP.

Ground source heating

Ground source heat pumps extract the heat from the ground (or bodies of water) through collector loops prior to passing through a refrigeration "evaporation/compression" heat exchange cycle which passes the heat into central heating systems.

Clearly, ground source heat pumps require external land into which the collector loops can be installed – a commodity that is available at Lauderdale Mansions, however, the limited scale of the boiler house conversion as opposed to the very high capital cost of a GSHP installation, would render any such project non-viable.

Air source heating

Delivering heat into the property via the same mechanism as the ground source heat pump, an air source heat pump uses the evaporator unit to extract heat directly from the air. The evaporator unit sits externally and is relatively compact.

As noted above, the HVAC systems involve the use of air source heat pumps to deliver the LTHW and DHW requirements for the newly refurbished dwelling.

Efficiencies are expected to be in excess of 330%, reducing CO_2 emissions by over 70% in comparison to the traditional gas fired boiler.

Summary

In summary, having considered the available options, it is considered most appropriate for the applicant to install the above noted ASHP and WWHR systems.

3.0 Environmental Performance

As required, the design team wish to consider the requirements of Westminster City Plan Policy 38, Policy 43 and the newly adopted Environmental SPD.

3.1 Energy Efficiency, Vacant and Underused Land and buildings

Considerations of energy efficiency are dealt with in detail under 2.0 above.

The proposed development is an extension/refurbishment of an existing building, with associated extension works to facilitate improved utilisation of available space – a highly sustainable approach to development, in keeping with the need to reduce the embodied carbon in new developments as well as aligning with the circular economy ambitions within Westminster's City Plan Policy 37.

3.2 Materials

Clearly, the rescue of the existing building - to be extended and improved to enhance useability and thereby, longevity – is clearly and highly sustainable by default.

The principal issue when considering the environmental impact of new construction materials is the embodied carbon – i.e. the carbon cost extraction of raw material, transport to factory, manufacturing, transport to site and erection on site.

Additional carbon costs are occurred through maintenance and repairs as well as end of life (deconstruction/demolition)

The design team will seek out construction techniques with a lower embodied carbon contents; steel work and lightweight concrete floor slabs and retaining walls.

It is recognised that concrete utilised to form the basement has a significant embodied CO_2e content, the majority of which comes from the cement, which makes up about 10% of concrete by volume, but accounts for around 75-90% of its embodied impact.

The team will aspire to utilise concrete with a significant recyclable content; concrete with a minim 30% GGBS content; higher if such product can be sourced at the time.

Emissions of CO_2 associated with calcium carbonate decomposition during concrete production are partly reversible through carbonation.

The mix design of structural concrete purposefully limits carbonation of the surface layer, preventing corrosion of any embedded steel reinforcement, which might otherwise be affected during the building's life. There is, however, a greater degree of carbonation during the end-of-life stage, when concrete is crushed for reuse as an aggregate. The crushing process substantially increases the material's surface area, allowing CO_2 to be more readily absorbed.

It is generally acknowledged that the concrete carbonisation process will remove up to 30% of the up-front embodied CO_2e during the buildings lifespan, including end of life.

Other significant measure considered to reduce the project CO_2e content include:-

- Rebar with a virtual 100% recycled content
- Blockwork for new wall constructions with a 30% recycled content
- Brickwork sourced from suppliers or re-used materials.
- Plasterboard with a significant recycled content – subject to market availability

In addition to the above low carbon strategy, the development will source all materials form supplier that can demonstrate that materials are sourced responsibly in line with recognised Environmental Management Systems (FCS, BES6001 etc.)

3.3 Air Pollution

The lead contractor will be required to undertake best practice measures in terms of the construction site impacts and put in place a Construction Management Plan that will consider the use of energy and water and to control the risks of air/dust pollution and ground water pollution throughout the strip-out and construction phases.

Operationally, as noted above, the HVAC solution will be zero emission, all electrical systems.

3.4 Noise Pollution

The Energy Efficiency considerations have already touched upon the issue of noise pollution from occupation of the proposed building as well as the selection of appropriate HVAC plant to avoid noise impact on neighbouring properties.

An appropriately enclosed heat pump unit will have a zero impact on the local acoustic environment.

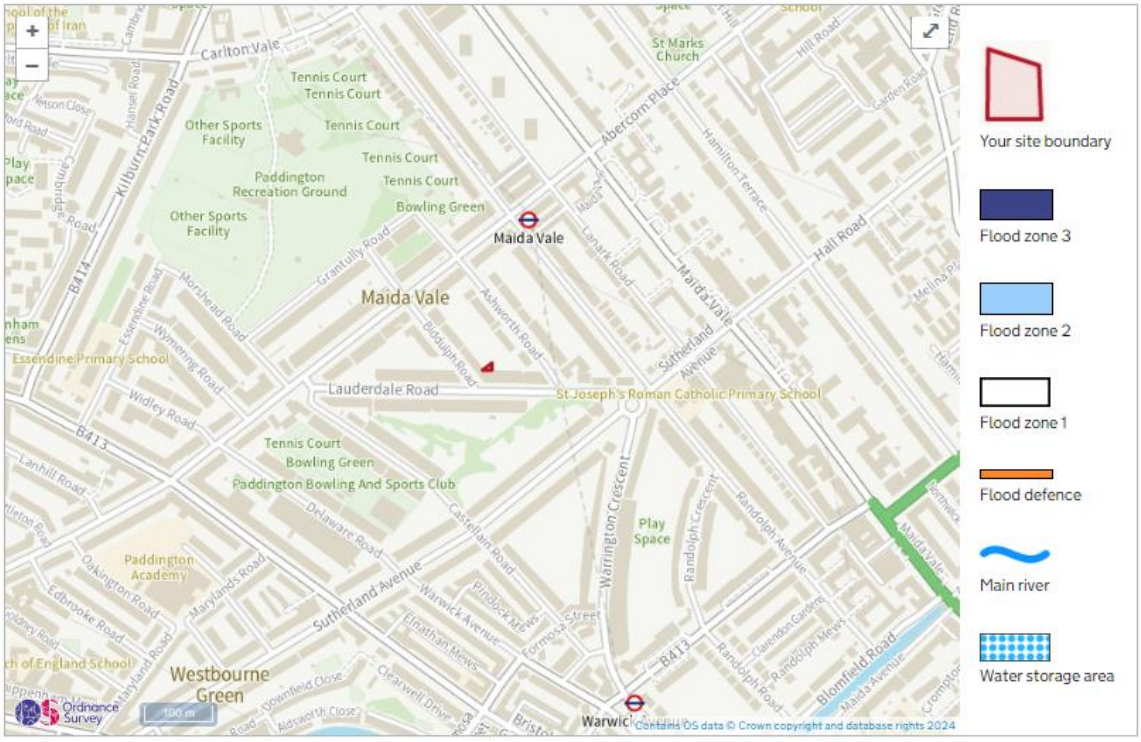
3.5 Contaminated Land

Given the formal use as a boiler house, there is potential for the site to have issues with contamination. This will be investigated and any remediation works required undertaken.

3.6 Water Quality, Saving & Drainage

In line with best practice sustainability principles, the design team will ensure that surface water run-off is no greater than the site prior to development – which given that there is no increase in building footprint – will be readily achievable.

The project is an area of “low” risk from surface water flooding (see extract from Government website below), and appropriate attenuation measures are to be put in place to ensure that project has a neutral impact.



The design team will seek to instigate good practice in terms of limiting the use of wholesome water within the extended dwelling when operational:-

- A water meter will be installed on the main supply, as well as a leak detection system to ensure any major leakage problems are identified and highlighted.

The extended dwelling will also minimise wholesome water use, and this will be achieved via the specification of internal water consuming items as follows

- WCs ≤ 4/2.6 litres dual flush
- Showers ≤ 8L/min
- Baths ≤ 170 litres
- Basin taps ≤ 5L/min
- Kitchen sink taps ≤ 6L/min
- Dishwashers ≤ 1.25L/place setting
- Washing machines and washer dryers ≤ 8.17L/kilogram

3.7 Light Pollution

All external lighting will comply with the Institute of Lighting Engineers guidance on the reduction in obtrusive light, and timers will be utilised to prevent external lighting been used outside of appropriate hours as well as preventing daytime use.

3.8 Waste and Recycling

During the construction phase, the lead contractor will put in place a best practice Site Waste Management Plan which will, target a recourse efficiency of 6.5tonnes of waste construction materials/100m^2 of development. Additionally, over 98% of non-hazardous construction waste will be diverted from landfill via an approved waste contractor and transfer station.

Sufficient storage areas have been included in the design to meet the developments operation waste storage requirements, including recyclable streams in line with Westminster collection policies.

3.9 Amenity, environmental quality, daylight and sunlight

Given the fixed location and restrictions placed upon the conversion of an existing building, the design team have sought to:-

- Have a neutral effect on the daylight and sunlight to neighbouring properties by limiting extensions to the external envelope above ground floor level to the elevations south of the east-west latitude.
- Maximise the natural daylight available to occupied spaces the introduction of new and significant glazing areas to the eastern elevations.

3.10 Circular Economy

The project has the core aim of retaining and extending an existing property, thereby extending the lifetime of the building, improving its energy efficiency and much reducing the waste and embodied carbon associated with any proposals for demolition and new build.

The newly created spaces can offer alternate uses within its lifetime, with much of the internal partitioning and finishes designed to be readily moved, demounted, re-used and future special requirements dictate.

Waste management during demolition/enabling works will be kept to an absolute minimum via BREEAM compliant procurement strategies and domestic waste will be sorted, stored and disposed of in line with Westminster collection policies.

4.0 Conclusions/Summary

It is the intention of the applicant to deliver a sustainable development as defined within the policies of Westminster City Council; the same polices that have informed this report and the recommendations within.

The policies require the applicant to submit an Energy & Sustainability Statement highlighting how the proposed development will consider the relevant City Plan policies whilst taking on board the advice within the Westminster City's Environmental SPD.

As can be seen above the applicant has identified opportunities when they are able to do so, including fabric upgrades, selection of sustainable materials, HVAC upgrades and the inclusion of air source heat pumps and WWHR systems.

The applicant will deliver these benefits as part of the development, thereby meeting the minimum sustainability requirements and advancing the development beyond the minimum Building Regulations and Planning Policy requirements.

In summary the project is projected to meet a reduction in emissions over Part L minima at 50% or more, whilst minimising its whole life carbon impact via careful selection of materials and reduced energy construction and contributing to the circular economy.