

Nile & Villiers, Sunderland

Residential, Retail & Commercial Development

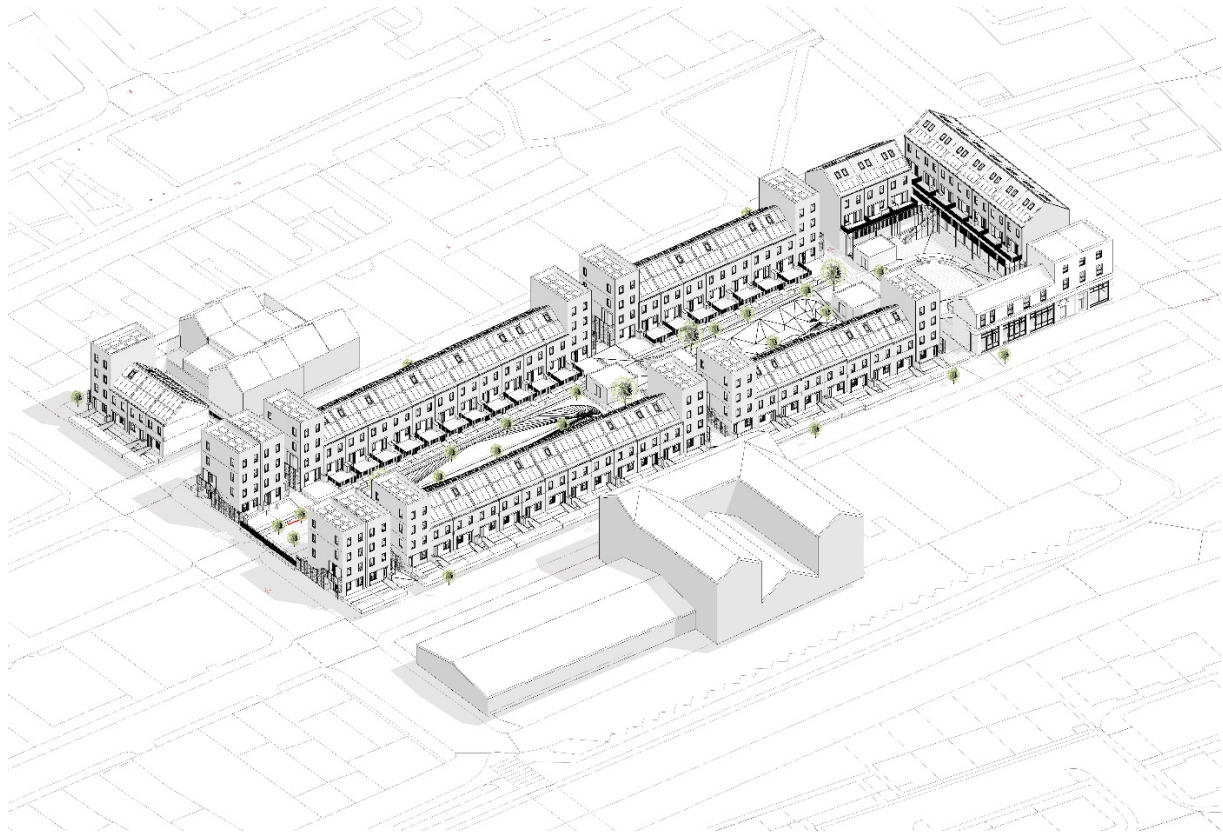
Mechanical, Electrical and Public Health Services

Sustainability Statement

23354-CDL-XX-ZZ-RE-ME-0002

Revision 01

13th March 2024









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Document Control

Project		Nile & Villiers	Project No.	23354	
Document Title		Sustainability Statement			
Document ref		23354-CDL-XX-ZZ-RE-ME-0002			
Revision	Date	Description	Prepared by	Checked by	Approved by
Rev 00	18 th September 2023	Planning Issue	G Clark	D Weatherall	C Degnan
		Signed			
Rev 01	13 th March 2024	Planning Issue	G Clark	D Weatherall	C Degnan
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1 Introduction

This report outlines the key sustainability and carbon reduction measures considered within the design of the building and the proposed Mechanical, Electrical and Public Health (MEP) Engineering services strategies for the mixed use residential, commercial and retail development at Nile Street and Villiers Street, Sunnyside, Sunderland.

Throughout the development, homes will set out to achieve an EPC rating of A or above by utilising high standards for the fabric and building services.

This report should be read in conjunction with the other planning documents, including the Design and Access Statement, specifically section 6 regarding Sustainability and the Climate Emergency.

2 Building Fabric

The energy performance of the development will be a major consideration within the design, with the aim of delivering a scheme that reduces energy demand through the implementation of passive and active energy and carbon reduction methods to meet the minimum energy performance requirements of the Building Regulations and meets the clients' sustainability objectives.

The 2021 Building Regulations Approved Document Part L1 imposes a 31% carbon reduction from the previous 2013 Building Regulations and requires significant improvements in the building specification.

To achieve the developments energy targets, a fabric first approach shall be adopted. This will include consideration of the following:

High Insulation Standards

The buildings shall be designed to significantly reduce heating energy demands through the specification of extremely high insulation standards achieving low U-values.

The 2021 Building Regulations Approved Document Part L1 sets minimum U value standards for new dwellings, however, to achieve nearly-zero energy buildings, these figures must be significantly improved.

Minimum Fabric U-values (Notional minimum target)

- Walls 0.18 (0.18)
- Floor 0.13 (0.13)
- Windows 1.2 (1.2)
- Rooflights 1.7(1.7)
- Doors 1.0 (1.0)

Building Air Permeability

A low building air permeability rate shall be targeted to reduce the buildings heating energy demand. The 2021 Building Regulations Approved Document Part L1 sets a minimum air permeability standard of 8.0 m³/hr m² @ 50Pa, however assumes a notional figure of 5.0 m³/hr m² @ 50Pa.

Therefore, within this development we propose a minimum target air permeability standard of 3.0m³/hr m² @ 50Pa.

Avoiding Overheating

The buildings shall be designed to meet the requirements of the 2021 Building Regulations Approved Document Part O: Overheating.

This will require that the windows are designed and specified to reduce the potential for overheating by limiting areas, maximising opening areas, and optimising the use of external shading.

This shall be demonstrated by either:

- a) The Elemental approach to compliance or,
- b) Dynamic thermal modelling in accordance with Chartered Institution of Building Services Engineers (CIBSE) Technical Memorandum TM59.

To verify the energy performance and carbon emissions, a SAP calculation shall be carried out for each property type and submitted to Building Control for their approval.

3 Avoiding Fossil Fuels

The significant de-carbonisation of the UK national grid supplied electricity and therefore reduced electric carbon factor, means that the use of electricity as the main heating and hot water fuel is preferable to meet the energy and carbon emissions targets.

Electricity shall therefore be adopted as the primary fuel source for heating and hot water.

4 Renewable Energy

The 2021 Building Regulations Approved Document Part L1 promotes the inclusion of Photovoltaic (PV) panels in new dwellings and assumes that PV will be provided within the associated SAP calculations.

Under this scheme, a local micro energy grid is to be provided by a dedicated IDNO provider who will incorporate PV and battery storage within the local distribution.

We recommend the area of PV will be maximised within the constraints of the existing flat roof area available. Final areas and quantities of PV panelling shall be confirmed at the next stages of design.

Given the limited roof area available, and the intention to maximise the provision of solar PV, the use of other solar energy systems to generate hot water have been discounted.

5 Low and Zero Carbon Technologies

The design of the homes as detailed above will place particular emphasis on passive energy saving by best practice design of the building and its services strategy.

To complement the energy savings previously detailed the following renewable, low carbon and sustainable measures have been considered for use within the scheme:

The use of Low or Zero Carbon technologies for heating and hot water generation has been considered within this development, however the options considered were limited to:

a) Ground source heat pumps

Ground source heat pumps offer stable, highly efficient generation of low-grade heating energy year round. However, they require either a large horizontal array or vertical pipework/boreholes to deliver the required heating energy.

Given the site constraints and restricted external areas, this option is therefore not viable.

b) Air source heat pumps (ASHP's)

Air source heat pumps can provide efficient generation of low-grade heating energy, however they external space, need to be located above ground, and generate noise, which needs to be carefully considered given the proximity of each property and to the existing residential areas surrounding the site.

They are proposed for the scheme for either heating and hot water or just hot water generation. If an air source heat pump system was to be used for hot water production only, this would be complemented by electric panel heaters for space heating.

The final system solutions are to be determined at the next stage of design.

6 Efficient Building Services

All building services shall be efficient in operation and shall be specified to reduce the overall installed energy demand. This shall include consideration and inclusion of:

- Low energy fans, motors, and pumps
- Low energy LED lighting
- Optimised time and temperature controls
- High efficiency whole house heat recovery ventilation units and extraction systems.

7 Conclusion

This sustainability statement begins to demonstrate the design requirements and fabric changes required for buildings to achieve Low Carbon performance targets.

It is proposed that the solutions within this report, high performance fabric, good level of air permeability and a range of low energy and renewable technologies i.e. air source heat pumps and the use of photovoltaics to generate electricity are implemented into the scheme.

Preliminary energy calculations have been conducted on the 4 dwelling types on the scheme. The results of these are as below. Note, these figures are preliminary and shall be confirmed following final assessments at the next stage of the design.

Carbon Emissions Usage

Dwelling Type	Target CO ₂ Emission Rate (kgCO ₂ /m ² .annum)	Building CO ₂ Emission Rate (kgCO ₂ /m ² .annum)	Percentage CO ₂ Reduction Against Building Regulations
Typical Terrace	5.90	2.88	51%
Lower Maisonette	8.10	3.43	58%
Upper Maisonette	8.36	3.43	59%
Commercial Maisonette	6.80	3.24	52%

Primary Energy Usage

Dwelling Type	Target Primary Energy Rate (kWh _{PE} /m ² .annum)	Building Primary Energy Rate (kWh _{PE} /m ² .annum)	Percentage Energy Reduction Against Building Regulations
Typical Terrace	63.55	30.49	52%
Lower Maisonette	85.44	36.06	58%
Upper Maisonette	88.71	36.00	59%
Commercial Maisonette	72.24	34.11	53%

8 Next Steps

The following will be investigated at the next stage of design:

- Development of RIBA Stages 3-4: Consider design proposals and implement into the scheme to obtain compliance with Building Regulations