Sustainability & Energy Statement

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Rushden
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Sustainability & Energy Statement

On behalf of:
NB Property Holdings Ltd

Proposal:
Proposed conversion and extension of existing store to rear of shops at ground floor & first floor rear extension to create 2no dwellings at the rear of 119 High Street, Rushden, NN10 0NZ and internal alterations to first floor flats 1 & 2 to create a single dwelling.

Development Site:
119 High Street, Rushden, NN10 0NZ

Site •
119 High Street, Rushden, NN10 0NZ

Report for •
NB Property Holdings Ltd

Document revisions •

No.	**Details**	**By**	**Date**
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1.0 INTRODUCTION & STATUTORY REQUIREMENTS

1.1 The proposed address of this minor development is 119 High Street, Rushden, NN10 0NZ.

1.2 The National Planning Policy Framework (NPPF) defines sustainable development as: Development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It is central to the economic, environmental and social success of the country and is the core principle underpinning planning. Simply stated, the principle recognises the importance of ensuring that all people should be able to satisfy their basic needs and enjoy a better quality of life, both now and in the future.

1.3 The fundamental purpose of Rushden Local Plan is to deliver the vision, objectives and strategy for the town, for the plan period up to 2031, whilst contributing to sustainable development, which can be described as positive growth that achieves economic, environmental and social progress (NPPF paras 6-7).

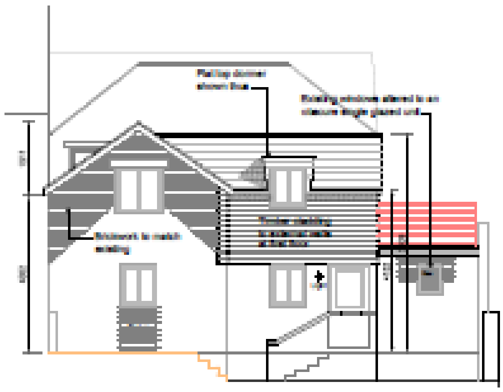
1.4 Rushden forms part of the 'North Northamptonshire's Joint Core Strategy 2011 – 2031 and within this one of its main objectives is to be by 2031, North Northamptonshire will be a showpiece for modern green living and well managed sustainable development: a resilient area where local choices have increased the ability to adapt to the impacts of climate change and to global economic changes. The special mixed urban-rural character of North Northamptonshire will have been maintained through urban-focused growth supporting a strong network of vibrant and regenerated settlements, which each maintain their separate and distinct character within an enhanced green framework of living, working countryside.

1.5 This statement is in support of a full application, seeking consent to create a proposed conversion and extension of existing store to rear of shops at ground floor & first floor rear extension to create 2no dwellings at the rear of 119 High Street, Rushden, and internal alterations to first floor flats 1 & 2 to create a single dwelling a first-floor.

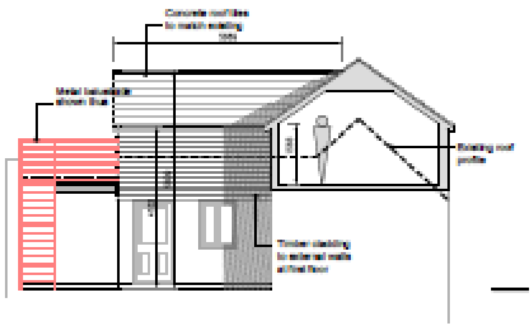
2. <u>THE PROPOSAL & APPLICATION SITE</u>

2.1 This proposal is an opportunity to extend at the rear of 119 High Street which in turn could enhance the surrounding area, which delivers a much more sympathetic environment. It will be delivered in a very creative and innovative way.

2.2 The proposed development has been designed to incorporate low energy and sustainable building design features using a fabric first approach with energy efficient building services and renewable energy generation.



REAR ELEVATION
(PROPOSED)



VIEW TO REAR ELEVATION
(PROPOSED)

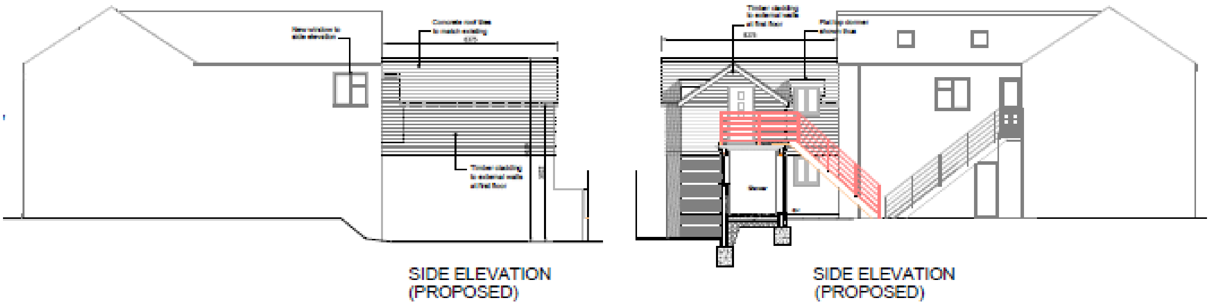


Figure 1: Proposed Elevations

3. RENEWABLE ENERGY

3.1 WIND TURBINES

3.11 Wind turbines convert the power in the wind into electrical energy using rotating wing-like blades which drive a generator. Similar to PV, they can either be grid connected or used to charge batteries or on-site use.

3.12 Wind turbines can range from small domestic turbines producing hundreds of watts to large offshore turbines with capacities of 3MW and diameters of 100m. A detailed study for urban deployment should take into account wind speed and turbulence and potential noise pollution issues.

3.13 There are two main types of turbines available, horizontal or vertical axis. Horizontal axis turbines, (sometimes referred to a propeller type) range in scale from 0.5m to 100m diameter. Vertical-axis turbines rotate around a vertical axis, resulting in lower rotor tip speed and reduced noise and vibration issues.

3.14 In both cases, the output of the turbine will be dependent upon both the start-up speed of the blades and the specific gearing and generator design.

3.15 The efficiency and performance of small scale, and in particular, domestic scale wind turbines can vary, however, the most common cause of poor performance is poor sitting of the turbine. The turbulent wind conditions often found in urban locations undermines the performance of horizontal scale turbines as they have to regularly rotate Yaw to face the oncoming wind.

3.16 This process reduces the proportion of energy that the turbine can capture. Vertical axis turbines are designed to avoid this issue by always having blades facing the wind.

3.17 These performance issues mean that as a general rule, horizontal turbines are better suited to less turbulent wind regimes, whilst vertical axis turbines offer potential for installation in urban environments.

Figure 2: Wind Turbine

3.18 In either case, the turbine must be mounted at a reasonable height to ensure that it can 'see' the wind. For urban deployment this means that roof mounted turbines still require a mast and the structural design of the building must be developed to incorporate the additional loads and stresses.

3.19 While the site is semi-exposed, the wind turbine would not be favourable for the development and local area due to noise, space required and biodiversity issues. **This option is NOT considered.**

3.2 BIOMASS HEATING

3.21 In the context of energy generation, the term 'biomass' can refer to any organic substance that can be processed to produce energy, either solid matter or liquid biofuel. Biomass fuels are an alternative to conventional fossil fuels and are often considered to be near carbon neutral. This is because the growing plant or tree absorbs the same quantity of CO_2 in its lifetime as is released upon energy conversion.

3.22 Biomass is a renewable form of energy as it can be replaced over a short period of time. Biomass or biofuels are currently being produced from plantations of a variety of plant types, as well as from waste materials like cooking oil and waste wood. If waste wood is used, care must be taken to maintain fuel standards and exclude wood treatments such as preservatives and paint. Biomass heating is simple and proven technology, widely used in mainland Europe, and which compares well in running cost with mains gas. It can be implemented on a variety of scales from systems for small buildings up to systems of several MW capacities, with the capital cost of larger installations decreasing per unit of heat output.

3.23 A key issue for any site considering biomass is the need for substantial storage space allocation for the fuel stock. Although not impossible, the storage requirement and the need for regular fuel deliveries can create significant complications in the development of large-scale urban biomass heating systems.

3.24 Biomass boilers can achieve similar efficiencies as good quality gas boilers, providing a significantly more efficient fuel burn than open fires or wood burning stoves. Large scale biomass boilers are particularly suitable for rural use such as farms or warehousing where space constraints are less onerous.

3.25 The capital costs of biomass boilers are greater than their gas equivalents. For example, the purchase price of a 50KW log boiler alone is in the region of £4,000-£5,000 and there is a requirement for additional 'buffer' storage compared to conventional gas systems.

3.26 Note however that the extra over cost compared to gas for a 15KW output can be as high as £8,000 - £12,000.

Figure 3: Biomass Boiler diagram

Figure 4: Woodchip pellets

3.27 It is also not uncommon for clients to require a standard gas boiler to provide back-up. Good practice for a 50KW log boiler would be to provide 3000 litres hot water buffer storage. The additional capital cost for biomass over gas is minimal when considered in the terms of the whole project value for new buildings, but the transportation and storage of fuel requires detailed consideration from the outset of any project.

3.28 Biomass has not been considered as a feasible option for this development due to issues associated with supply and storage of fuel; but the units have the potential to connect into a future system if it were to be constructed off site. **This option is <u>NOT</u> considered.**

3.3 <u>SOLAR THERMAL HOT WATER HEATING</u>

3.31 Solar thermal panels collect solar radiation to heat water that can then be used for either space heating or domestic hot water. There are two types of competing solar thermal technologies; flat- plate and evacuated tube. In summary, evacuated tube collectors are more efficient and therefore require less active collector array than the equivalent output of a flat plate system. However, in general, capital costs for the two technologies are comparable.

3.32 The system consists of solar collectors that are often roof mounted. Liquid is passed through the solar collectors and then to a heat exchanger in a domestic hot water cylinder, which will also have a top-up heat source (gas, biomass, or electricity) to ensure reliability of supply.

Figure 5: Typical solar thermal panel

3.33 Solar thermal collectors can still produce energy from diffuse sunlight and are therefore less susceptible to performance reductions from orientation and angle compared to PV.

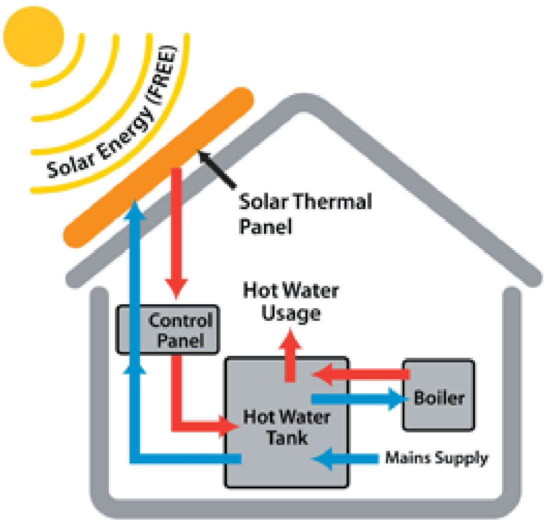


Figure 6: Solar thermal system diagram

3.34 A typical 3 - 4m2 collector area system (area dependent on technology) is capable of providing 50% the annual domestic hot water demand for a typical 2 - 3 bed house. The proportion of hot water provided varies over the course of a year, with the system achieving 100% coverage during the summer months and 5% during the winter.

3.35 If properties are left during the day, or empty for periods over the summer, the hot water can recirculate through the system which can cause the panels to corrode and shorten their lifespan.

3.36 The current proposed hot water system is a highly efficiency condensing gas boiler. The advantages over this by using solar thermal are minimal and would add to the occupants' maintenance issues. It has been disregarded on this basis. **This option is <u>NOT</u> considered.**

3.4 GROUND SOURCE & AIR SOURCE HEAT PUMPS

3.41 A ground source heat pump (GSHP) harnesses the energy from the ground and upgrades it for use within buildings. Whereas ambient air temperatures can have a large swing throughout the year the temperature of the ground a few metres below the surface stays relatively stable. This makes it possible to use the heat in the ground during the winter months to meet our heating needs. In the summer months it is also possible to cool buildings using ground temperatures that are lower than ambient air.

3.42 A typical ground system consists of a ground to water heat exchanger often called the 'ground loop' or 'ground coil', a heat pump and a distribution system. Water (or other solution) is passed round the system 'absorbing' heat from the ground and upgrading this heat via the heat pump into the building.

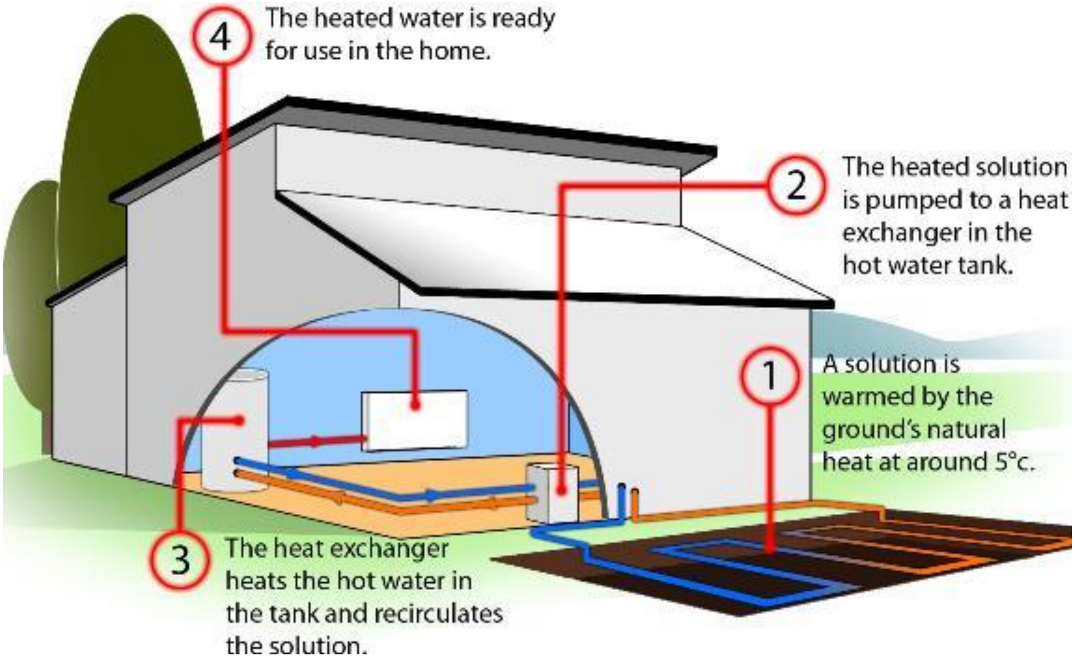


Figure 7: Ground Source Heat Pump system diagram

3.43 The heat exchanger can consist of either a vertical borehole system, where long pipes are driven deep into the ground or a horizontal trench system, which operates at shallower depths. The performance of a GSHP is measured using a COP (coefficient of performance). This defines the amount of useful energy output from the heat pump compared to the energy input. Typical systems can achieve a COP in the region of 350-400%.

3.44 The COP is maximised where the flow temperature of the heating circuit is between 35-40°C and therefore GSHP are ideally suited for connection to under-floor heating. The potential scale of GSHP is only limited by the availability of land for the ground loop and reasonable levels of energy abstraction.

3.45 Typical costs for ground source heat pumps range from £800/kW for trench systems to £1,500/kW for vertical borehole systems.

3.46 Cheaper alternatives are the use of Air Source Heat Pumps. They have externally located condenser units that recover heat from the air and connect to the internal space heating & hot water system. They can be noisy and it is important to consider the system set up to ensure the hot water immersion is not providing the space heating, causing high bills and increased carbon emissions.

3.47 The constraints of the proposed site do not lend well to the use of ground source heat pumps and as a result, this technology has not been considered feasible. **This option is NOT considered.**

3.5 PHOTOVOLTAICS (PV)

3.51 Photovoltaic panels convert solar radiation into direct current electricity. In principle, they are an ideal source of renewable energy as they harness the most abundant source of energy on the Earth, the sun, and they produce electricity which is the most useful form of energy. PVs are silent in operation, have no moving parts and have a long life with low maintenance levels. PV systems can be connected to the grid or battery arrays in remote locations. Grid connected systems consist of PV arrays connected to the grid through a charge controller and an inverter.

Figure 9: Typical PV installation to pitched roof

3.52 PV cells are more efficient at lower temperatures so good ventilation should be allowed around the PV modules where possible. Overshadowing and self-shading reduce energy production and in order to maximise energy output, the modules must face due south at an angle of approximately 35 degrees.

3.53 Output is measured in kWp (kilowatts peak which is the maximum output a module will have under standard test conditions.

3.54 At present typical costs start in the region of £2,000 - £3,000 per kWp for medium sized orders. The cost varies between systems to reflect the overall efficiency of the modules. Higher efficiency modules cost more but require less space for installation. **This option <u>IS</u> considered.**

4. <u>WATER CONSERVATION</u>

4.1 Water conservation is '***the practice of using water efficiently to reduce unnecessary water usage***.' According to Fresh Water Watch, water conservation is important because fresh clean water is a limited resource, as well as a costly one.

Figure 10: Water Butt System

4.2 Simple and more innovative measures such as water butts, rainwater harvesting and greywater recycling systems should also be pursued where appropriate, alongside the use of water efficient internal fixtures (taps, baths, showers, etc) to further reduce the demand upon mains water and the amount of water which requires treatment. **This option IS considered.**

4.3 Under Part G of Building Regulations, indoor water use is restricted to 125 litres/person/day.

5. CONCLUSION

5.1 The proposed development has been designed to incorporate low energy and sustainable building design features using a fabric first approach with energy efficient building services and renewable energy generation.

5.2 This report demonstrates that the proposed development complies with the North Northamptonshire Joint Core Strategy 2011 – 2031 which has a basic outline of sustainability and renewable energy which should be considered within new build developments, in turn reducing carbon emission offset. The report also complies with the national planning policy framework (NPPF) in delivering a development which meets the needs of the present without compromising the ability of future generations to meet their own needs.

5.3 The dwelling has been designed to maximise the 'Fabric First' approach, using the geometry of the building design, combined with strategically placed glazing, orientated to maximise passive solar gains.

5.4 It is proposed to consider the installation of photovoltaic array to generate renewable electricity to reduce the overall carbon emissions on site.

5.5 Internal water use will be equal to or less than 125 litres/person/day. It is proposed to use external water butts to reduce the use of potable water for garden irrigation.