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Bold Forest Garden Village

Sustainability and Energy Framework

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Sustainability and Energy Framework

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Introduction

Sustainability and Energy Framework

Introduction

This sustainability and energy framework has been prepared by Useful Projects for the Bold Forest Garden Village (BFGV), St Helens. It sets out a Sustainability Framework and site-wide energy strategy intended to achieve the ambition set out by stakeholders in a development that delivers for people and planet.

It is structured into two sections, as follows:

Sustainability Framework

Introduces the Sustainability Framework for BFGV and the themes used to guide its development over time.

The Framework places the priorities in the context of the local policy and the ambitions set out by stakeholders.

Energy Strategy

Outlines how the energy ambition for BFGV can be achieved within the context of the site and local infrastructure. It presents three options of energy strategy which could be adopted on-site over the delivery phase and recommends a preferred approach to be further developed at detailed stages.

Sustainability Framework

Sustainability Framework

Introduction

The Sustainability Framework has been informed by policy, stakeholder aspirations, best practice guidance and long-term expectations for a 21st century development to be within environmental means and support local needs.

The Framework is structured around the six themes outlined in the St Helen Borough Council Design SPD (2024), as outlined opposite.

A joint-vision and ambition for the project addressing the above themes was co-developed with the Council and landowners at a workshop led by Useful Projects. The following ambition emerged from this discussion:

- create a landscape-led development that integrates with existing communities whilst making nature central to the site's identity and desirability,
- implement comprehensive water management and biodiversity net gain measures locally, with long-term environmental stewardship as a priority,
- enable an energy-positive development over time that exceeds renewable energy targets and centres around net zero principles to secure funding and affordable bills,
- reduce car dependency through integrated transport planning.

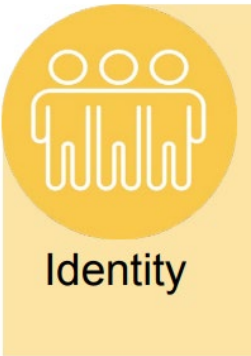
The Framework sets out an evolving level of ambition for the interim (where we are now) and long-term (net positive position). The following page presents a dashboard on how the emerging masterplan proposals are responding to that vision in comparison with the current site baseline and long-term goals.

At this point in time the dashboard provides a snapshot of what has been considered at the masterplan scale, further design development and evolution of supporting strategies will be required to advance the dials closer to our goal.



Community

Support a strong, thriving, inclusive and well-connected local economy.



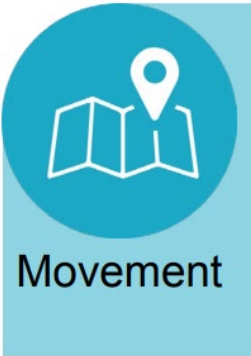
Identity

Create safe and strong communities and neighbourhoods for all.



Nature

Create green and vibrant places that reflect our heritage and culture.



Movement

Increasing the number of people choosing active travel and public transport.



Resources

Create well-designed places and buildings that conserve natural resources including land, water, energy and materials.



Health

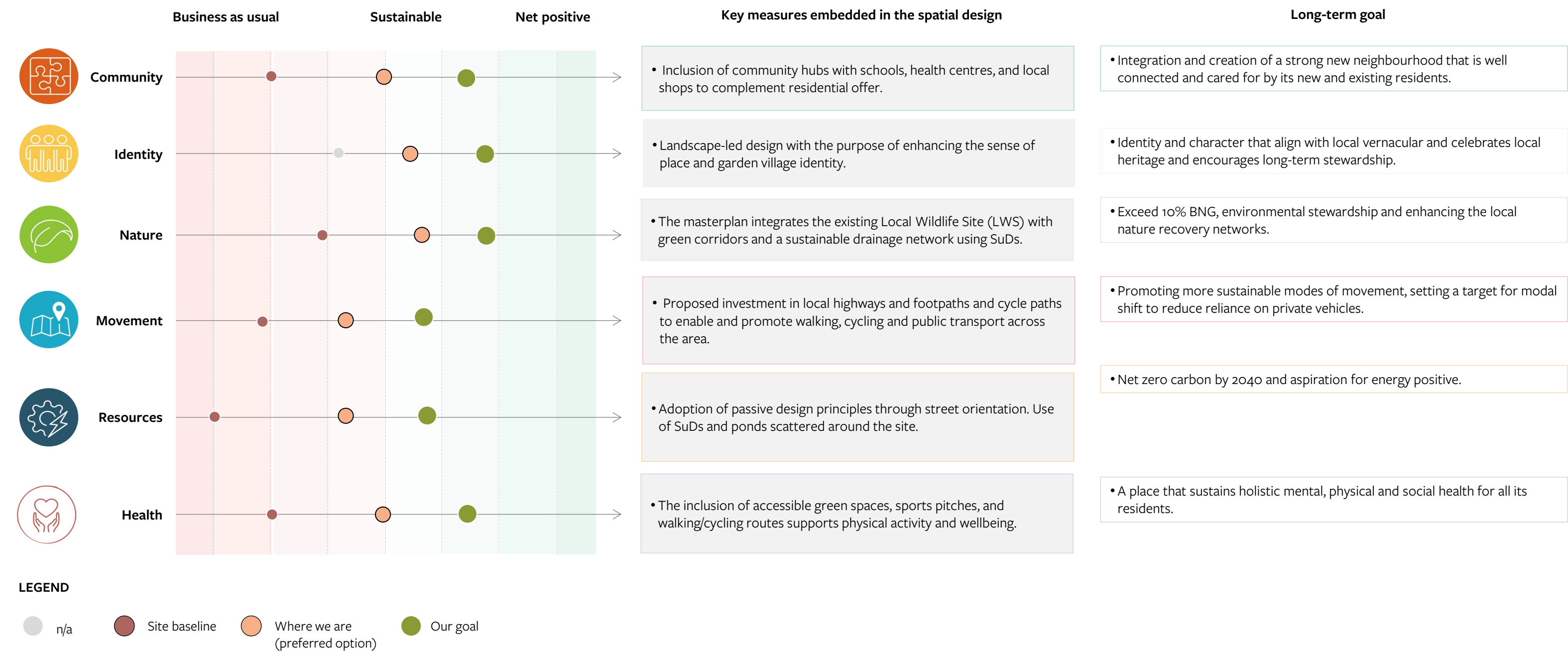
Promote good health, independence and care across our communities.



Six themes identified in the St Helens Borough Council Design SPD (2024) and used as the basis of the Sustainability Framework for Bold Forest Garden Village.

Sustainability Framework

Framework for Bold Forest Garden Village



Energy Strategy

Energy Strategy

Introduction

The following energy strategy for BFGV has been developed through a comprehensive process of desk-based research, stakeholder engagement and technical assessment. This included conducting a thorough policy review and assessing site conditions through a detailed baseline study. A utilities assessment was also carried out, supplemented by direct engagement with local utility providers. For further detail, please refer to the separate utilities note produced by Useful Projects.

Through a series of collaborative workshops involving both council officers and landowner representatives, an energy ambition was established to set out the guiding principles for the strategy. This ambition, which forms the foundation of the approach, is shown opposite.

The following section outlines how this energy ambition can be achieved at BFGV.

Energy ambition for BFGV

Bold Forest Garden Village aspires to be energy positive and enable a net zero carbon development by 2040.

The first phases are expected to go beyond the 10% on-site renewable generation target, as far as practically possible, and meet Future Homes and Building Standards as a minimum.

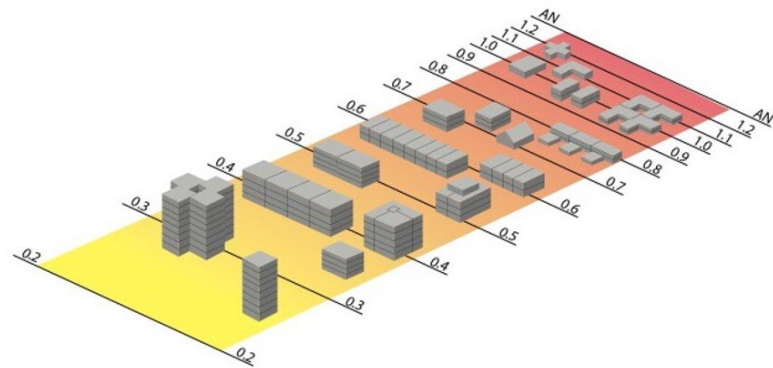
Net zero will be central to the whole development programme so that funding opportunities aligned to this vision can be secured.

Energy Strategy

Passive design principles

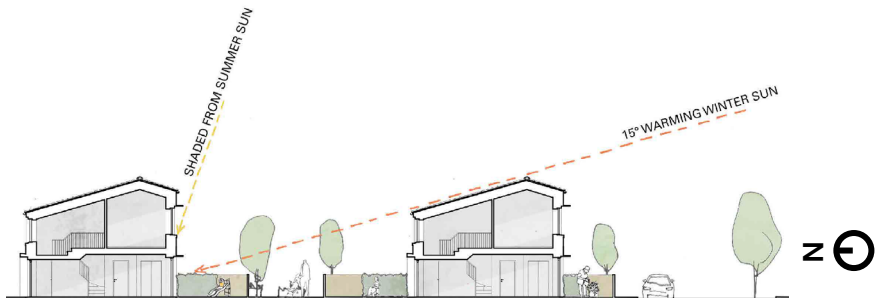
Early masterplan decisions such as street orientation and building form significantly influence the passive performance of homes. The following principles will inform future design code and detailed design.

Compact Building Massing



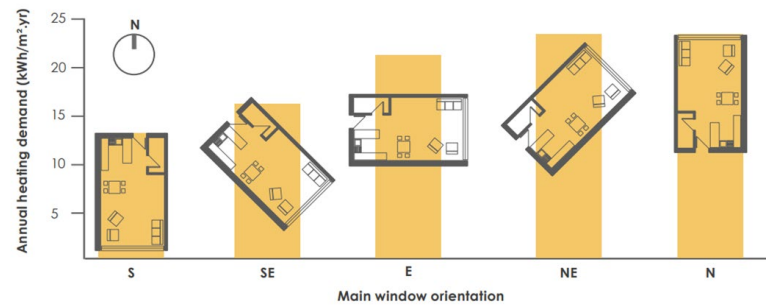
- Building form factor (external surface area to floor area ratio) determines energy efficiency, with higher ratios requiring expensive insulation and system upgrades to minimise heat loss. A form factor of less than 1 should be targeted.

Maximise Winter Solar Gains

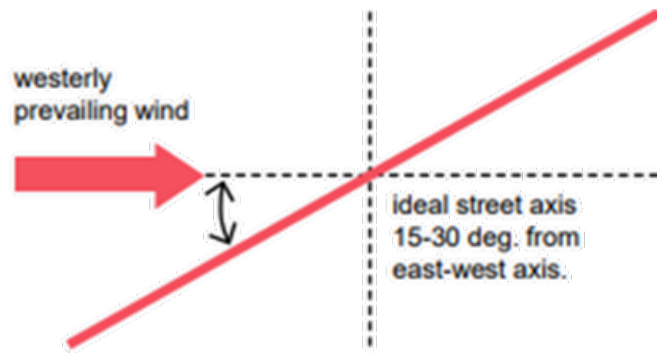


- Maintain 1-1.5m spacing per 1m building height to avoid overshadowing and prioritise dual aspect dwellings with optimal glazing ratios of 20-25% south, 10-15% east/west, and 10% north.

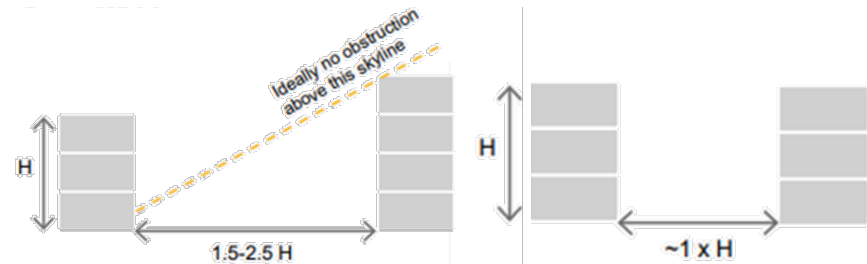
Orientation



- Building orientation and glazing ratios are crucial for minimising energy consumption, with south-facing windows providing net heat gain whilst north-facing windows cause heat loss.
- Street orientation should be skewed 30 degrees to prevailing winds, and the amount of south-facing glazing must be optimised to prevent summer overheating.

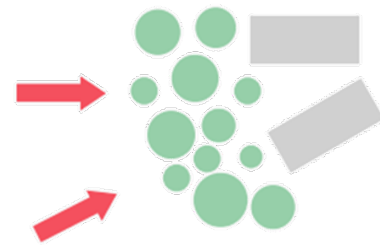


Building Height & Street Width



- For buildings of different heights, spacing of 1.5-2.5 times building height is recommended for natural ventilation, wind control, daylight and solar gain.
- Courtyard width should equal building height when fully enclosed to provide wind buffering whilst allowing sufficient ventilation and winter solar gains.

Using Environmental Features



- Masterplanning should utilise landscape features for natural cooling and windbreaks, incorporate urban breaks for wind flow, and integrate green infrastructure with solar PV for optimal building performance.

Energy Strategy

Energy strategy options

As per the energy ambition for BFGV, the preferred energy strategy must align with the following principles:

- Exceeding local plan targets for renewable energy generation
- Being affordable to residents
- Enable energy positive (where more energy is generated than consumed)
- Exploring sharing of energy
- Making net zero central to development vision to unlock funding opportunities
- Set the tone for the first phases of development to align with energy ambition

Moreover, the strategy must be resilient to the local grid capacity constraints on headroom for electrical supply and generation.

Three options for the supply of energy have been explored. These were:

1. Individual building energy
2. Community power
3. Shared heat and power

These options are designed to present a suite of options that are available for BFGV. Each can deliver the above principles for an energy positive site, similarly elements of each could be combined across the site and phases.

Each option is compared opposite, with a diagram demonstrating the options overleaf.

Our recommended option is number 2, which focuses on shared power, subject to a costing and viability appraisal.

Strategy option		Description	Pros	Cons	Site-specific implications	Example operating model
1	Individual building	Buildings are served by an air source heat pump for heating with the option for rooftop solar PV arrays and battery storage for power resilience.	Technological flexibility with reduced interdependencies with other plots or phases. Suited to the multi-landowner nature of the site.	Increased capital expenditure for individual homes. Requires more space on plot for renewable technologies such as heat pumps and batteries. Requires grid capacity for both import and export of power used and generated.	This solution has limited spatial impact at the masterplan scale.	Octopus Energy’s Zero Bills model allows residents to avoid paying for energy tariffs for 5-10-years. Critics say the model can be overly prescriptive and expensive, but it is often an attractive selling point for developers.
2	Community power	Power: A communal battery storage system installed in conjunction with the rooftop solar PV arrays. Heat: Individual air source heat pumps on the side of homes.	Provides opportunities for revenue generation Reduces demand on the electricity grid during peak periods, providing grid stability	Community batteries need to be located away from habitable rooms and vegetation limiting developable area.	Community batteries would make the site less dependent on the grid and its capacity.	SNRG fund and operate smart grid solutions that aim to reduce grid connection costs and end-user electricity bills, using an integrated distribution network, batteries, solar and potentially incorporating EV charging.
3	Shared heat and power	Power: Same as option 2 above. Heat: Shared ground array for heat extraction that provides heat to multiple buildings. Potential to upgrade to site-wide heat network using ground source or mine water source heat pumps.	Reduce space required for air source heat pumps on the side of buildings with in-home boiler-sized heat pumps connected to ground array or heat network.	High costs and impact on phasing may limit applicability across site. Requires site-wide delivery and operation. Heat density proposed (i.e. mix of uses) might not justify feasibility of heat network.	Infrastructure for shared ground arrays could be aligned with land ownership parcels. Site-wide heat network would require infrastructure to align with phasing.	Kensa funded array models helps de-risk the development through the initial funding of the ground array with ongoing maintenance and technical support included.

Energy Strategy

Energy strategy options

The opposite diagram presents the components of all three energy strategy options. All three align with the energy ambition to be net zero by 2040. A summary of each option and their differences is outlined below.

Option 1 offers a standalone building-level solution whereby all technologies are located on-plot either within, upon, or beside the buildings. This means that, beyond a connection to the grid, it does not require additional heat or power infrastructure making it independent from any phasing concerns. This also means, however, it is reliant on the grid and its capacity for both the import and export of power which has been identified as a potential constraint. Buildings with commercial and community facilities are fitted with reversable air source heat pumps which provide both heating and cooling.

Option 2, in comparison, makes use of community batteries to reduce the reliance on the grid. The smart grid connecting the homes would be able to charge when grid demand is low or store energy generated by the rooftop PV arrays for use at peak times. This means they could be able to power their air source heat pumps could run cheaper than those in option 1.

Option 3 uses the same community power principles as option 2, with shared ground arrays instead of air source heat pumps. The shared ground arrays would run at higher efficiencies than the air source heat pumps used in the other options as ground temperature is more stable than air temperature. This option does incur significant capital costs and would likely rely on establishing a site-wide infrastructure before plots come live. This could be aligned with landowner plots to reduce spatial requirements as no external plant is required since buildings would connect to the heat network using smaller in-building interface units. There would also be potential for connecting to heat sources off-site, such as groundwater or mine water, to power the network. This option has the greatest embodied carbon impact due to the additional infrastructure required across – and potentially beyond – the site.

While all options achieve the net-zero goal, Option 2 represents a preferred, balanced approach, as it significantly mitigates reliance on grid capacity constraints through community battery storage and a smart grid, offering cheaper heat pump operation than Option 1 without the high upfront cost and complex, site-wide infrastructure dependencies of Option 3's shared ground array. This middle-ground strategy effectively balances cost, grid independence, and feasibility for phased development.

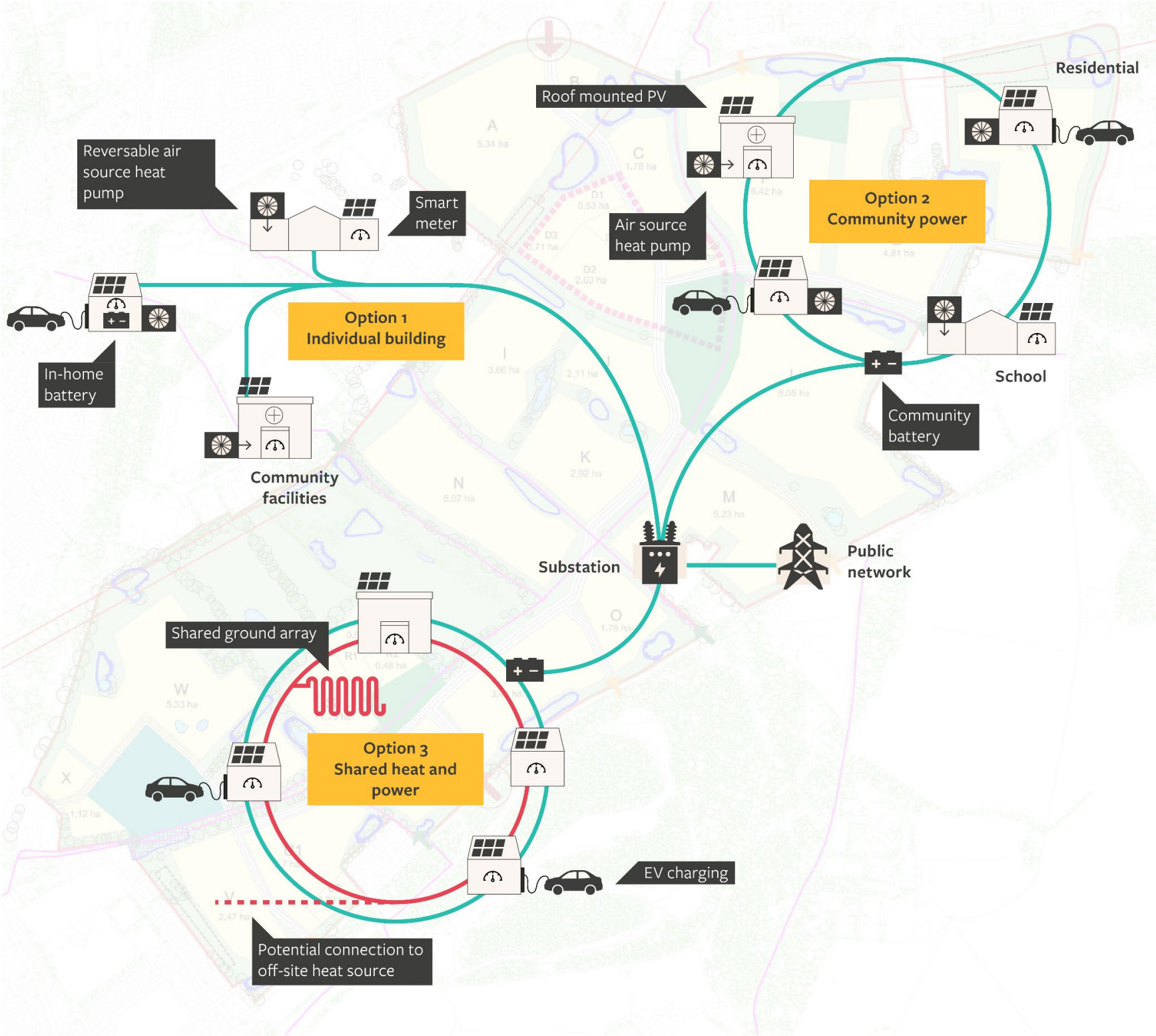


Diagram presenting the energy strategy options for BFGV.

Energy Strategy

Phasing and delivery considerations

There are two primary substations adjacent to the site, Clock Face to the south and Hills Moss to the north, and they receive power from the Bold grid substation to the north. See the locations of these substations in map opposite. It is assumed that the power for the site would be supplied by one or both substations via the utility corridor’s connections to the surrounding roads.

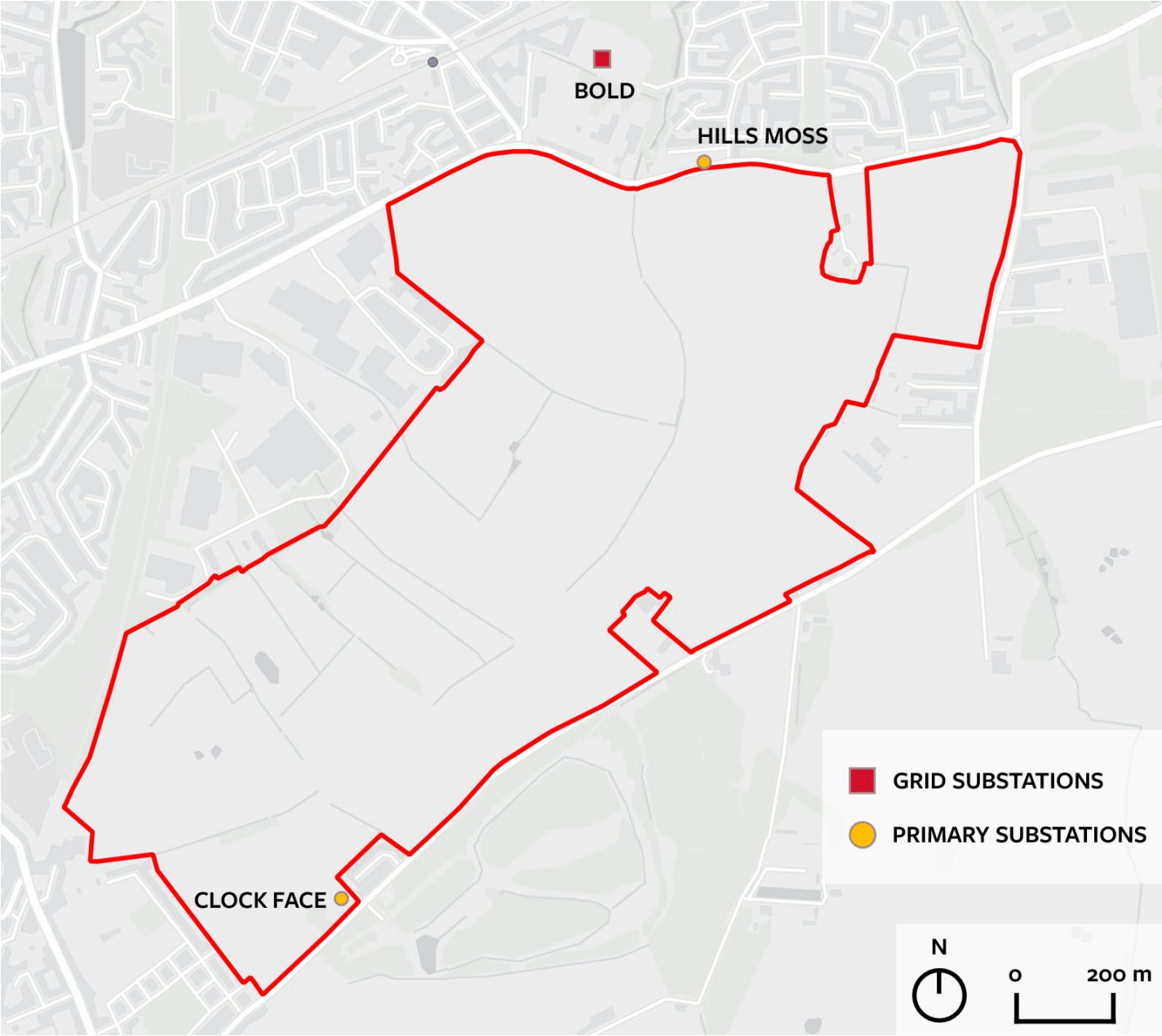
According to the local grid operator’s, Scottish Power Energy Networks (SPEN), forecasts, the Bold grid substation currently has sufficient demand headroom, but this is projected to decrease substantially by 2040 under various development scenarios. A high-level load assessment undertaken as part of this stage, indicates that the estimated first phases of development (approximately 1,000 homes plus community uses) will fall within current headroom available capacity, subject to further engagement. However, the final development allocation of near 3,000 homes with electric vehicle (EV) charging would exceed available power capacity. Without local reinforcement, this would necessitate a new primary substation and approximately 21 secondary substations to facilitate development.

Any additional substations within the site to facilitate development would need to be placed preferably within close proximity to either of the two existing primary substations to reduce cabling transmission losses, carbon impact and capital costs. The wider masterplan would then be connected to the substations via the utility corridor bisecting the site.

Specific capacity for each site will be calculated by Scottish Power when they receive connection requests from individual plot developers.

Given these considerations, energy strategy option 2 presents the most suitable for BFGV given its lower reliance on the grid using community batteries connected via a smart grid.

For further commentary on the site’s utility considerations, please refer to the separate Utilities Assessment produced by Useful Projects.



Locations of the electricity substations near the site.

Conclusion

Conclusion

This report presented the Sustainability Framework and Energy Strategy for BFGV.

The purpose of the Sustainability Framework is to provide a robust foundation for decision-making throughout the delivery of BFGV, ensuring that sustainability remains central to the development as it evolves.

It has appraised the current masterplan preferred option against a series of themes, as well as setting long-term goals for the development to aim for when complete.

The Energy Strategy has considered policy requirements, best practices and site-specific factors to recommend an energy strategy option that is adaptable to the infrastructure constraints and aligns with the energy ambition developed with key stakeholders.

Applying the Sustainability and Energy Framework at BFGV

- Individual plot developers to demonstrate how they are responding to the long-term goals set out in the Sustainability and Energy Framework.
- Individual plot developers to demonstrate alignment with the energy ambition for BFGV.
- Plot developers must demonstrate alignment with the energy ambition for BFGV at the time of the planning application. There is a preference for future plot developers to align with the preferred option (2) of the energy strategy or demonstrate alignment with the other two options (1 and 3), should the preferred option be not feasible. If a different option is presented, plot developers should provide a robust justification to the Council of how their revised energy strategy aligns with the energy ambition.