Carbon Green Consulting

Bordon Garrison Redevelopment

Our commitment to green living

Green Measures Strategy

W&B WHITEHILL & BORDON REGENERATION COMPANY

Executive Summary

The Green Town Vision for Whitehill and Bordon has been an overarching principle for the town's redevelopment since its inception.

e.1 The Green Measures Strategy for the Bordon Garrison Redevelopment and appended to the Section 106 Legal Agreement, offers a range of options to deliver a sustainable community based on green living and working.

Delivery objectives

e.2 It sets out to fulfil the section 106 legal agreement obligations fully (see Annex 1) and support the submission of subsequent Reserve Matters Applications (RMAs) through the preparation of individual Green Measures Statements.

e.3 Each Green Measures Statement will draw upon the range of options set out in this Green Measures Strategy to develop its own means of achieving the specific objectives of :-

- A 10% improvement in environmental performance beyond current Building Regulations in place up to a point in time where the Zero Carbon Homes Standard becomes mandatory through Building Regulations. The S106 Agreement contains a cost limit of £6.5m to support the delivery of the Green Measures Strategy for elements beyond those associated with building fabric (as defined by 2014 prevailing Building Regulations.)

- Reduce overall potable water usage across the scheme both in residential and commercial units by the introduction of water saving measures and green and grey water strategies including adopting the optional saving requirement potentially under Building Regulations 2010 Approved Document G, Regulations 2, Clause 36 (2) (b) , for a maximum use of wholesome water of 110 litres per person per day for all dwellings.

Delivery Strategy

e.5 The Green Measures Strategy refresh will focus on delivering a low carbon based community and will continue to follow the Carbon Emissions Reduction Hierarchy described in section 3 of this document. The first two parts of the Carbon Emissions Reduction Hierarchy - the Avoidance and Reduction of CO_2 emissions, will be achieved through the "Fabric First Approach" employed as the primary method in achieving the 10% CO_2 reduction target across the development.

e.6 The redevelopment of Prince Phillip Barracks requires the delivery of new energy infrastructure to serve all parcels of the development. Whitehill and Bordon Regeneration Company (WBRC) has recognised that in order to secure the greatest carbon emissions reductions , a site wide energy strategy is required to set out a co-ordinated approach. This Energy Strategy will be formed by two main elements. Firstly, origin and secondly distribution of energy will be considered. The town centre is the focus of the non traditional generation and distribution of energy.

e.7 This approach is supported by the Energy Forum[1] and currently under discussion with East Hampshire District Council (EHDC) to ensure the section 106 Legal Agreement obligations are fulfilled.

e.8 Therefore, this Green Measures Strategy refresh has extracted the town centre energy infrastructure elements in section 3 "Space Heating - District Heat" and the site wide energy strategy, which includes the town centre energy infrastructure plan, is currently being prepared.

e.9 The current Green Measures Strategy provides a set of options which offers various CO_2 emissions reduction opportunities. Each refresh will give an update on the performance monitoring measures being deployed across the development.

1. See chapter 12

e.10 In addition, Green Measures Statements, which will accompany each RMA, will set out how performance will be measured against the specific options chosen. All the measures employed and set out in each Green Measures Statement will be monitored and their overall performance set against the overall carbon target for the development.

e.11 Each subsequent Green Measures Strategy refresh will include an update on the performance monitoring measures being deployed across the development as a whole. In addition, a cumulative total of budget committed versus expenditure to date will be included.

e.12 Each Green Measures Strategy refresh will be influenced by carbon emissions beyond the building envelope. Therefore, it will demonstrate an holistic approach to delivering a truly sustainable community. To this aim, work to show CO_2 reductions across areas such as the Green Infrastructure Strategy provision and Public Open Space will be incorporated in to each Green Measures Strategy refresh and then integrated into the Green Measures Statements as part of the Reserve Matters Application process.

Compliance and the Governance Process

e.13 The co-ordination and delivery of the Green Measures Strategy is complex and will require a number of project partners throughout the lifetime of the development.

The energy forum recently established by WBRC brings together the key players from the developers perspective, but acknowledges wider stakeholders are needed to ensure that delivery can take place. It will be crucial to ensure all outputs from the strategy will be allocated to project wide work streams.

e.14 The Green Measures Strategy refresh has provided an update to the governance structure and a reporting framework to ensure that progress against the delivery of the Green Measures Strategy objectives, namely carbon reduction and cumulative performance across the development on the 10% CO_2 reduction requirement and post occupancy performance is being tracked effectively. It will also include a cumulative statement of expenditure against the £6.5m (See Annex 2).

e.15 This will be used as the basis of ongoing engagement with EHDC and support the preparation and approval of the RMA Green Measures Statements moving forward.

e.16 A Green Measures Statement framework will be set up to ensure that each Green Measures Statement, attached to RMAs, employs a cogent structure to enable a common basis for their preparation. This should aid interpretation of the chosen options in each RMA. Annex 3 will include the Green Measures Statement Framework.

Contents

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For and on behalf of Carbon Green Consulting Ltd				

Definitions

Fabric First Approach - maximising the performance of the components and materials that make up the building fabric itself, before considering the use of mechanical or electrical building services systems

Potable Water - water safe enough for drinking and food preparation.

Green and Blue Infrastructure - The network of green spaces, streams, ponds, rivers and natural elements that intersperse and connect cities, towns and villages, waterways, gardens, woodlands, green corridors, wildlife habitats, street trees and open countryside. It has a role to play in enhancing the places we live, work and enjoy in our spare time, as well as providing an important network of wildlife habitats.

Carbon Emissions Reduction Hierarchy - The Method by which the development will work to achieve the required CO_2 emissions targets in buildings, focused on initial avoidance of buildings related CO_2

Low Zero Carbon Technologies - Technology which emits low levels of CO_2 emissions, or no net CO_2 emissions.

Performance Gap - the difference between the measured and the theoretical energy performance of a building.

Grey Water - the relatively clean waste water from baths, sinks, washing machines, and other kitchen appliances

Green Water - The fraction of rainfall that infiltrates into the soil and is available to plants. It includes soil water holding capacity and the continual replenishment of reserves by rainfall.

Heat Pumps - A heat pump is a device that provides heat energy from a source of heat to a destination called a "heat sink". Heat pumps are designed to move thermal energy opposite to the direction of spontaneous heat flow by absorbing heat from a cold space and releasing it to a warmer one. They include Air Source heat pumps which absorb heat from outside air and Ground Source Heat Pumps which utilise heat from the ground through vertical or horizontal ground loops.

Communal Growing - The cultivation of land by groups based on residential estates, faith premises, places of employment, schools or within neighbourhoods offering different approaches to local food production in such places as communal gardens and orchards, container growing, edible landscapes, landshare, nectar bars, roof gardens, raised beds temporary growing and vertical growing.

Post Occupancy Monitoring - Voluntary scheme which offers residents an opportunity to feedback their experiences of their new homes and environments as part of a Customer Care Package.

Post Completion Monitoring (Building Regulations) - Evaluation of performance against the target measures set by prevailing Building Regulations, specifically Part L1A, Part L2A and Part G.

1. Introduction

The Bordon Garrison redevelopment seeks to demonstrate an intense commitment to a truly sustainable community based on developing a sense of place and belonging for those who will live and work there.

1.1 The Green Measures Strategy document is appended to the s.106 Agreement and articulates the Green Town Vision for the new and existing community, providing the range of tools and approaches to demonstrate how Bordon Garrison will develop as a low carbon, highly sustainable community.

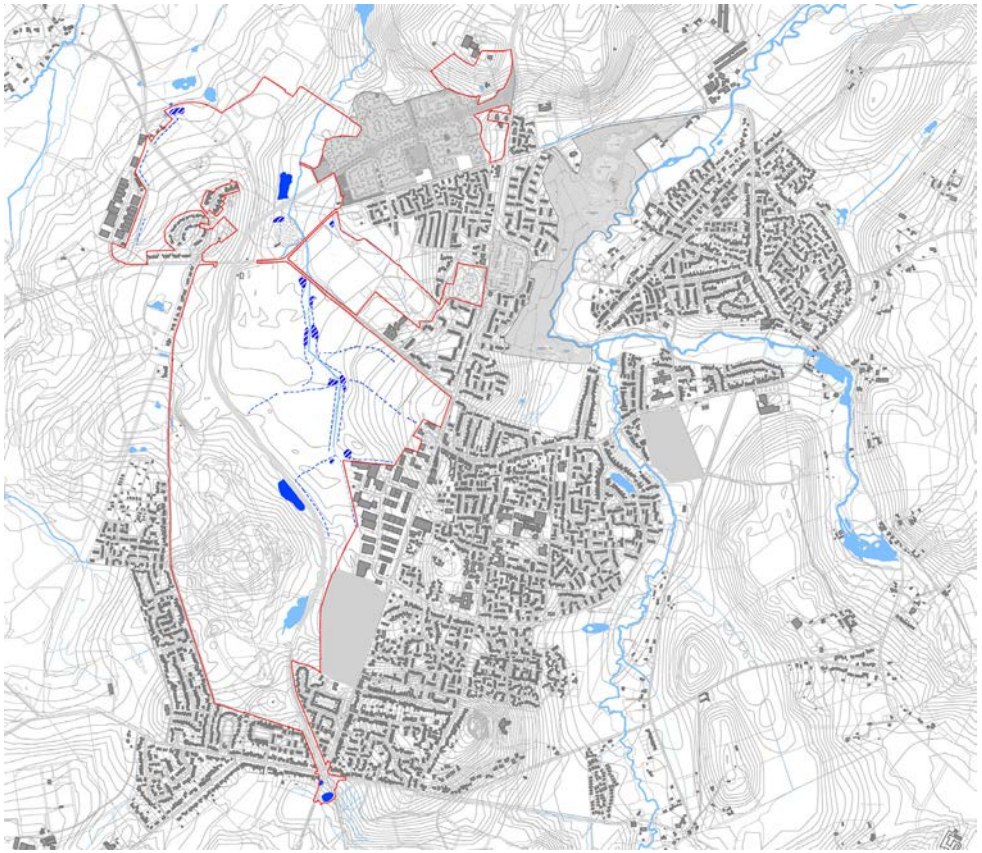
1.2 This document relates directly to the sustainable elements within the submitted Structuring Plan, offering further insight into the relationship between these elements at each stage of the development.

1.3 The Green Measures Strategy will inform individual Green Measures Strategy Statements at each Reserve Matters Application (RMA) stage. In turn, the Green Measures Statements will inform each RMA and highlight the specific means by which the various sustainability targets can be achieved on each phase of the development.

1.4 In addition, the emergence of specific Design Codes, which will inform the design content and character of each RMA and span the various elements of the development, interface with this document with reference to the various common sustainable themes.

1.5 For each Design Code there may be elements in this Green Measures Strategy that span both Specific Design Codes and the individual RMAs. Each Design Code may incorporate references to the Green Measures Strategy and its subsequent refreshes as there are a number of areas of overlap. These will be set out in the Reserve Matters Applications and Supporting Green Measures Statements.

1.6 The themes of the Whitehill and Bordon Green Town Vision and the Whitehill and Bordon Eco-town Masterplan Framework 2012 have be brought through into conditions of the current outline planning permission for the redevelopment of Bordon Garrison through the Section 106 Agreement.



2. The Green Vision for Whitehill and Bordon

Develop a thriving sustainable community with a distinct character within Hampshire and the South East region

Improve the built environment of the town so that it complements the superb landscape surroundings and it's unique heritage.

Create an attractive built environment where people want to live, work, shop and play, with a balanced mix of housing, community facilities, and commercial and employment opportunities.

Promote innovative, modern, environmentally friendly design.

Create a town that encourages living and working in ways that do not waste our natural resources.

Promote the "One Planet Living" approach where local people and nature are the priority and where local food and 'grow your own' are encouraged and local jobs and local communities develop.

Develop a pedestrian friendly town centre which is well connected for all users.

Develop user friendly public transport to discourage car use.

Ensure that residents have easy access to a variety of different green recreational spaces, both formal and informal.

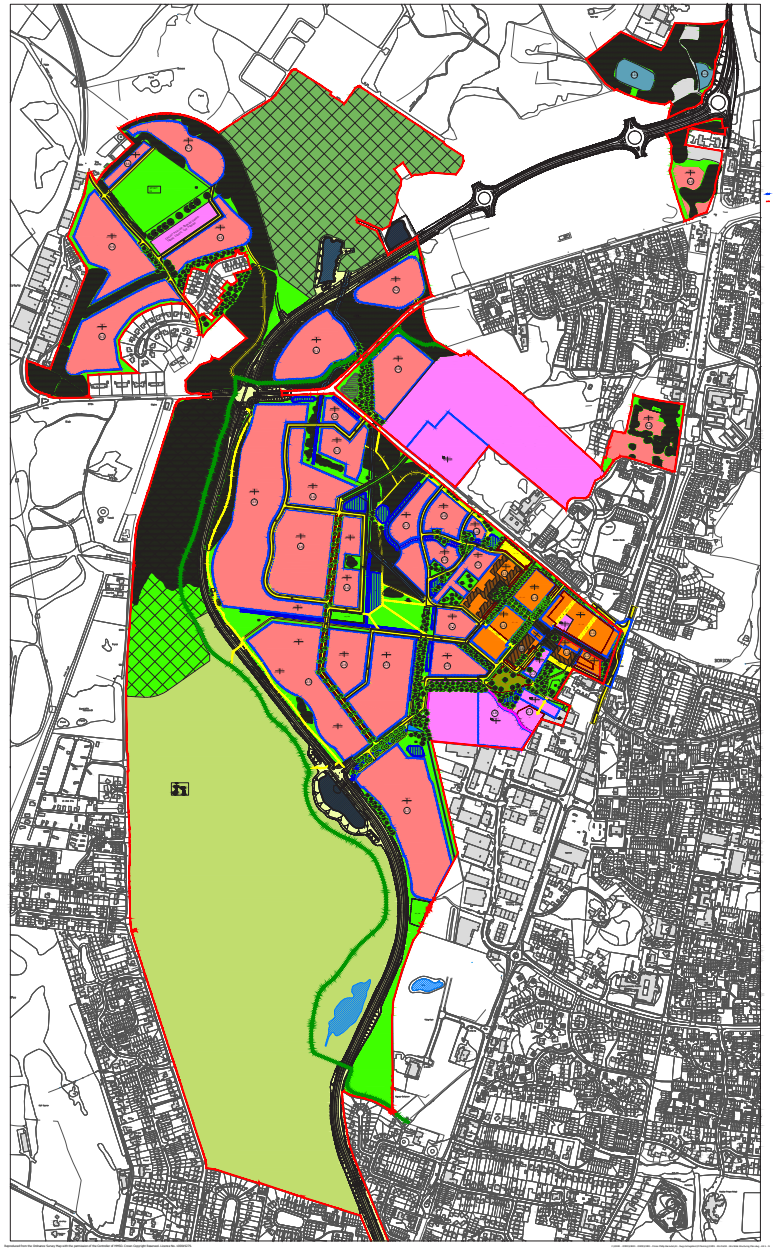


Figure 2.1 Draft Structuring Plan

3. Comfortable Homes - Reducing Energy, Carbon and Bills!

3.1 Bordon Garrison will deliver a low carbon development that primarily follows the Carbon Emissions Reduction Hierarchy as set out in Figure 3.1 to Avoid CO_2 emissions, Reduce CO_2 emissions and Replace CO_2 emissions.

3.2 The residential units will be designed using the "Fabric First approach" as the primary method to "Avoid" and "Reduce" CO_2 emissions across the development. Where required, Low zero Carbon (LZCs) technologies will be deployed to achieve the 10% target Carbon Reduction target levels.

3.3 Due to the diverse requirements and complexities involved with the Town Centres' commercial and retail elements, a separate Energy Strategy is evolving to achieve the CO_2 target emissions requirements. The current proposal for the town centre retail and commercial elements of the site potentially includes non traditional energy generation and distribution.

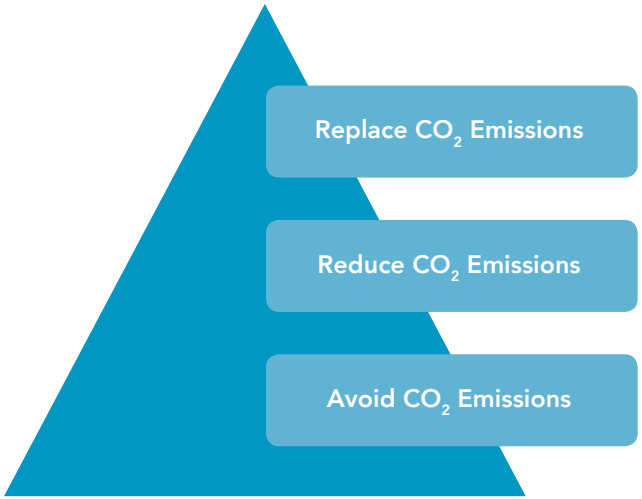


Figure 3.1 Carbon Emission Reduction Hierarchy

3.4 The development aims to achieve a minimum 10% reduction in CO_2 emissions beyond current Building Regulations in place up to a point in time where the Zero Carbon Homes Standard becomes mandatory through Building Regulations.

3.5 The S106 Agreement contains a cost limit of £6.5m to support the delivery of the Green Measures Strategy. It is currently envisaged that this funding will help draw in significant investment from other sources over the life of the development to deliver the best possible outcomes for sustainability on the scheme as a whole.

3.6 Carbon emissions reduction for buildings will primarily be achieved using Fabric Energy Efficiency measures. Where a 10% saving cannot be achieved through fabric changes alone, actions which follow the Carbon Emissions Reduction Hierarchy (Figure 3.1) will be examined, as set out in this document.

3.7 As Building Regulations evolve the obligation will remain to further the reduction in CO_2 emissions and may draw on additional site wide infrastructure initiatives to meet the overall target. Where 10% CO_2 emmissions cannot be achieved in buildings alone, consultation with EHDC will be undertaken to agree how the 10% target can be hit using the methodology as defined on Page 15 'Additional Contributions to Carbon Reduction'.

3.8 The development at the Bordon Garrison will minimise the amount of energy used across the site and therefore the first objective is to adopt the Carbon Emissions Reduction Hierarchy in Figure 3.1 as a fundamental principle.

3.9 The current proposal for the town centre retail and commercial elements of the site potentially includes non traditional energy generation and distribution and this will be dealt with in a separate work stream, as highlighted in the EHDC Outline Feasibility Study for District Heating within the town centre area.

Avoiding Emissions

Passive Design

3.10 The Sustainability Strategy (Sustainable Energy Statement November 2014) sets out how all buildings on the Bordon Garrison Site will achieve part L of the Building

Regulations as required.

3.11 The building designs for the development will employ energy efficiency features across the development, including high levels of insulation in all elements (floors, walls, ceilings) to minimise energy requirements and reduced heat loss through detailed attention given to thermal bridging at structural junctions.

3.12 The minimum fabric standards set out in Table 3.1 are the considered approach in the initial stages of the development until Zero Carbon regulatory changes are made.

3.13 Through implementing the strategy in table 3.1, new residents will benefit from the significant increase in the energy efficiency of their homes which will deliver:-

- Significant increases in environmental performance (lower CO_2 emissions) through reduced energy use.
- Increased affordability of energy bills through reduction of energy demand.

Table 3.1 Considered Building Fabric Standards for All Residential Units compared to Part L 2010- 2013 edition Building Regulations limiting requirements.

	Part L Limiting Values (W/m^2K)	Bordon Considered approach (W/m^2K)
Walls	0.3	0.18
Roof	0.2	0.1
Floor	0.25	0.15
Glazing	2	1.3
Air Permeability (m^3/m^2hr @ 50pa)	10	4 - 5

Air Tightness

3.14 Air tightness plays a critical role in ensuring that dwellings are comfortable and warm to live in. If drafts are allowed within the home, warm air can escape and cold air can leak in. This has the potential to increase energy use for heating and therefore the CO_2 emissions of the new scheme.

3.15 The development will commit to high standards of air tightness as illustrated in Table 3.1. Current regulations sets a minimum air leakage target in a dwelling of $10m^3(h.m^2)$ @ 50 Pascals. The new development at Bordon Garrison will target an average air leakage in all dwellings of significantly less than minimum standards (at least $5m^3$ $h.m^2$ @50pascals). This is achievable through good design and a more educated and skilled approach at the construction stage.

Energy Efficient buildings, lowering our bills and Carbon footprint

3.16 Orientation and layout will have a significant effect on reducing the heating and cooling requirements in the development. The design team are cognisant of the need, where possible, to align all living and working areas with south facing glazing, ensuring solar gain is maximised during winter. Minimising heat loss through reductions in exposed walls and smaller building footprints will shape the building designs across the development to accommodate further Building Regulations changes in future.

3.17 Units will be designed to include high window to wall ratios and roof lights where feasible, to increase internal day time natural light and reduce the requirement for artificial lighting.

Lower heat loss

3.18 As external elements (floors, walls and ceilings) have become significantly more energy efficient, more marginal gains are becoming important in maximising energy efficiency such as design details around junctions. Care will be taken to ensure building designs minimise the risks of thermal bridging through mindful detailing of junctions and around openings.

3.19 Buildings will be designed with high efficiency double and triple glazed units where appropriate, to further enhance the thermal efficiency and internal comfort levels.

Comfortable Buildings

3.20 The new development will explore the provision for maximising thermal mass in all building designs demonstrated by the use of heavier weight building materials such as masonry (brick and block) or the design of thermal mass into lighter weight structures (timber frame). This will enable storage of solar heat energy in summer, reducing the risk of overheating and ensure a more comfortable internal temperature.

3.21 The development will consider thermal mass in solid floors in apartment blocks which delivers considerable benefits in reducing energy use in winter for heating. In-use studies demonstrate up to 15% energy saving from solar gain in standard homes with simple, well designed solar heat capture methods. The design team will consider the balance of thermal mass with the increased embodied carbon this may cause.

Ventilate right

3.22 In achieving the low levels of energy demand and low CO_2 emissions across the proposed development, controlled ventilation is critical to ensure minimal heat loss from buildings as well as maintenance of good air quality to inhibit condensation and mould growth, both significant factors of illness associated with poorly designed homes.

3.23 Various methods of controlled ventilation will be considered including cross and through ventilation where open windows allow movement and replacement with fresh air. In addition, Mechanical Ventilation and Heat Recovery (MVHR) will be considered where design air permeability is very low and additional measures are required to achieve targets.

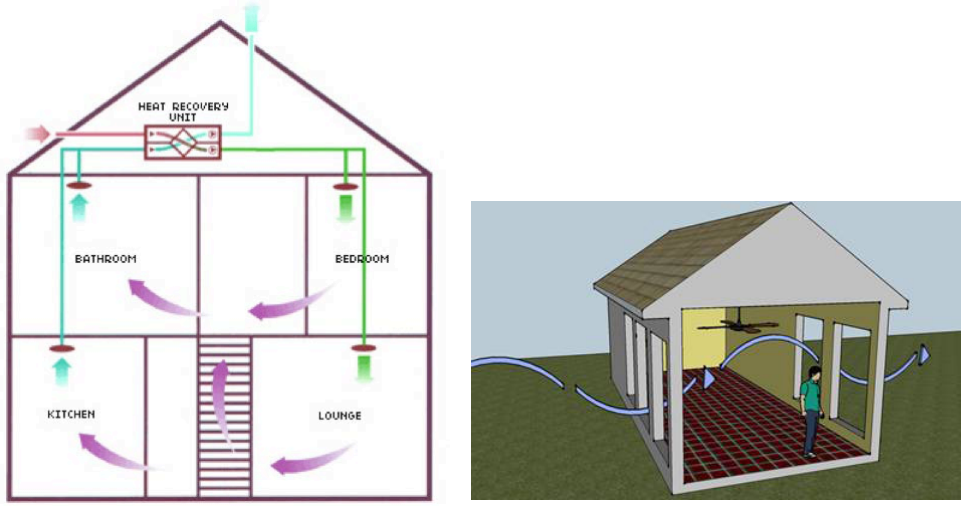


Figure 3.2 Methods of Ventilation

Heat Recovery from waste hot water

3.24 Significant energy is lost through waste hot water from showers and baths. Building design teams will consider Waste Water Heat Recovery (WWHR) which offers an efficient, low maintenance and low cost method of recycling a proportion of the lost heat which can then be used to preheat water entering the main hot water system.

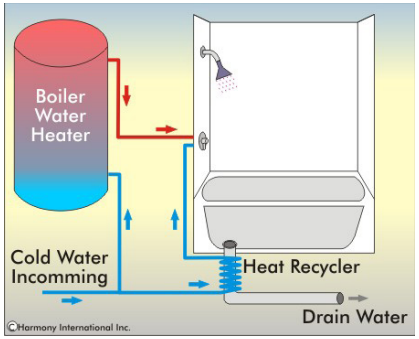


Figure 3.3 Waste Water Heat Recovery

Reduce CO2 emissions

3.25 Once the need for energy has been avoided, using measures in the previous section, reducing the emissions from the home and equipment within the home is the next stage in the carbon hierarchy. Careful specification of systems and good management of energy in the operation of the building is critical.

Changing our behaviours

3.26 As all new homes will be fitted with state of the art technologies to aid residents reduce energy and CO_2 emissions, it is important that residents are able to use these with confidence. Most of the variation between new homes in the efficiency of their use of energy is due to occupant choices.

3.27 Therefore, it is expected that the following measures will be implemented at the Bordon Garrison site to influence this behaviour:

- Residents will be provided with information on EU energy labelling for white goods, including estimates of typical annual energy costs for each grade of efficiency.
- Where appropriate all white goods will be A++ rated for energy efficiency.
- Where possible, units on the development will be designed to include either adequate external clothes drying space or alternatively internal drying space to reduce reliance on the use of drying machines.
- Energy Display Devices showing current mains energy consumption (kilowatts and kilowatt hours) will offer vital information to families on how and when they use most of their energy. This will help with a targeted approach to energy reducing behaviours.
- Building User Guides will be available to help get the best performance from the range of technologies present.
- Energy experts may be employed to visit the development after occupation to advise on the energy display devices, typical efficiency measures and MVHR systems.

Figure 3.4 Energy Display Devices

Replace Emissions

3.28 New homes and other buildings on the site will be required to achieve targets as described in this document. Therefore, it is estimated that there may be a requirement for renewable energy sources and also alternative carbon reduction measures across the site to achieve these levels.

3.29 The redevelopment will feature a blend of technological advances with tried and trusted equipment, to ensure the highest levels of performance with low levels of maintenance and potential repair costs.

Renewable Energy and Low & Zero Carbon Technologies

3.30 A strong emphasis is being placed on Renewable Energy (RE) and Low and Zero Carbon (LZC) solutions in support of efficient building practices. This further demonstrates the commitment to a sustainable future for the town by reducing CO_2 emissions and achieving the carbon emissions reductions required.

3.31 Below in Fig 3.5 is a modelled example (based on SAP 2012) of a standard semi detached unit featuring the Carbon Hierarchy Measures described earlier in this section. Using the specification in Table 3.1 the model achieves 11% reduction in CO_2 emissions.

Figure 3.5 Typical Semi-detached unit (SAP 2012 Modelled example)

Example specification of a standard semi detached unit delivering:-

- High levels of Insulation in floors walls and ceilings
- Junctions use Accredited Construction Details (ACDs)
- 90% efficient Gas Combi Boiler with Flue Gas Heat Recovery
- Triple glazed window orientation maximised for solar gain
- Air Permeability 4m^3/hm^2 @50 pa
- Thermal mass to ensure internal comfort.

Results:-

- Target Emissions Rate = 18.67
- Dwelling Emissions Rate = 16.6
- 11% Reduction in CO_2

Low Energy Lighting

3.32 Lighting can account for a large proportion of energy demand especially in commercial buildings. The HPA makes special reference to the provision of low energy bulbs both in domestic and commercial buildings and suitable, automatic controls to ensure minimum wasted energy.

3.33 Consideration will be made for all street lighting to feature low energy fittings controlled by the latest central management system. Streets will be well lit and offer a feeling of security without costing the earth.

Electricity Generation

Solar PV

3.34 As stated in this strategy, carbon reductions will primarily be achieved through high fabric energy efficiency and where these measures do not achieve targets, other methods such as PV will be considered especially on apartments.

3.35 A combination of domestic and commercial roof space across the new development may be provided and orientated with PV in mind without detracting from the aesthetic of the built environment.

3.36 Rooftop PV minimises the impact of renewable infrastructure by utilising otherwise redundant areas for generating clean energy for direct use within the community. Systems are scalable and will offer the developer flexibility to match installed capacity with factors such as available roof area, occupancy, energy demand and budget.

3.37 Residents will be able to generate electricity from their own roof spaces. This has been proven to raise awareness of individual consumption, further engaging householders in the energy debate and reinforcing the drive for sustainability throughout the community on a personal level.

3.38 Financially, families will feel the reward from reduced energy bills and benefit by living in a property that comes complete with an income from the Feed-In Tariff

Commercial PV Solutions

3.39 In addition to domestic systems the proposed school and supermarket would potentially offer excellent locations for medium sized, commercial PV systems. Commercial buildings are an ideal fit with the generating profiles of photovoltaic systems. Peak electrical demand for schools, offices and supermarkets is during the day when the PV system is generating, therefore maximising the benefit of the system by offsetting a considerable amount of grid electricity that would otherwise be required to meet day time demand.

Financial Incentives

3.40 Currently the government is offering financial support for the owners of solar PV systems through the Feed-In Tariff (FITs). The payment is offered for every unit of electricity produced for a twenty year period. However, the government has cut the Feed In Tariff for small domestic solar PV installations by 65% from 1 January 2016. Currently the Feed In Tariff is set at 4.39p/kWh for domestic solar arrays up to 10kW.

3.41 Currently residents and businesses would be eligible for the scheme and would receive quarterly payments although the scheme may well close in the life time of the development phase of the Bordon Garrison Redevelopment.

Monitoring

3.42 A wide range of monitoring systems are available to accompany Solar PV systems which serve to reinforce the visible benefits of an individual's system and raise awareness of the benefits of Renewable Energy technologies. These will be considered at the Bordon Garrison redevelopment.

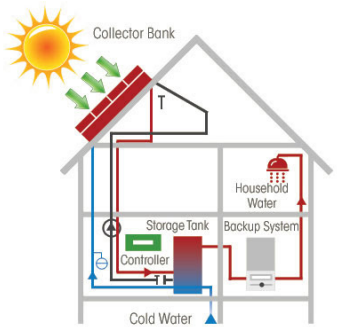
Hot Water Generation

3.43 Hot water will be supplied by either the same systems deployed for space heating or an alternative low carbon supply such as solar thermal.

Solar Thermal

3.44 Solar thermal is a feel good technology, owners admit to gaining a huge sense of satisfaction knowing the hot water they are using for showering or washing has been heated by the sun and free from any fossil fuel input.

3.45 Solar Thermal systems use solar irradiation to generate hot water, the energy is then stored in a highly efficient hot water tank and ready for use when required. Systems require a supplementary heat source such as a boiler or an immersion heater to meet demand when the panel output is low, for example in the winter.



3.46 These systems are supported by the Renewable Heat Incentive (RHI) which offers regular payments over a seven year period for domestic systems or twenty years for commercial schemes. This may be an option for the development.

Space Heating

Individual Space Heating for Dwellings

3.47 At this stage no commitment has been made as to which technology will be used for space heating in the dwellings proposed for the later phases. However, the design strategy illustrated could form the basis for developing new homes after subsequent Building Regulations changes.

3.48 The market is fast moving and there is potential for significant improvements over the coming years. As the Energy Matrix demonstrates below a 'design approach' has been put forward to best serve the sustainable credentials of the scheme.

- Suitability – resource availability, energy output, purpose
- Performance – efficiency, CO_2 emissions, useability
- Social Benefit – Minimising energy bills
- Value for Money – Best option in terms of £/kgCO_2 Saved

Ground Source Heating

3.49 Ground Source Heat Pumps will be considered as a Low Zero Carbon (LZC) alternative to conventional heating across the town centre. This may take the form of horizontal loops which could lie underneath hard standing areas or vertical loops which would offer a more practical solution. Low grade heat from these loops would be combined with high efficiency heating systems, including under floor heat sources and intelligent control systems.

Table 3.2 Energy Matrix for Bordon Garrison

RE or LZC Solution	Evaluation	Fuel Cost (Jan 2015) p/kWh	Industry Stated Efficiency	Emission Factor $kgCO_2/kWh$
Solar PV	Cost effective, flexible and a proven technology, Solar PV offers the best solution for reducing CO2 emissions across the site. Individuals will benefit from reduced energy bills as well as receiving an income from the Feed-In Tariff.	-	17%	-0.519
Solar Thermal	Higher cost per kg CO_2 saved compared to solar PV and not always cost effective in situations with low hot water demand. Solar thermal should be reserved for larger domestic dwellings or commercial applications with high demand for HW during the summer months. Annual Income from the RHI available.	-	76%	-0.216
Boiler	Accessible and cost effective with relatively low emission factor. The main benefit of gas is that the end user will have cheap running costs and a well understood, tried and tested technology with low maintenance costs and good longevity.	4.18	90%	0.216
Biomass Pellet Boiler	Lowest emission rates of all options. Requires large amount of space, high installation costs and higher than average running costs for the end user.	5.53	92%	0.039
Air Source Heat Pump	ASHP's become viable when designed to operate with a COP of at least 2.5. Hot Water mode often results in COP of less than 2 incurring high running costs and greater CO_2 emissions than mains gas. When designed and operated correctly they can provide a good option.	5.29	280%	0.185
Ground Source Heat Pump	The lowest running costs for the end user and lower than average CO_2 emissions, Ground Source Heat Pumps are great in the right situation. High capital costs and large spatial requirements limit deployment.	3.70	400%	0.130

Additional Contributions to Carbon Reduction

3.50 Carbon Futures provides an approach to measuring additional CO2 savings across the development over and above those delivered against Building Regulations.

3.51 It is proposed that the Bordon Garrison development will explore the use of this type of mechanism to deliver its commitment to reductions in carbon and where further emissions reduction are required.

3.52 The application of the Carbon Futures (CF) approach within regeneration and strategic settlements, such as Bordon Garrison, provides the evaluation of its additionality to sustainable development. 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"

3.53 The CF approach captures the whole sites performance with sustainable development through quantifying the CO_2 emissions and absorption for the benefit of the new settlement as:

- all the buildings (residential and non-residential) CO_2 emissions with additional gains achieved through fabric first approach, water reducing fixtures and fittings and hot water savings
- additional savings achieved through the establishment of new biodiverse landscaping and water features as carbon sinks.

3.54 When each aspect is examined, the proposed development contributes greatly to the present and future generations as both buildings and the green infrastructure are attributable to the developer.

3.55 CF was undertaken to supplement the Green Measures Strategy for Whitehill & Bordon which was worked through at two stakeholder workshops with EHDC and Development partners TWD to inform the s.106 Agreement in meeting the carbon reductions target.

3.56 Following the publication of "Fixing the foundations: Creating a more prosperous nation "by HM Treasury (July 2015), the government has confirmed that zero carbon dwellings and buildings are no longer required within the previous policy target dates of 2016 and 2019 respectively. This change alongside the withdrawal of the Code for Sustainable Homes (23rd March 2015) has currently altered the policy and delivery landscape for developers.

3.57 However, the UK has an obligation to implement the Energy Performance in Buildings Directive (EPBD) target for all new buildings in the EU to be "Nearly Zero - Energy Buildings from 2020. Article 9 of the Directive states that "(a) by 31 December 2020, all new buildings are nearly zero-energy buildings: and (b) after 31 December 2018, new buildings occupied and owned by public authorities are nearly zero-energy buildings". This may well have an impact on carbon emissions and energy demand targets as defined by the UK government, in later phases of the development.

3.58 Setting out how sustainable development additionality for Bordon Garrison using CF approach enables a response to the presumption in favour of sustainable development as a golden thread running through plan making and decision taking in the NPPF and within a CO_2 emissions framework for current and future generations as an intergeneration asset.

3.59 The CF assessment approach is founded on key and robust data sources that are cited within United Nations reports, key government policy, green economics research practitioners, institutes and by industry leaders.

3.60 The operational emissions from the buildings formulate the baseline target as $KgCO_2$/yr. Buildings are required to be compliant to Building Regulations and formulated through known published sources:

3.61 Standard Assessment Performance (SAP) is a methodology used for dwellings and requires a lower Design Emission Rate (DER) against a modelled Target Emission Rate (TER) for compliance to Building Regulations (2013) for new dwellings and is expressed as both fabric energy efficiency value (as kWh per sqm per year) and CO_2 emissions per sqm per year.

3.62 Best selling house types are used with SAP assessment values when the dwellings are orientated northeast for generic 1 bedroom, 2 bedroom, 3 bedroom and 4 bedroom. No differentiation is made between open market and affordable dwellings.

3.63 CIBSE Guide F provides energy consumption values for non-residential building types as fossil fuel and electricity use per sqm per year. These values are converted to CO_2 emissions through the DECC conversion factors for electricity and natural gas that are published each year.

Residential Generic housing types values for DER and TER are set out below:

Table 3.3 Residential Generic House Type DER and TER

Type	Area (m^2)	DER ($KgCO_2$/ m2)	TER ($KgCO_2$/ m2)	DER ($KgCO_2$/ yr)	TER ($KgCO_2$/ yr)
1 bed	32	29.87	30.99	118285	122720
2 bed	66	23.13	23.24	732758	736243
3 bed	82	18.31	18.49	1441363	1455533
4 bed	113	17.09	18.19	1622183	1726595
TOTAL				3914590	4041091

The key benchmarks used for the non-residential buildings are set out in the table below:

Table 3.4 Non-residential CO_2 emissions

Type	Electrical Use kWh/yr	Fossil fuel kWh/yr	Elec $KgCO_2$/yr	Fossil $KgCO_2$/ yr	TER $KgCO_2$/yr
Commercial/ retail	4592000	1728000	2121504	317952	2439456
Supermarket	5130000	1305000	2370060	240120	2610180
Primary schools	98120	502000	45331	92368	137699
Secondary schools	176000	960000	81312	176640	257952
Leisure centre (3000m2)	711000	4008000	328482	737472	1065954
TOTAL					6511241

3.64 Non residential buildings CO_2 emissions as CIBSE Guide F Benchmarks are converted to $KgCO_2$ using DECC conversion factors of 0.184 for natural gas and 0.462 for electricity use.

3.65 The Baseline Operational CO_2 emissions for all the proposed buildings is 10,552,333 $KgCO_2$/yr. The site target requires a 10% improvement beyond this baseline which sets a compliance site target of 9,497,099.7 $KgCO_2$/yr.

3.66 The table below sets out the savings achieved once the additional elements of site wide CO_2 emissions savings that are attributable to the developer, are included.

Table 3.5 Developer Contribution to CO_2 Savings.

Developer Contribution	CO_2 Saving (kgCO2/yr)
Dwelling Fabric First	126,502
Dwelling Potable hot and cold water	218,160
Green Infrastructure	2,000,574
Blue Infrastructure	40,754
TOTAL	**2,385,990**

3.67 The total savings against the whole site operational baseline deliver 25% CO_2 savings beyond Building Regulations Part L (2013).

3.68 The CO_2 emissions reductions of 10% are required from a site-wide approach.

3.69 It is envisaged that this will be delivered through the residential dwellings through a combination of solutions that include fabric improvements, waste heat recovery, reduced potable water consumption and additional technologies that contribute to achieving these exemplar dwellings.

3.70 The commercial buildings will deliver savings through a combination of different technology solutions that will include fabric first improvements, reduced hot and potable water consumption and additional technologies that contribute to achieving these exemplar buildings.

Measuring and monitoring CO_2

3.71 The development, through Energy models in SAP and SBEM will demonstrate at Design Stage its commitment to the required CO_2 emissions reduction. Furthermore, homes and commercial buildings will be fitted with smart meters and monitors to enable collation of energy and CO_2 data across the site, if necessary. This will enable accurate analysis of the developments actual energy and carbon emissions performance compared to the design targets, if required.

The Performance Gap

3.72 A number of factors during the design and build phases of any new development can have an impact on the final energy and water efficiency of a building. These factors include the materials used, orientation, the design detail and the way in which they are installed on site in association with other building services.

3.73 In recent years, the house building industry and government have grown increasingly concerned over the potential gap between "design" and "as-built" energy performance. It could undermine a building's vital role in delivering the national carbon reduction plan, present a reputational risk to the house building industry and damage consumer confidence if energy bills are higher than anticipated.

3.74 An important aspect of the Green Measures Strategy is to reduce the performance gap between 'as designed' and 'as built' performance of new buildings, which rests beyond the design and planning stages. This also includes the end user experience and marketability of homes for sale, if reducing running costs and improving the health and well being of the new occupants is a key marketing tool, which is the case for the Bordon Garrison development.

3.75 Ensuring that the "as built" performance of new homes at Bordon Garrison matches the high design standards it has set itself, EHDC and National Energy Federation (NEF) are working together to develop a set of measures under the Assured Performance Process Mark (APPM) .

3.76 The APPM will be designed to highlight where development has shown best practice to eliminate the "Performance Gap" and in turn deliver the high energy efficiencies for which The Bordon Garrison redevelopment aspires.

3.77 The APPM will identify the key drivers in reducing the performance gap such as continuous skills development to maintain and up skill construction workers, training and skills courses for new construction workers, eliminating ambiguity in design features and correct commissioning. The APPM approach is currently being tested on the Quebec Park development with Radian.

4. Our Precious Water Resource

Make sure that the development is safe from flood risk, reduces water consumption and maintains water quality.

4.1 Sustainable water management and water availability are central to the development at Bordon Garrison, both for the community and local wildlife.

Surface Water Run Off (SUDs)

4.2 Oxney Drain is the central spinal waterway which forms the basis of the Surface Water Drainage Strategy (SUDs) on site. By improving its ability to convey water, yet restoring more natural watercourse features such as riffles and pools, a balance of a practical flood solution and significant environmental resource is being made. Oxney Drain will become the centre piece of a system of waterways which will delivery great environmental and amenity value to residents and businesses at the heart of the town and beyond.

4.3 Porous paving will be considered strategically to allow water runoff to replenish the water table.

Natural water courses

4.4 The proposed development will deliver on a fantastic opportunity for residents to experience a diverse and natural environment made up of natural ponds swales and ditches as well as offering the practical feature of flood elevation.

4.5 The Blue and Green Infrastructure strategy underpins how the new development will embrace and improve the existing water features such as culverted drainage ditches, ponds and drains to achieve more effective defence against surface water flooding and also deliver very special natural places where wild habitats harbour a multitude of species to be enjoyed by residents as part of their daily lives.

Reducing water use in our homes and businesses

4.6 Every effort is being made to reduce the quantity of water used within homes and business without disruption to normal life and work.

4.7 Both grey and green water solutions will be considered as part of the strategy to reduce the need and usage of potable water within homes and businesses on the proposed development.

4.8 If recycled properly, grey water can save approximately 70 litres of potable water per person per day in domestic households. Therefore, it will be explored to determine how the need to use potable water could be reduced.

4.9 The optional water saving requirement under Building Regulations 2010, Approved Document G, Regulation G2, Clause 36 (2) (b), for a maximum use of wholesome water of 110 litres per person per day for all dwellings will be targeted.

4.10 This can be achieved through the use of low flow taps, showers and aerators, dual flush toilets and low volume baths, where applicable.

4.11 Each unit will be fitted with downpipe fed water buts for rainwater storage. This will be demonstrated by utilising the Building Regulations 2000 Part G (2013 Edition) Water Calculation tool.

4.12 A BREEAM "Very Good" rating will be targeted for water usage in all non domestic buildings.

Direct use systems and Grey Water use

4.13 Untreated grey water needs to be utilised quickly to prevent bacteria and harmful pathogens developing. Therefore, proprietary methods or valves fitted to external waste pipes directed to water butts or direct to flowerbeds and communal growing areas will be investigated as a part of the grey water strategy.

Mechanical filters (for using water to flush toilets)

4.14 Simple pump systems can take grey water away from the variety of grey water sources including washing machines, showers and utility sinks. Once treated in a holding tank , normally by chlorine, the water can then be distributed to where it is required, usually toilet cisterns and washing machines. This method will be considered as a part of the strategy to reuse waste potable water across the residential and commercial elements of the scheme.

Reducing the flow

4.15 All dwellings and commercial properties will be fitted with low flush toilets, aerated taps and low use appliances, where feasible. Bathrooms will include showers to help reduce the number of baths in each household. Where baths are designed in, low volume baths of 195 litres will be specified. An overall target of less than 110 litres of water per person per day will be a focus across the residential element of the scheme. Water usage limits for commercial units will also be targeted under BREEAM where appropriate, as above.

Rainwater Capture

4.16 Green water usage from the capture of rain water is a very effective and environmentally efficient way to reduce potable water use in industry and domestic settings. Simple water butts attached to roof downpipes will prove effective and low cost measures to capture rain water for a broad range of uses.

4.17 In the domestic realm, storage in water butts for watering flowerbeds, vegetable borders and lawns will be a primary use. For the commercial units, this green water may require filtration before reintroduction into processes.

Water Awareness

4.18 In addition to practical measures to reduce potable water usage mentioned above, enabling the local residents to appreciate the importance of saving water will be a focus of water metering programmes across the town and initiatives based at the Environmental and Heritage Centre which is planned for the proposed scheme.

4.19 For example, installations to demonstrate how rain water harvesting and grey water filtration will help reduce reliance on our precious water resource may be set up and schools could become involved with practical lessons and related projects.

4.20 In addition, leaflets and website information will be made available to residents and businesses on how best to reduce water consumption across the development.

5. The Environment, relaxation and leisure.

Seamlessly connect natural and wild places with our town and community leisure facilities

Green corridors and wild places

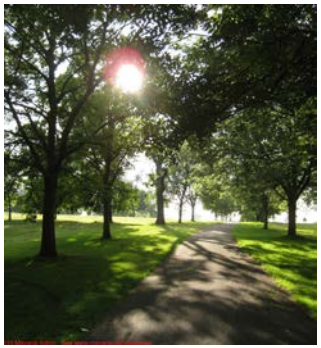
5.1 The new development has striven to bring the high quality natural environment around the site into the town centre. Other proposals for the development will need to be linked to ensure the strategy below remains coherent.

Fig 5.1 Proposed Green Loop

- All Green Spaces, both formal and informal, will be linked to the new development by the extensive network of footpaths and cycle routes
- The Green Loop offers a circular grid of footpaths and cycle ways linking parks and sports facilities to the centre allowing nature to permeate the whole town. (Fig 5.1)
- Wildlife corridors form a mosaic of restored heathland, wetland and woodland habitats to the east and west of the new town centre.
- Blue corridors form a system of watercourses, swales and ponds throughout the development site, providing incredible wildlife habitats as well as flood control and great places for recreation.

Trees and Woodland

5.2 Woodland and woody heathland are the dominant landscape on the edges



of town and within the development site covers around 118 hectares. These woody areas define the setting and character of the new development and their importance for environmental, biodiversity and amenity value is recognised by the developer. Great lengths will be taken to ensure this will be reinforced by the retention of an unprecedented number of trees and woodlands within the development.

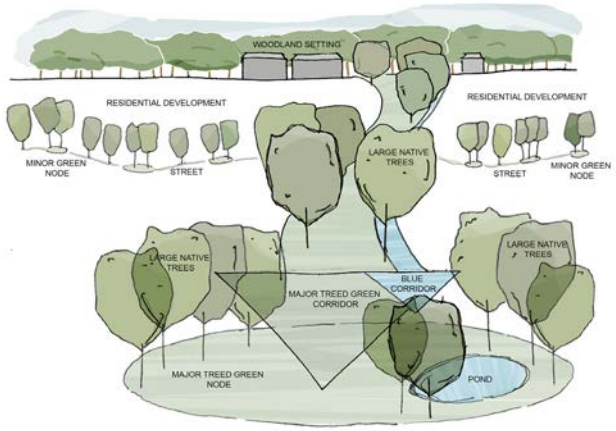


Fig 5.2 Woodland setting, treed corridors and treed green nodes / spaces - bird's eye 2

5.3 Also, an extensive programme of planting of new trees is planned across the site to line streets and populate green nodes and also within strategic green spaces and corridors. (Green Infrastructure Strategy Part 1)

Green places where many species flourish

5.4 Maintaining and increasing biodiversity on the development site is paramount as a barometer of achieving the green vision for the redevelopment.

5.5 A great number of species live in the development area including 10 species of bat, protected amphibians, otters, notable invertebrates and a number of bird species.

5.6 There are currently a number of designated wildlife areas within a few miles of the proposed site and due to the added recreational pressure from the increased population, the provision of Suitable Alternative Natural Green Space (SANG) has been proposed as a means of attracting recreational visitors who may otherwise visit the designated wildlife sites such as the Special Protection Areas (SPA), which are protected for rare ground nesting birds. Hogmoor inclosure, over 54 hectares of mixed woodland and heathland, will be established as SANG provision for recreation purposes with excellent foot and cycle ways linked to the town centre and the environs.

5.7 Throughout the development, a network of habitat links will be provided by the provision of further green and blue infrastructure and habitat retention.

5.8 The sports and recreation facilities such as the BOSC will be upgraded with changing facilities and a new pavilion building which will offer a multitude of opportunities and support local sport and the community. In addition, new indoor court facilities at the secondary school and the new leisure and swimming pool complex will ensure a full range of community focused leisure activities, easily accessible and close to residents' homes.

Traffic – Impact on our local environment

5.9 Considerable work has been undertaken to understand the impact of traffic on both the construction phase of the development and the completed development.

5.10 Where changes to traffic are likely to occur as a result of the proposed development the following measures have been incorporated into the scheme to minimise and mitigate the environmental effects of increased traffic. (Environmental Statement – Non Technical Summary)

- The implementation of a Construction Environmental Management Plan and a Construction Traffic Management Plan detailing measures to reduce construction traffic
- Creation of a North South relief road through the centre of the site
- Traffic management measures
- Junction improvements to six local junctions
- Pedestrian and cycle network throughout the development linking with new local routes
- Retention and enhancement of public rights of way
- Incorporation of formal and informal cycleways and paths
- A travel plan for the long term management of the proposed scheme.

5.11 The major change for the town will be the siting of the relief road which will take through traffic, away from the town centre. The effects of reduced through traffic flows on the new town centre will allow significantly more pedestrian ownership of the main shopping street and therefore more footfall into shops and businesses.

6. Jobs and our Community

To create a healthy community which has its own identity, where kids go to local schools and their parents have local employment.

Local Employment

6.1 The relocation of 1500 jobs from the military bases around Bordon has presented the area with a significant socio-economic issue and the new development with a great opportunity.

6.2 The new development as part of the broader redevelopment of Whitehill and Bordon, will provide a significant number of new jobs (Economic Benefits and Employment Strategy) to the town by developing a mixed economy through the provision of a new town centre of up to 23,000 sq m of commercial space, employment land of 5ha, 10,000m sq of employment floor space, as well as the potential for developing a learning campus as a catalyst for developing new local businesses.

6.3 With the growth in the local population estimated to be 5760, supported by the mix of homes and local employment could see an increase in total incomes in the local economy by around £73 million. (Economic Benefits and Employment Strategy)

Training a local workforce

6.4 A significant opportunity exists for developing a local workforce to ensure a steady supply of the right local skills to fill vacancies in the development construction phase, as well as delivering technically skilled workers to suit the expected expansion of the technology and engineering employment sector within the town.

6.5 Therefore, potential demand for relevant local technical skills training facilities in the town is foreseen. The Future Skills Centre, planned at Louisburg Barrack will expect its first student intake at the beginning of 2017. It will have a critical role in delivering the high levels of skills training to students and therefore for contractors. This may well offer an opportunity for collaboration across the development sites and within the community.

6.6 The developers are committed to a programme of Corporate Social Responsibility. Work experience and on the job training are central components to this. The programme will be available as part of the Employment Delivery Plan accompanying each Reserve Matters Application.

6.7 The Strategy for Employment and Sustainable Jobs (SESJ) delivers a number of critical elements which are integral to the development of a sustainable community, in particular, investment in training and apprenticeships, and therefore should be highlighted in this Green Measures Strategy.

6.8 SESJ links long term employment to the section 106 Agreement in terms of transport Infrastructure, namely improving transport links, walking and cycling and it also will enable additional opportunities for monitoring and feedback to EHDC.

6.9 It has been established that there is a link with secondary education to current low skills in the area. Raising standards and cultivating close relationships with Chichester University will further develop higher standards and aid in retention of pupils, as well as offer new pathways for young adults to increase their skills and move into further education.

6.10 The revitalisation and renewal of the town centre of Bordon will deliver significant sustainable employment opportunities. Both the Energy Strategy and SESJ will deal with the town centre separately and set out principles and specific sustainable strategies therein.

6.11 The Employment Delivery Plan which will accompany each Reserve Matters Application and highlights the overarching strategy for the development of each phase, emphasises the elements common with the Green Measures Strategy objectives and therefore should be read in conjunction with this document.

6.12 The key elements in delivering an highly skilled local workforce, set out here and advanced in more specific strategy documents, are to ensure a vibrant commercial community where sustainable, highly skilled employment is developed and delivered.

Working from Home

6.13 The potential for a significant number of jobs for home workers will be created at The Bordon Garrison development. Therefore, providing the right home working environment is critical.

6.14 The Bordon Garrison development encourages the philosophy of working locally or at home and will ensure residential dwellings have the facility for home office provision, including a dedicated space for a desk and chair near natural light and with power sockets, telephone connections for superfast or fibre-optic broadband close by.

Information Technology and Superfast broadband

6.15 The proposed development is keen to promote the latest superfast fibre optic broadband across the development to encourage home working as part of the "Green Vision" and SMART metering for business and homes to monitor and manage building performance.

6.16 New technology will also enable the community to check public transport timetables and plan their journeys with real time passenger information as well as local service information by providing direct access to local authority web portals.

6.17 Local community news and activities may be made available through direct links to the governance organisation websites and a town network portal may be used for the community, schools and business.

Local Construction jobs

6.18 It has been estimated that around 420 full time equivalent (FTE) construction jobs will be created between 2015 and 2036.

6.19 The Future Skills Centre will be delivered by Hampshire County Council for the locality to ensure that local residents acquire the requisite skills to take advantage of these jobs and keep the employment benefits within the local economy. Also, there is a commitment to provide apprenticeship places as part of the construction process as set out in the Strategy for Employment and Sustainable Jobs.

6.20 This commitment will not only be monitored and measured as part of the Performance Monitoring element in subsequent Green Measures Strategy refreshes, this component will be measured as a deliverable in closing the Performance Gap as part of the Assured Performance Process Mark.

The New town centre and new local jobs

6.21 Through this process, local residents will find their need to travel elsewhere for a broader shopping experience will reduce, ensuring lower car usage and further increasing local economic benefits.

6.22 With the additional income generated locally, The Bordon Garrison development will ensure this wealth stays within the local economy.

6.23 Around 23,000 square metres of commercial space is being developed in the new town centre including a food store, retail units, offices, a pub and hotel, and civic buildings. Projections estimate that around 1,153 full time equivalent jobs will be created (Economic Benefits and Employment Strategy). With other small employers and Defence Infrastructure Organisation (DIO) jobs, it is estimated that approximately 2,500 additional jobs will be created for the local community within easy reach by public transport, walking or cycling.

Opportunity, variety and choice.

6.24 Due to the current limited retail offer in the town of Bordon, a significant level of available expenditure is simply spent elsewhere. Over the years this has created a suppressed and shrinking retail market, further reducing employment opportunity and choice.

6.25 Developing the new town centre with a food store and other new retail units, (Retail Impact Assessment) will have a profound effect on the local community by reversing the market trend with a variety of new shops and new employers, retail spending being retained and in turn creating healthy local markets for the town centre to thrive and grow.

Primary and secondary schools in the community, for our

community.

6.26 Provision is being made for a primary school including a sports field of around 0.5 hectares to be situated to the western edge of the new town centre and square. This will ensure that new residents are able to access local primary school places close to the employment centres of the new development.

6.27 A new secondary school on Budds Lane will replace the existing Mill Chase Academy, with over 10,000 m^2 floor area and 4 hectares of sports pitches including a new 3G floodlit pitch and a new 4 court sports hall which may be utilised by community sport clubs and associations.

6.28 Both new schools will be centrally positioned, close to the employment centre of the town and linked to the network of cycle and foot paths offering easy access for pupils, parents and teachers.

The housing mix – so families can grow.

6.29 The developer appreciates the importance of the individual dwelling as a home and the vital role it has in the development of "Place". The Bordon Garrison development, within the broader HPA, will create the opportunity for homes that people will want to invest and stay in, providing room to expand and with flexible garden space.

6.30 A mix of affordable flats and houses will be included and there is an emphasis on family house types in order to meet broader aspirations for larger family housing to assist in rebalancing the housing stock within the town.

6.31 They are expected to attract a full range of households including working age, economically active households and families, first time buyers and retirees (Housing Statement). Thus, the development will make an important contribution towards sustaining a balanced population and community in Whitehill & Bordon.

6.32 An average density of around 40 dwellings per hectare is proposed across the HPA site, with higher densities around the town centre and reduced densities of around 30 dwellings per ha on the periphery.

Community Facilities

6.33 Within the framework, other important community facilities as well as the town centre, education, leisure, transport and sports facilities mentioned in this document, have been planned for the redevelopment of Whitehill and Bordon which include:-

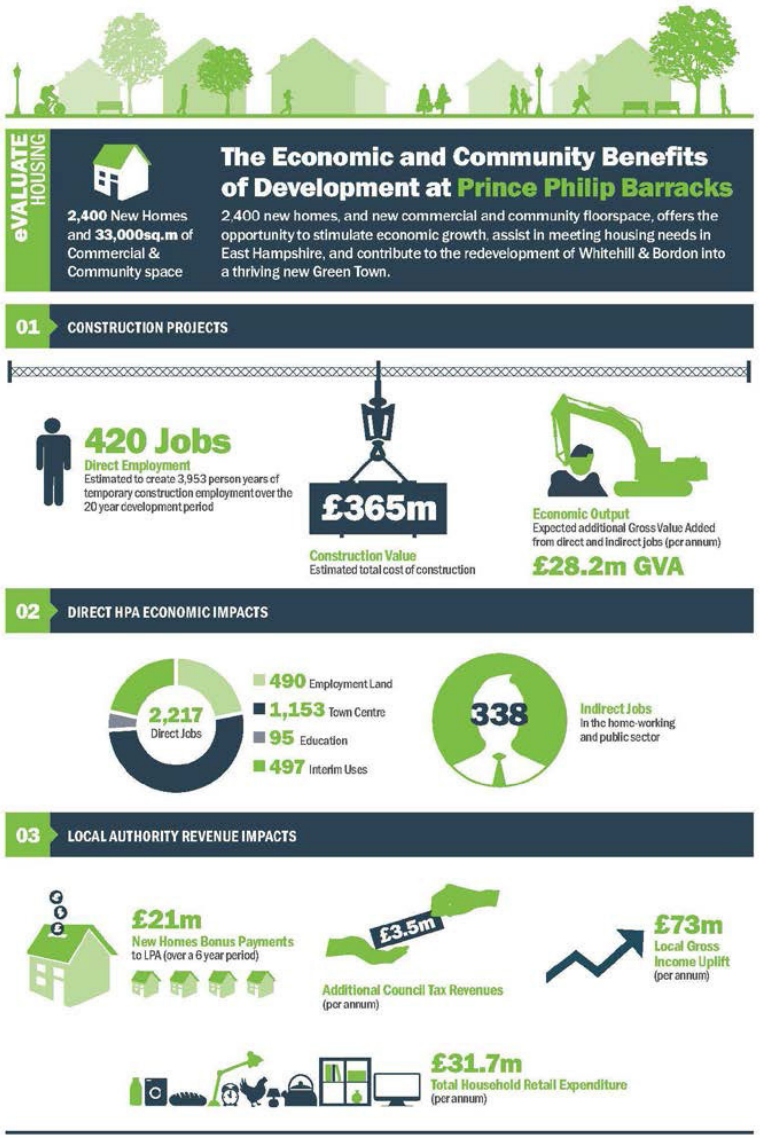
- GP surgery based at the Chase Community Hospital or in the town centre.
- A care home
- The existing Church of England Church if St Georges will remain and other faith facilities will be included in the town centre if required.
- A neighbourhood police office in the town centre

Environmental and Heritage Centre

6.34 The redevelopment's "Green Vision" plan for the future offers a great opportunity to showcase sustainable innovations across the development. The "Green Shop" will not only present new innovation in sustainable living, energy efficiency and renewable technologies, it will encourage new residents to purchase eco-friendly enhancements to their homes, enabling greater choice and flexibility.

6.35 The Centre could offer an interactive approach to understanding the development as a Low Carbon community and local economy, exploring the various measures being taken to reduce CO_2 emissions and energy use on site. Real time monitoring of CO_2 and energy use could be used to demonstrate how renewable technologies have been integrated and their impact on energy demand from the national grid.

6.36 In addition, an Event Centre situated either near the central park or the SANG will offer visitors and residents, a variety of experiences such as bicycle hire as well as an opportunity to learn how to fix a bike on a bicycle repair course. It may also deliver educational opportunities on local military and broader recent history, as well as various practical environmental conservation and biodiversity matters.



7. Design and Sustainable Construction

To design quality homes to maximise comfort, convenience, flexibility and sustainable living.

7.1 The Development will seek to develop a range of homes and buildings that people want to live in and use, respond to their environment and are adaptable to future use and climate change.

7.2 In the design process, materials and systems will be selected that include an environmental assessment using the BRE Green Guide to Specification for Buildings. Wherever possible

7.3 'A or A+ Rated' materials will be used. These selections will include evaluations of cost and performance as well as environmental considerations. Preference will be given to the use of local materials and suppliers, where viable, to reduce the transport distances and to support the local economy.

7.4 With the ample supply of timber locally, supply chains could be developed for timber products where timber frame buildings are specified and many other products such as stairways and panelling.

7.5 In addition, to minimise the impacts of construction site operations, all contractors will register with a Considerate Contractors register.

7.6 Local labour will be acquired wherever possible and strong links forged with the planned local apprenticeship schemes. Highly relevant skills and local training, possibly based at the Future Skills Centre at the Louisburg Barracks site will could help ensure that all new buildings perform as designed. This will be operated by Hampshire County Council in the first instance and therefore close co-operation will be required in order to maximise this potential resource.

Offering choice and diversity

7.7 The development will provide a mix of tenures and layouts that meet the needs of local and incoming residents and the requirements of the local housing market including shared equity, rented and affordable homes.

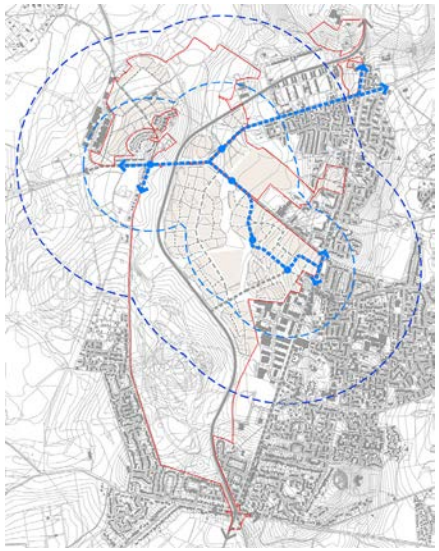
7.8 All buildings will be designed for both now and future use accounting for the potential for the effects of climate change and therefore overheating.

7.9 Layouts and designs will be distinctive and place setting , mindful of potential to take advantage of solar power through orientation north – south and all residential units will be built to follow key sustainable design principles, with all commercial buildings following BREEAM "Very Good", where appropriate.

8. Sustainable Travel - Staying connected

Reduce the need or desire to travel by providing sustainable travel choices with less reliance on the car.

Buses



8.1 Travel accounts for between 15-25% of the overall carbon emissions of residents in the UK, therefore an important aspect in the provision of new developments is to provide suitable and sustainable travel networks for residents to use to go about their every day journeys, reducing air pollution and making streets cleaner and safer.

8.2 The developer will build a transport hub at the heart of the new development linking both sides of the town initially achieving a minimum service every 60 minutes, and later aim for every 15 minutes or 9 minutes for sub regional services. All residents should have access to a bus stop no more than 400 metres from their homes.

8.3 Offering residents and businesses easy access to the town, local centres and sub regional centres will deliver a truly sustainable transport network, further linked to rail stations and national termini, helping reduce the reliance on the car.

Cycling and walking

8.4 Reducing car journeys and promoting car free lifestyles involves enticing residents and workers to walk or cycle.

8.5 The development of the Green Loop and Green Grid network around and throughout the development, as a proportional facet in the s.106 legal agreement, will form both a critical coherent and cohesive infrastructural, economic, environmental and social element of the regeneration project and forms a contribution to the broader town-wide strategic project to promote cycling and walking in Whitehill and Bordon.

8.6 Making sure there are local jobs and schools, for local people, close to their homes will encourage residents out of their cars and onto the excellent cycle and footpath networks to make those small but rewarding journeys by foot or cycle, experiencing the beautiful natural environment. In the process this will increase natural surveillance and help develop a sense of community where neighbours and work colleagues can interact outdoors.

8.7 "Walkable neighbourhoods" has been a major focus for the sustainable transport proposal which has been designed to make walking a more attractive and safer option for local residents. By siting all new homes within close proximity to employment shops schools, community and leisure facilities all connected to the green loop and grid, the development will be interconnected within easy reach for all.

8.8 A range of considered measures will enable residents to reduce their impact on the environment such as car clubs for car sharing which can help reduce car ownership, the promotion of electric vehicles through installation of convenient charging points and a significant reduction in overall distances travelled across the Whitehill and Bordon due to local jobs and schools.

9. Local and sustainable food

To enable the local community to enjoy the best of local produce and seasonal foods, offering health diets, high in vegetables.

9.1 The proposed development has planned for the provision of flexible grow your own facilities using best practice and aims to produce a town-wide strategy which will cater for residents who are keen to grow local produce such as fruit and vegetables.

9.2 The new community is set within a productive farmland environment which only currently delivers a small proportion of local produce to local families tables.

9.3 As local fresh and seasonal produce with low food miles are major considerations in developing a truly sustainable community, the town centre development will seek to provide better access to local goods and services and therefore there will be a place for local produce to be sold in the proposed town centre. This will in turn reduce the requirement for potential additional shopping trips and therefore have a positive impact on CO_2 emissions.

10. Waste and Recycling

To minimise the effects of the construction phase and across the proposed development ensuring household and business waste is recycled

Construction phase waste

10.1 Bordon Garrison redevelopment will generate considerable amounts of material waste during the construction phase with demolition of areas of hard standing and various brick buildings.

10.2 A Site Waste Management plan will be employed on the site to monitor and report waste generated in defined waste groups. The plan will include the setting of targets to promote resource efficiency and will include procedures and commitments to sort and divert waste from landfill.

10.3 The target is at least 80% of all waste should not go to landfill with alternative uses such as crushed stone used under roads as a base material. This will also reduce vehicle journeys and further pollutants such as dust and noise issues.

Storage of Waste

10.4 Provision will be made for the internal and external storage of non-recyclable waste and recyclable waste in homes and businesses. External space should be located on level hard standing and accessed by an inclusive route from the closest external door to the dwelling/block of flats.

10.5 The area benefits from East Hampshire District Council local waste and recycling services and therefore waste and recycled materials will be regularly collected from homes and businesses.

Composting

10.6 Composting facilities will be considered for each dwelling to accommodate recycling of green and garden waste. In addition, as the proposed development includes a number of communal growing areas for residents and the wider community, communal or community composting will be encouraged. Furthermore, facilities will be made available for the commercial development on site, where appropriate.

11. Building a sense of "Our place"

To be proud to live and or work in the new development at Bordon Garrison as significant and different from anywhere else.

11.1 In physical terms, the proposed new development will deliver a setting which feels established and offers a sense of the town's history.

11.2 The refurbished Sergeants' Mess Building and Sandhurst block will show prominence at the centre of the new town centre with squares, other municipal buildings and boulevards spread around them.

11.3 Building designs will be influenced by the various design codes to support each planning application. This will provide a balance across the various building forms and build a sense of place across the development.

11.4 With the retention of significant woodland areas and extensive tree planting schedules across the development, the overriding feeling of being a part of nature, will also lend immediate character to the place.

11.5 Streetscapes have been considered to allow all forms of traffic to access but ensure the correct priority whether pedestrian, cycle, car or bus .

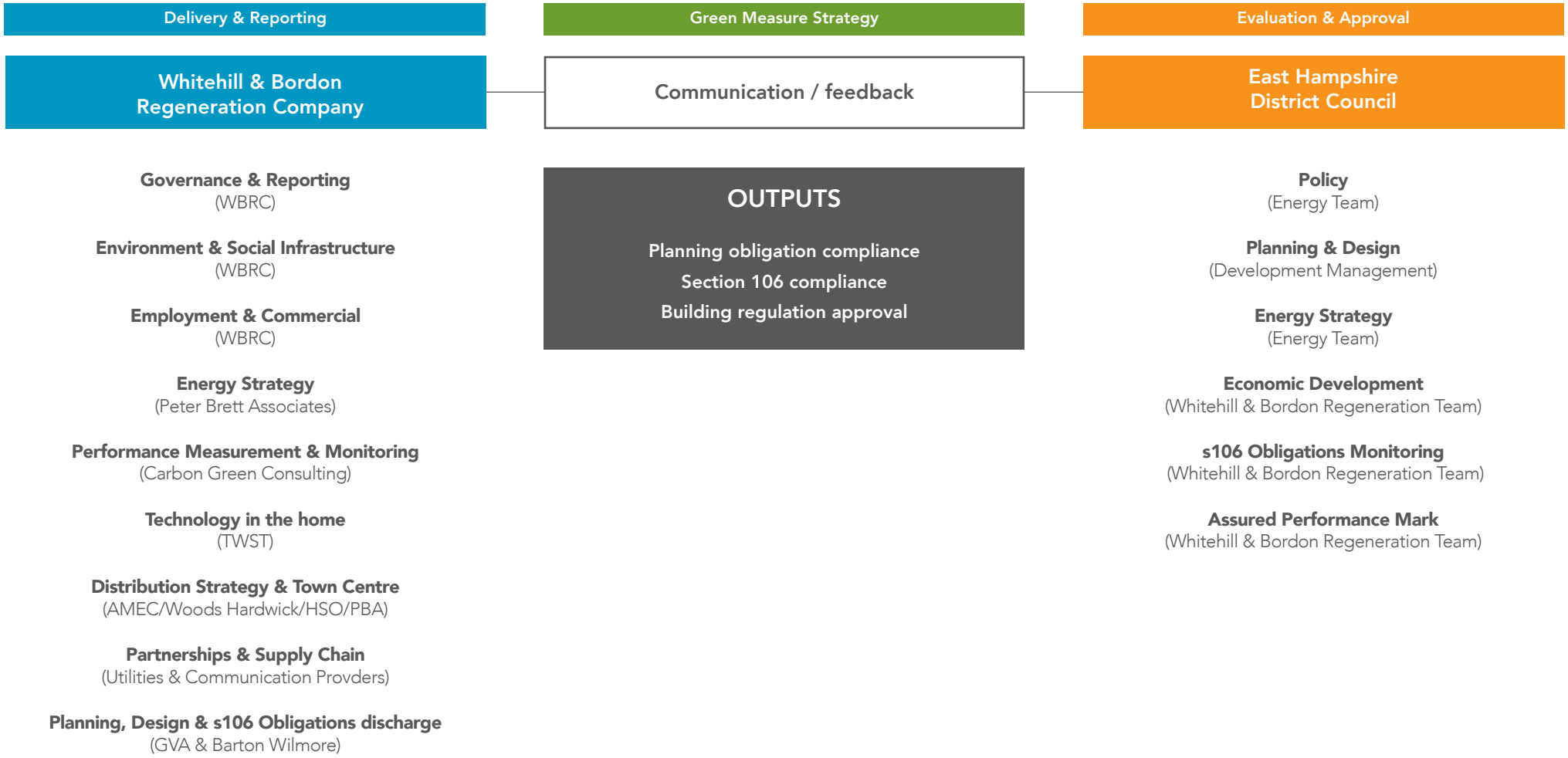
11.6 The relief road will take traffic away from the town centre where pedestrians can take prominence and new local businesses may thrive.

11.7 Well designed public transport links will connect residents to the community and further afield.

Fig 11.1 Reference Design Code 1 (draft) 02.16

12. Workstream Governance

12.1 The organogram below shows the key work steams considered critical to the future successful delivery and implementation of the Green Measures Strategy.



13. Summary

13.1 This document has drawn together the wide ranging and detailed set of sustainability and low carbon measures being planned for the Bordon Garrison site and it offers methods by which the commitments within the Section 106 Legal Agreement may be achieved.

13.2 All the elements in the list of options set out in the Green Measures Strategy will be considered at each RMA stage and the subsequent choices from this list used to fulfil each commitment. This will be set out in a Green Measures Strategy Statement.

13.3 Successive Green Measures Strategy refreshes will include a Green Measures Strategy Monitor (See annex 2) which gives a summary of the performance to date against agreed commitments across the development as a whole. Each measure will be set against CO_2 emissions and other targets and budgetary criteria.

13.4 The wide range of options set out in this document and summarised below will sit alongside our commitments and form the basis of the development of a truly sustainable development at Whitehill and Bordon.

Our Commitments are:

- Low carbon and low energy buildings to significantly increase environmental performance and reduce bills, where high fabric energy efficiency, and the appropriate use of renewable energy will deliver the Carbon Emissions Targets across the development.
- Built to the highest quality and environmental standards.

The list of options to deliver our commitment to green living across the site are:-

- In further developing the Green Town Vision, other environmental contributions such as Carbon Futures will demonstrate additional CO_2 savings across the broader development area.
- A commitment to raising residents' understanding of living within a sustainable community where Building User Guides and a community based educational facility will help shape their sustainable experiences.
- A commitment to reducing surface water runoff and saving potable water across the site will shape the SuDS system and high levels of water efficiency will be targeted through the use of water butts and water efficiency measures.
- Our part in developing the Green Loop and Green Grid offers residents unprecedented opportunities to live and work in a natural environment and be close to the highest quality natural green and recreational spaces.
- The blue infrastructure and corridors will offer an additional layer of environmental quality through the planned system of watercourses , swales and ponds across the site.
- We will seek to offer opportunities for local jobs across the construction phase and support home working through delivering the right home working environment
- Facilitating superfast broad band as a standard feature throughout the residential and commercial development
- To support the work to upgrade and develop local skills education
- Develop a town centre of vibrancy and excitement promoting itself as a high class shopping experience
- Offering high quality educational experiences through new primary and secondary schools, located close to the new town centre.
- Offering a community where families can grow and a mix of housing and tenure types allows the greatest choice.
- To deliver an integrated local sustainable transport system which offers residents and businesses alternative and sustainable travel options through buses, footpaths and cycle ways.
- Promote the growing of local food by setting aside an area for community growing areas on-site.
- To deliver the highest quality environment for play and relaxation through offering access to a broad range of natural space and formal play areas.
- To ensure that waste is managed effectively at construction stage. Construction site waste management plans will be implemented and residents and businesses given the required storage facilities for high levels of recycling and composting.

Annex 1 – Green Measures Strategy S106 Obligations

Key requirements:

- Clause 70 of the s106 requires submission of a Green Measures Strategy within 6 months of the date of the planning permission ie by 6 April 2016.
- Clause 72 requires a Progress Report to be provided every 6 months to set out actions taken towards achieving the Green Measures Strategy;
- Clause 73 requires each Reserved Matters application to be accompanied by a Cumulative Statement of expenditure against the £6.5m cap.
- Clause 74 requires that each Reserved Matters application is supported by a Green Measures Statement to set out how the RMA delivers the provisions of the Green Measures Strategy;

The definition for Green Measures strategy requires that;

"Green Measures Strategy" a strategy to be submitted to set out measures the cost of which shall not exceed in total £6.5million (the items of expenditure to be allowed toward the £6.5m cap being as set out in Appendix H or as may be agreed between the Owner and the Council) for securing:

a) 10% better environmental performance than the level required in the Building Regulations 2010 (as amended or replaced from time to time or such alternative policy or statute as agreed by the Council and Owner in the event that the relevant provisions of the Building Regulations 2010 cease to have effect without replacement) such measures to primarily focus on a fabric first approach with the residual energy demands met by on-Site low/zero carbon heat and power;

b) the delivery of the Green Town Vision through the measures set out in the Green Measures Strategy for the redevelopment of the Site PROVIDED THAT the cost or value of Energy Centre Land shall not be included as a measure for the purposes of this contribution;

c) actions, training and monitoring with site contractors to reduce the performance gap between 'as designed' and 'as built' energy performance across the redevelopment area;

d) the construction of all Dwellings in compliance with Regulation 36 (2)(b) and Requirement G2 of Schedule 1 of the Building Regulations 2010 so that the potential consumption of wholesome water by persons occupying a new Dwelling do not exceed the requirement in Regulation 36 (2) (b) of 110 litres per person per day;

Annex 2 - Green Measures Programme Monitor

Issue/Requirement	Measure/Intervention	Target level	Actual v Target to date	Budget (£)	Committed Expenditure	Actual expenditure (As Part of the £6.5million)
Post Construction Performance Measures						
Environmental Performance - Building Regulations Part L +10% further reduction in CO2	Fabric upgrade	10% CO2 reduction Below Building Regulations		1,800,000		
	Use of Renewable Technologies (Residential)	10% CO2 reduction Below Building Regulations		1,334,667		
	Use of Renewable Technologies (Town Centre)	10% CO2 reduction Below Building Regulations		1,768,000		
	District Heat Network	10% CO2 reduction Below Building Regulations		1,000,000		
	Green Shop	-	-			
	Carbon Futures modelling	10% CO2 reduction Below Building Regulations		-		
	Confirm specification of low flow taps and showers, reduction in bath use and/or low volume baths	≤ 110 litres/person/day		600,000		
TOTALS		6,502,667				
Assured Performance Process Mark (APPM)	Training courses ,	All construction teams				
Post Occupancy User Experience						
Post Occupancy Performance	**Post Occupancy Study Questionnaire scores**					

Annex 3 - Green Measures Statement Framework

The Green Measures Statement Framework lays down a common structure to which each Green Measures Statement, submitted alongside every Reserve Matters Application (RMA), will follow. It reflects the broad intentions of the Green Measures Strategy and it's subsequent refreshes but within the specific contextual requirements of each RMA.

It therefore responds to the particular set of circumstances of each individual phase of the development and directly to progress made in pursuance of the broader Green Measures Strategy targets. This statement will then provide the basis of the six monthly reporting via annex 2.

The Town Centre element is considered in a separate Energy Strategy work stream outside the Green Measures Strategy and therefore the Green Measures Statement Framework does not refer to this facet of the development.

Green Measures Statements will include the following Tabulation:

Issue	Strategy	Measure	Evaluation	Planned Delivery (measured in time)
Comfortable Homes - Reducing Energy, Carbon and Bills	Avoid Emissions	Energy Efficiency		
		Air leakage		
		Ventilation		
	Reduce Emissions	Behavioural Change		
		Smart Meters		
		Appliance		
		Lighting		
	Replace Emissions	Low Zero Carbon Technologies for electricity generation		
		Low Zero Carbon Technologies for hot water generation		
	Post Completion Monitoring (see definitions)			
	Post Occupancy Monitoring (see definitions)			
	Addressing the Performance Gap			
Our Precious Water	Surface Water Run Off (SuDS)			
	Water Usage			
	Rainwater Capture			
	Water Awareness			

Issue	Strategy	Measure	Evaluation	Planned Delivery (measured in time)
Living with Nature	Green Corridors and species richness			
	Trees and Woodland			
	Traffic Impacts			
Jobs and Community	Local employment			
	Training and a local workforce			
	IT and Superfast Broadband			
	Housing Mix			
	Education - Primary and Secondary			
	Community facilities			
Design and sustainable Construction	Choice and Diversity			
Sustainable Travel	Buses and Public Transport links			
	Cycling and Walking			
Local sustainable Food				
Play and Relaxation				
Waste and Recycling	Construction site waste			
	Storage of Waste			

Building Regulations Performance versus Target

Building Regulation	Reserve Matters Application (RMA)	Measure/ Intervention	Committed Expenditure	Actual expenditure (As Part of the £6.5million)
2010 Edition Part L 1A	Phase 1A Residential Development 10% improvement over Building Regulations through Building Fabric Efficiency measures	Fabric - LZC - Carbon Futures		
2010 Edition Part L 2A	Not Applicable	Not Applicable		
2010 Edition Part G Regulation 36 (2) (b)	Phase 1A Residential Development 110 litres per person per day	Low Flow Taps Aerators Low volume Baths		

Annex 4 - Summary of major Omissions or Changes

The Green Measures Strategy Refresh contains up to date information relating to the current status of the development and date of issue of each six monthly Green Measures Strategy Refresh under the Section 106 Legal Agreement Clause 72.
The Summary of major Omissions or Changes section highlights the various changes to this current version of the Green Measures Strategy.

Omissions or Changes

For ease of referencing, paragraph numbers are now added to each section.

P2 Executive Summary - This section has been amended to reflect the changes within the document since being appended to the Section 106 legal agreement and now used as a working document to deliver the Green Measures Strategy across the various development phases. It sets out the delivery objectives, strategy and compliance and governance process for the Green Measures Strategy.

P5 Addition of Definitions

P6 Introduction - This has been amended and sets out the methods by which The Green Measures Strategy informs Reserve Matters Applications through Green Measures Statements and where the Green Measures Strategy relates to other important and relevant planning documents.

P8 Comfortable Homes- Reducing Energy, Carbon and Bills - Changes focus on residential energy and carbon emissions. The text omits reference to town centre energy strategy as this will be a separate work stream under Energy Strategy

P14 Omission of section on District Heating as this is the focus for a separate work stream under a broader development wide and town centre Energy Strategy.

P21 Change to Title "The Environment, Relaxation and Leisure.

Seamlessly connect natural and wild places with our town and community leisure facilities"

5.1 Additional information referring to links with open space by footpaths and cycleways

5.8 Additional information describing formal leisure facilities across the development.

P23 Jobs and our Community Training a Local Workforce

6.6 Additional information highlighting developer commitment to Corporate Social Responsibility through development of work experience and on the job training

6.7 Additional information for clarity included -reference to the Strategy for Employment and Sustainable Jobs (SESJ)

6.8 Paragraph linking SESJ long term employment with the s.106 agreement focus on improving transport links, walking and cycling and the additional opportunities for East Hampshire District Council (EHCDC) to receive feedback.

6.9 Additional information recognises link between low skills and association with the Higher Education establishment at Chichester University to further develop standards, retain pupils and offer additional opportunities.

6.10 Additional information focussing on sustainable employment opportunities

6.11 Additional Information to highlight Employment Delivery Plan which will accompany each Reserve Mattes Application.

6.12 Additional Information in support of other strategy documents

P28 Local and Sustainable Food - Omission of "Local allotments" and addition of "flexible grow your own facilities which will cater for residents keen to grow local produce...".

P30 10. Play and Relaxation - Omission of section.

P32 Work stream Governance - Change to Work stream Governance Organogram

P33 Summary - This section has been amended to reflect this Green Measures Strategy Refresh