



Durrington Gasworks (Elizabeth Square Phase 2)
Martlets Way, Goring-by-Sea, Worthing

Energy & Sustainability Statement

April 2026

Key Features

Highly energy efficient properties, adopting a 'fabric first' approach

Air source heat pumps for heating and hot water

Renewable energy generation via photovoltaic panels

Zero carbon ready

Low carbon from the outset

100%
of properties with associated parking to have a dedicated EV charging point

25%
estimated reduction in potable water use against the national average

100%
of properties to have fibre-to-the-home enabled

Adapted to future changes in the climate

The sustainable approach described within this Statement demonstrates that the proposals align with the relevant policies of the *Worthing Borough Council Local Plan 2020-2036 (March 2023)*, creating a zero-carbon ready development which is adapted to future changes in the climate.

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1 Introduction

1.1 This Statement

- 1.1.1 This *Energy & Sustainability Statement* supports the full planning application for the proposed development at Durrington Gasworks (Elizabeth Square Phase 2) in Worthing. It has been commissioned by Bellway Homes Limited (South London) (the Applicant).
- 1.1.2 The policy framework encouraging sustainable new development is comprehensive at both a national and local level. This Statement responds to existing policy, including the *Worthing Borough Council Local Plan 2020-2036 (Adopted March 2023)* and current Building Regulations whilst looking ahead to the emerging Future Homes and Buildings Standards, details of which were announced in March 2026.
- 1.1.3 In particular, this Statement describes how the development proposals address sustainability, with a focus on climate change mitigation and adaption:

Sustainable Energy

- The buildings will be 'zero-carbon ready', and will be futureproofed to become operationally zero carbon over time;
- High fabric standards for thermal efficiency will be specified;
- There will be no natural gas connection to the proposed development;
- Energy demand will be met from low and zero carbon sources.

Domestic Water Efficiency

- Domestic water use will be reduced compared to a standard development through the adoption of water efficient fixtures and fittings.

Climate Resilience and Adaptation

- The development designs will anticipate future changes in the climate;
- Overheating risk will be reduced through passive design measures as required by Approved Document O;
- Open space and landscaping will provide multiple benefits;
- Surface water will be managed with the integration of SuDS.

Reducing Carbon Emissions from Transport

- Electric vehicle charging infrastructure will be incorporated in line with the requirements of Approved Document S;
- Gigabit-ready infrastructure will be installed as required by Approved Document R.

Embodied Carbon and Sustainable Waste Management

- The adoption of sustainable design and construction principles will reduce the embodied carbon of the development;
- Construction and operational waste will be managed according to the principles of the Waste Hierarchy, with a focus on waste prevention, re-use and recycling.

- 1.1.4 Worthing Council, in partnership with Adur Council, declared a Climate Emergency in 2019, setting ambitious targets for the councils to become carbon neutral in their operations by 2030 and for a net zero carbon area by 2045. The holistic approach to energy efficiency and low carbon energy described in this Statement aligns with these aspirations.
- 1.1.5 The recommendations provided are described in as much detail as is possible at this stage in the planning process.

1.2 Site Description

- 1.2.1 The application site is located within the Built-up Area Boundary of Worthing. It comprises previously developed land that has been allocated within the Worthing Local Plan as an area for employment and residential development (Site Allocation A10 – Martlets Way).
- 1.2.2 The site comprises three parcels of land:
- The Southern Gas Network (SGN) Site – this northeast land parcel comprises 1.76ha of brownfield land with areas of hardstanding and grass. It is bound by mature trees and hedgerows, and was formerly the location of Southern Gas Network gas holders.
 - The Martlets Way Site – this 1.37ha western land parcel was formerly sewage works.
 - The Nib Site – this 1.05ha site is to the south of the SGN land parcel. It is bound by mature trees and hedgerows.

1.3 Development Proposal

1.3.1 The formal description of development for the proposed development is as follows:

Full Planning Application for mixed-use development comprising 123 dwellings and commercial units with associated parking, landscaping, open space and drainage.

1.3.2 The image below shows the Site Layout:

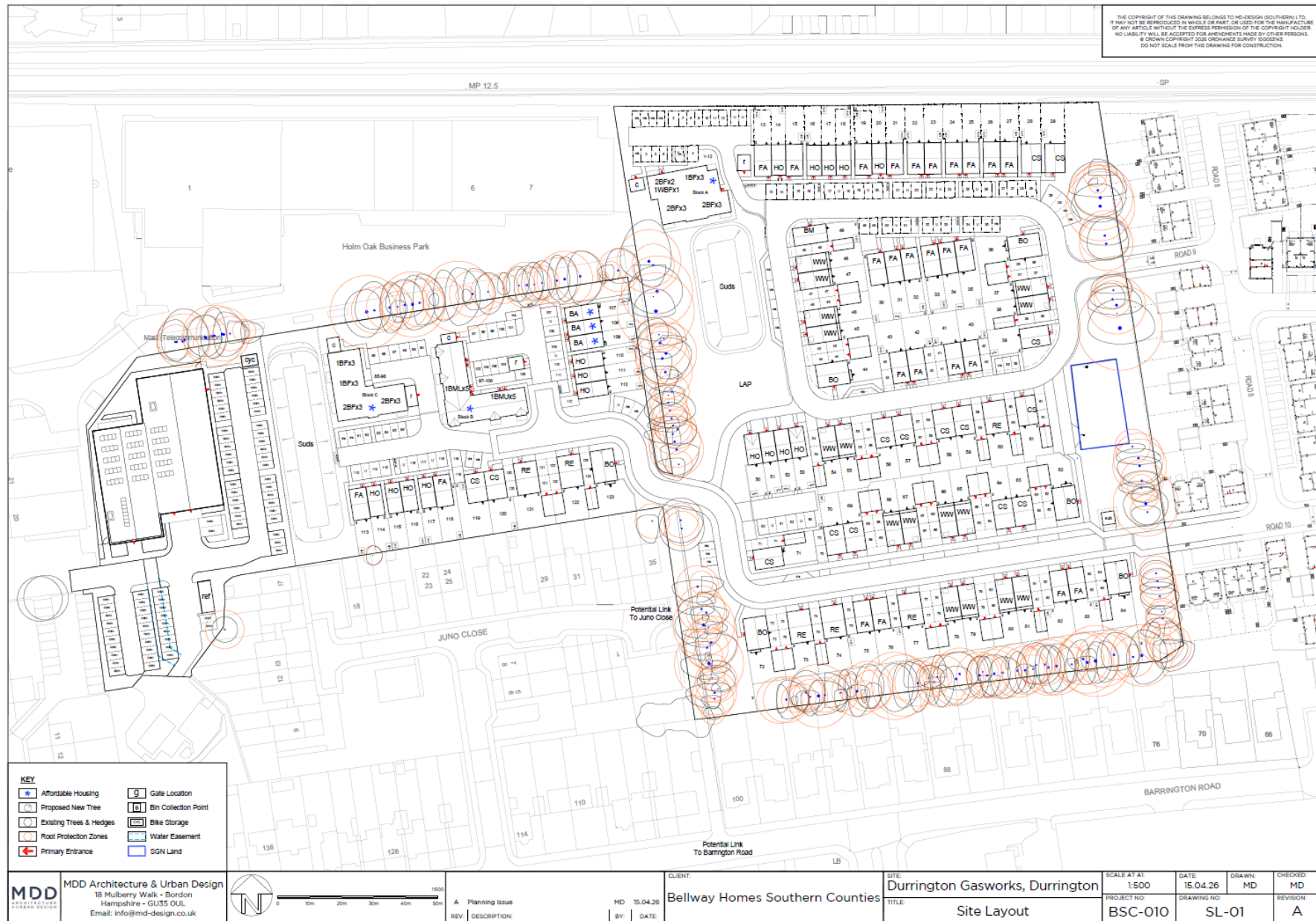


Figure 1: Site Layout (MDD Architecture & Urban Design)

2 Sustainability Policy Review

2.1 National Planning Policy

The National Planning Policy Framework December 2024 (NPPF)

2.1.1 The NPPF Section 2 states that the purpose of the planning system is to contribute to the achievement of sustainable development, and it includes three overarching objectives 'to be pursued in mutually supportive ways':

- An economic objective, contributing to a strong, responsive and competitive economy;
- A social objective, supporting vibrant and healthy communities and;
- An environmental objective, protecting and enhancing our natural, built and historic environment.

2.1.2 As such, the NPPF at its heart contains a 'presumption in favour of sustainable development'. Emphasising the need to achieve well designed places, the NPPF states that "*Good design is a key aspect of sustainable development, creates better places in which to live and work and helps make development acceptable to communities*".

2.1.3 The NPPF sets out a number of principles which should underpin both plan-making and decision-taking, and of which many are particularly relevant to this document. In this context, planning should:

- Promote healthy and inclusive places that encourage social interaction, enhance healthy lifestyles, and which are safe and accessible;
- Seek to secure a high-quality of design and a good standard of amenity for occupants;
- Support the transition to a low-carbon future, avoid increased vulnerability to climate change impacts, take account of flood risk and coastal change and seek to reduce greenhouse gas emissions. Plans should include a positive strategy to help increase the use and supply of renewable and low carbon energy;
- Help conserve and enhance the natural environment, achieve net gains in biodiversity and reduce the impact of all forms of pollution;
- Plan and manage development to make full use of public transport, walking and cycling, and take into account the need to ensure an adequate provision of spaces for charging plug-in and other ultra-low emission vehicles;
- Support the expansion of electronic communications networks, including next generation mobile technology (such as 5G) and full fibre broadband connections, which are seen as essential for economic growth and social wellbeing.

The Climate Change Act

- 2.1.4 The Climate Change Act 2008 is the basis for the UK's approach for tackling and responding to climate change. It originally set a binding target to reduce the UK's carbon emissions by at least 80% in 2050 from 1990 levels. In June 2019, this target was replaced with achieving net zero emissions by 2050.

Building Regulations

- 2.1.5 *Approved Document L: Conservation of Fuel and Power 2021 Edition*, which includes a Volume 1 for dwellings and a Volume 2 for buildings other than dwellings, came into force in June 2022. It sets out the Building Regulation standards for energy performance in new developments, placing a greater emphasis on reducing primary energy use, in addition to achieving carbon and fabric efficiency targets, compared to the previous standards. The tightening of fabric energy efficiency standards, air tightness and carbon performance targets are accompanied by updated calculation and modelling requirements within the compliance mechanism (SAP10.2 for dwellings and SBEM or other approved software tools for buildings other than dwellings).
- 2.1.6 *Approved Document F: Ventilation*, which also includes a Volume 1 for dwellings and a Volume 2 for buildings other than dwellings, details requirements for maintaining indoor air quality. It places an emphasis on managing ventilation to ensure that the increased air tightness of new buildings as required by Approved Document L does not impact in internal air quality.
- 2.1.7 These documents have been joined by *Approved Document O: Overheating* which has been put into place to limit overheating risk in new residential buildings. It expands on the provision in the previous Approved Document L and requires the use of passive methods where feasible. Compliance can be demonstrated through a prescriptive or thermal simulation compliance path.
- 2.1.8 *Approved Document S: Infrastructure for Charging Electric Vehicles (December 2021)* details regulations for the installation of electric vehicle charging points and cable routes. Requirement S1 from Part S of Schedule 1 and Regulation 44D of the Building Regulations states that every new home with an associated parking space must have access to an EV charging point.
- 2.1.9 Where the building is not residential or is a mixed-use building with more than 10 parking spaces, one of these must have access to one electric vehicle charge point and cable routes must be installed for a minimum of one fifth of the total number of remaining parking spaces.
- 2.1.10 Water efficiency targets for new dwellings are driven by Approved Document G of the Building Regulations 2015 covering Sanitation, Hot Water Safety and Water Efficiency.
- 2.1.11 Within a domestic setting, the requirement is to limit water use to either 125 litres per person per day or, if required by the planning permission, an enhanced standard of 110 litres per person per day.
- 2.1.12 No specific Building Regulations require limits to water use in a non-domestic setting, although in practice there are frameworks and guidance from professional bodies that recommend different approaches depending on the nature of the building.

The Future Homes and Building Standard

- 2.1.13 On 24 March 2026, regulations were laid in Parliament to amend the Building Regulations 2010 and the Building (Registered Building Control Approvers etc.) (England) Regulations in order to implement the Future Homes and Buildings Standards. Updated Approved Documents, which provide the statutory guidance accompanying the Building Regulations, were also published.
- 2.1.14 The Future Homes and Buildings Standards will make sure that new homes and non-domestic buildings are future-proofed with low carbon heating and high levels of energy efficiency. Homes and buildings constructed to these standards will not require retrofitting to become zero carbon in use once the electricity grid is fully decarbonised.
- 2.1.15 The regulations and amended guidance will come into force on 24 March 2027 (for non-higher-risk building work) followed by a 12 month transition period. For such building work to be completed to the *current* Part L (2021) standards, relevant Building Regulations documents will need to be submitted to the relevant authority by 24 March 2027 and construction will need to commence by 24 March 2028 (unless other transitional provisions apply).
- 2.1.16 An updated version of the Standard Assessment Procedure (SAP), known as SAP 10.3, will soon be available as an approved calculation methodology to demonstrate compliance with the FHS.
- 2.1.17 It is then expected that the new Home Energy Model (HEM) will be available as an approved calculation methodology later in 2026. Once HEM is approved, it will be possible to use either HEM or SAP 10.3 to demonstrate compliance with the FHS during a 'dual running' period of approximately 24 months, after which the SAP will be phased out.

2.2 Local Planning Policy

Worthing Borough Council Local Plan 2020-2036 (Adopted March 2023)

2.2.1 The *Worthing Borough Council Local Plan 2020-2036 (Adopted March 2023)* sets out the Council's spatial vision, key objectives and overall principles for development in the borough. It forms the main basis for assessment in planning terms and this Statement has therefore been designed to address its requirements.

2.2.2 Policy extracts from the Local Plan which are of most relevance to this document are provided within the following table:

Policy	Extract
SP2	Climate Change A comprehensive and integrated approach to addressing climate change will be taken, consisting of the following elements: <u>Carbon Reduction</u> a) Development proposals are expected to reduce the amount of energy used in construction and operation of buildings and improve energy efficiency, including retrofitting existing properties, to contribute to achieving zero carbon emissions. b) The Council will support and promote the creation of low carbon heating/ cooling networks and the delivery of renewable energy schemes. c) Developments should prioritise active travel such as walking, cycling and public transport to reduce reliance on the private car and facilitate car free lifestyles. d) Follow the waste hierarchy to minimise, reuse, and recycle waste during the construction phase and to encourage greater levels of recycling over the lifetime of the development. <u>Maximising Carbon Sequestration</u> e) Incorporate green infrastructure such as street trees and other vegetation into the public realm to support rainwater management through sustainable drainage, reduce exposure to air pollution, moderate surface and air temperature and increase biodiversity. f) Achieve an overall net gain for biodiversity commensurate with the scale of the development, including a positive contribution to the habitat network through habitat protection, creation and enhancement. g) Maintain the current level of tree canopy cover across the borough and seek opportunities to increase appropriate species of woodland cover. <u>Climate Change Adaptation and Mitigation</u> h) Development must be designed to adapt and mitigate the impacts of climate change and reduce vulnerability, particularly in terms of overheating, flood risk and water supply. i) Ensure buildings and infrastructure are designed to adapt to a changing climate, making efficient use of water, reducing impacts from natural hazards like flooding and heatwaves, while mitigating against and avoiding contributing to the urban heat island effect. This should include maximising opportunities for both natural heating and ventilation. j) The Council will seek adaptation and mitigation measures which improve the resilience of communities, reduce inequality and bring a range of social benefits. k) Development must not compromise land that is required to deliver towards a nature recovery network.
SP3	Healthy Communities a) New development must be designed to achieve healthy, inclusive and safe places, which enable and support healthy lifestyles and address health and well-being needs in Worthing. In order to maximise opportunities to promote healthy lifestyles, where appropriate, new development must: (...)

Policy	Extract
	iii. provide high quality and energy efficient homes within an attractive environment, (...) v. improve environmental sustainability resilience and reduce contributors to poor health and mitigating their risks, such as those associated with climate change, flooding, (...)
DM16	Sustainable Design a) All development (excluding householder applications) will be required to achieve the relevant minimum standards below unless superseded by national planning policy, Building Regulations or it can be demonstrated that it is not practicable, feasible or viable (in which case the minimum standard should be met as far as is possible). Applications for major development must be supported by a Sustainability Statement demonstrating that the minimum standards are met and where possible exceeded. All development is encouraged to exceed these minimum standards where possible. <u>Towards Zero Carbon Development</u> b) All new build housing will achieve a minimum 20% CO2 reduction compared to the Building Regulations Part L 2013 standard through energy efficiency measures, unless superseded by national policy or Building Regulations. Developers will be expected to provide evidence of the level of carbon reduction achieved in the dwellings through submission of SAP calculation reports at the design and built stages. c) New non-domestic buildings will achieve a 27% reduction in CO2 on average per building compared to the Building Regulations Part L 2013 standard unless superseded by national policy or Building Regulations. Applications for major development should demonstrate how the design and layout of the development has sought to maximise reductions in carbon emissions in line with the energy hierarchy. d) All new build housing should seek to achieve an A rating (with a minimum expectation of B rating) Energy Performance Certificate. New housing should achieve a minimum of a 'C' rating Energy Performance Certificate. e) All non-domestic properties (including those created through conversions) should achieve a 'B' rating Energy Performance Certificate. f) Non-residential development of at least 1,000 sqm floorspace should achieve BREEAM New Construction 'Very Good' as a minimum rating based on the latest BREEAM scheme. <u>Preventing Overheating</u> g) All new development should incorporate design measures where appropriate to minimise excessive solar gain and maximise opportunities for passive cooling through natural ventilation and other passive means to avoid contributing to the urban heat island effect and reduce vulnerability to overheating. Multifunctional green infrastructure should be integrated into public spaces to provide urban cooling and access to shady outdoor space. h) Major development proposals should reduce potential overheating and reliance on energy intensive air conditioning systems and demonstrate this in accordance with the cooling hierarchy. <u>Minimising Waste</u> i) All development will be required to follow the waste hierarchy to minimise the amount of waste disposed to landfill and incorporate facilities that enable and encourage high rates of recycling and re-use of waste and materials. j) New development should minimise construction waste and maximise the recycling and re-use of demolition materials.
DM17	Energy a) All new housing and major non-residential development should incorporate renewable and low carbon energy production equipment to meet at least 10% of predicted total energy requirements (after CO2 reductions from energy efficiency measures). b) All proposals for major development must demonstrate that the heating and cooling systems have been selected in accordance with the heating and cooling hierarchy and that the lowest carbon solution that is feasible is used. Applicants will be required to submit a feasibility assessment to provide a rationale for the chosen heating/cooling system. c) Applicants for major development within areas identified as heat network opportunity clusters should demonstrate how they have considered connecting to district heating networks where: i) they exist at the time of permission being granted;

Policy	Extract
	ii) the heat network route lies adjacent to the site; and iii) otherwise it is feasible and viable to do so. Alternatively, where a heat network route is planned but has not been delivered, sites adjacent to the planned heat network routes should consider being heat network ready to enable a future connection. d) The development of renewable, low carbon, or decentralised energy schemes will be supported and community initiatives encouraged where proposals: i) are located appropriately and do not cause an unacceptable impact on surrounding uses or the local environment, landscape character or visual appearance of the area (including the South Downs National Park), taking into account the cumulative impact of other energy generation schemes; and ii) mitigate any potential noise, odour, traffic or other impacts of the development so as not to cause an unacceptable impact on the environment or local amenity.
DM14	Digital Infrastructure The Council supports the expansion and improvement of digital infrastructure. Applicants will be required to meet the following requirements. Fibre to Premises a) Development proposals will be expected to provide access to superfast broadband, as a minimum, and full fibre connections where available. This will include provision for multiple infrastructure providers to access the site. (...)
DM15	Sustainable Transport & Active Travel (...) a) Worthing Borough Council will promote and support development that prioritises active travel by walking, cycling, Non-Motorised User routes and public transport, and reduces the proportion of journeys made by car. This will help to achieve a rebalancing of transport in favour of sustainable modes by: (...) iv) requiring new development to provide for an appropriate level of cycle parking, car parking and electric vehicle space allocations that takes into consideration the impact of development upon on-street parking residential amenity, highway safety and has regard to West Sussex County Council standards / guidance; (...)
DM21	Water Quality and Sustainable Water Use (...) e) All new residential development must achieve as a minimum the optional requirement set through Building Regulations for water efficiency that requires an estimated water use of no more than 110 litres per person per day.

Worthing Planning and Climate Change Checklist (Updated December 2023)

2.2.3 The Worthing Planning and Climate Change Checklist brings together the adopted local plan policies relating to climate change, and highlights the relevant minimum standards that developments are required to meet.

2.2.4 It should be noted that the Checklist includes a point of clarification on Local Plan Policy DM16 as described above in light of the updates to Approved Document L (2021) as follows:

In 2021 the Government published its response on proposed changes to Part L of Building Regulations. This has resulted in an interim uplift that came into effect on 15 June 2022. There are higher performance targets – CO2 emissions are reduced by 31% for dwellings and 27% for other buildings – and a new emphasis on low carbon heating systems. These are an interim step towards the Future Homes Standard and Future Buildings Standard that will arrive in 2025. This supersedes the minimum standards in parts b) and c) of Policy DM16 and these therefore no longer apply.

- 2.2.5 This development will therefore be designed to comply with the requirements of the Future Homes Standard (as discussed above, the regulations and amended guidance will come into force on 24 March 2027 (for non-higher-risk building work) followed by a 12 month transition period).

Additional Planning Policy Documents

- 2.2.6 Further guidance exists relating to transport, parking, flood risk and ecology. These are covered in more detail in the other reports accompanying this submission. This Statement does however summarise the outputs of these reports where relevant to give a rounded picture of the approach to sustainable design and construction issues.

3 Sustainable Energy Strategy for the Residential Units

3.1 Introduction

- 3.1.1 This section describes the design principles and concepts which will be applied at the proposed development to ensure that the dwellings achieve the Future Homes Standard, which will come into force on 24 March 2027 (for non-higher-risk building work) followed by a 12 month transition period. In doing so, the development will also exceed the requirements of Policies DM16 and DM17 of the Worthing Local Plan:
- The development will be 'zero carbon ready', and will be futureproofed to become operationally zero carbon over time as the Grid decarbonises;
 - Space heating demand will be reduced by:
 - Balancing solar gain against overheating risk;
 - Applying 'fabric first' principles and adopting a highly efficient thermal specification.
 - Operational energy use will be reduced by:
 - Installing high efficiency lighting and appliances;
 - Installing low carbon air source heat pumps.
 - Energy will be generated on site via roof integrated solar photovoltaic panels.
- 3.1.2 An illustrative thermal specification for the proposed development is presented in Section 3.10. This will be refined once energy calculations have been completed to ensure compliance with the emerging regulatory framework.
- 3.1.3 The commercial units on the development and their energy systems will be designed to achieve BREEAM New Construction 'Very Good' standard as required by Local Plan Policy DM16. This is discussed in Section 5.

3.2 The Energy Hierarchy

- 3.2.1 The Energy Hierarchy underpins the entire approach to building performance for this development, thus prioritising a reduction in the demand for energy as far as possible through thermally efficient, easily controlled, well designed and oriented buildings:

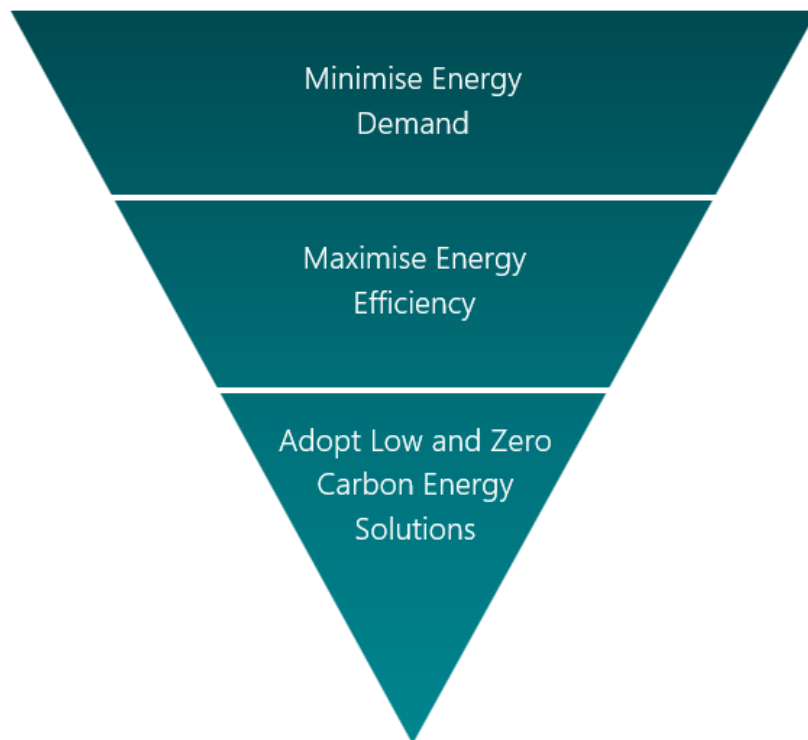


Figure 2: The Energy Hierarchy

3.3 Site Layout and Property Orientation

- 3.3.1 The proposed layout of the site has been developed with respect to identified spatial, topological and visual constraints, all of which need to be carefully considered.
- 3.3.2 Within these parameters, a large proportion of the units have a southerly orientation. This will ensure that these dwellings are able to benefit from the heat and light of the sun during the day, thus reducing the requirement to use fuels to perform the same function.
- 3.3.3 However, there is a balance to be struck between maximising solar gain and the risk of overheating. Section 6 of this Statement discusses approaches to addressing and managing this risk which align with the requirements of Building Regulations Approved Document O.

3.4 Highly Efficient Building Envelope

Thermal Insulation

- 3.4.1 A 'fabric first' approach to building specification will be established, ensuring the building envelope of each dwelling (including the wall, roof, floor, glazing and doors) will be highly energy efficient, minimising energy demand and increasing comfort.
- 3.4.2 Illustrative u-values for different thermal elements are provided in Table 1 in Section 3.10.

Thermal Bridging

- 3.4.3 Construction detailing in respect of insulation will seek to minimise the creation of thermal bridges which can have a significant impact on heat loss and thermal bypass.
- 3.4.4 Approved Document L (2021) includes best practice guidance and requirements for ensuring continuity of insulation, and 'Thermal Bridging Option 2' within that document is one recommended route to ensuring heat losses through thermal bridging are minimised.

Air Tightness

- 3.4.5 The air tightness of a building is important in reducing heat loss and in the prevention of draughts. The target for the development will be to ensure that the properties are built with a design air permeability level of less than $5\text{m}^3/\text{m}^2@50\text{Pa}$.
- 3.4.6 This will help reduce the size of the required heating systems, thus reducing energy use and carbon emissions. Other benefits include the reduction in the risk of interstitial condensation, improving the buildings' lifespan and reducing sound transmission through the building structure.

Controlled Ventilation

- 3.4.7 The drive for air tightness will need to be matched by correctly designed ventilation. This is vital for healthy, comfortable buildings as it dilutes and removes pollutants that can accumulate in a closed space. Excessive moisture in particular can otherwise be a significant problem.
- 3.4.8 The houses and the flats at the proposed development will benefit from natural ventilation via openable windows. This will enable rapid purges of air to maintain good levels of internal air quality when required.

3.4.9 It will also be necessary for the properties to include a form of mechanical extract ventilation:

- A mechanical extract ventilation unit will ensure adequate and controlled ventilation when as-designed air permeability is less than $5\text{m}^3/\text{m}^2@50\text{Pa}$, in line with the requirements of Approved Document F;
- The results of the accompanying Acoustic Assessment prepared by Ardent Consulting Engineers indicate that the railway line to the north and the commercial park to the west may have noise implications for a proportion of the dwellings. It will therefore be necessary to design those properties, and their ventilation systems, to ensure sufficient ventilation with certain windows closed in line with the requirements of Approved Document F and Approved Document O. The Acoustic Assessment should be referred to for full details in this regard.

3.4.10 A whole-house Mechanical Ventilation Heat Recovery (MVHR) system would be a suitable option for each of the houses on this development, recommended on the basis of the system's energy saving impact and its technical efficacy when dealing with the low levels of air permeability described above.

3.4.11 It is likely that the flats will each feature an exhaust air heat pump which combines heating, hot water and whole property ventilation (see Section 3.7 for further details).

3.4.12 The final choice of system will be dependent on detailed recommendations from the Applicant's M&E consultant and will be designed with due regard to the findings of the noise assessment. All ventilation will be in line with the requirements of Approved Document F.

3.5 Lighting, Fixtures and Fittings

3.5.1 All internal and external fixed electric lighting will be highly efficient to minimise lifetime energy use and associated emissions.

3.5.2 All appliances where installed will be high efficiency, further minimising the use of both electricity and hot water. There will be space in all gardens for clothes drying to discourage the use of tumble dryers.

3.5.3 Taps and shower fixtures and fittings that reduce hot water consumption with low and/or aerated flows will be specified; more detail in relation to potable water management is provided in Section 4.

3.6 Heating and Cooling System Feasibility Assessment

- 3.6.1 The high level Feasibility Assessment provided in Appendix A considers heating and cooling system and technology options for the development, in line with the Heating and Cooling Hierarchy described in Local Plan Policy DM17.
- 3.6.2 It has concluded that low carbon heat pumps and solar photovoltaic panels will be the most suitable solution for a development of this size in order for it to comply with the emerging requirements of the Future Homes Standard. This is discussed below.

3.7 Space and Water Heating

- 3.7.1 Each of the houses will be fitted with an air source heat pump (ASHP) to provide space and water heating. High quality, well installed ASHP units using lower flow temperatures in efficient buildings can deliver a Seasonal Coefficient of Performance (SCOP) which exceeds 320%. This significantly reduces both operational costs for occupiers and carbon emissions when compared to gas or direct electric alternatives.
- 3.7.2 Space constraints mean that it is likely that each of the flats will be fitted with an exhaust air heat pump (examples include the NIBE Fighter 470). Exhaust air heat pumps combine the efficient operation of a heat pump, providing space heating and hot water, with a dwelling's ventilation system. They are particularly suitable for thermally efficient new build flats and small homes, and they do not require space for an external heat pump unit.
- 3.7.3 Exhaust air heat pump systems have carbon reduction benefits due to the use of heat pump technology, although overall SCOPs are typically lower compared to ASHPs. Furthermore, as an individual dwelling system, exhaust air heat pumps do not suffer from the distribution losses which occur in traditional heating networks typically found within apartment buildings.
- 3.7.4 Both of these options align closely with the nationwide approach to the low carbon energy transition, setting the development on a trajectory to net zero emissions: the rapid expansion in renewable and low carbon energy supply within the Grid in recent years means that Grid electricity is considerably cleaner per unit than natural gas, and will continue to decarbonise over time:

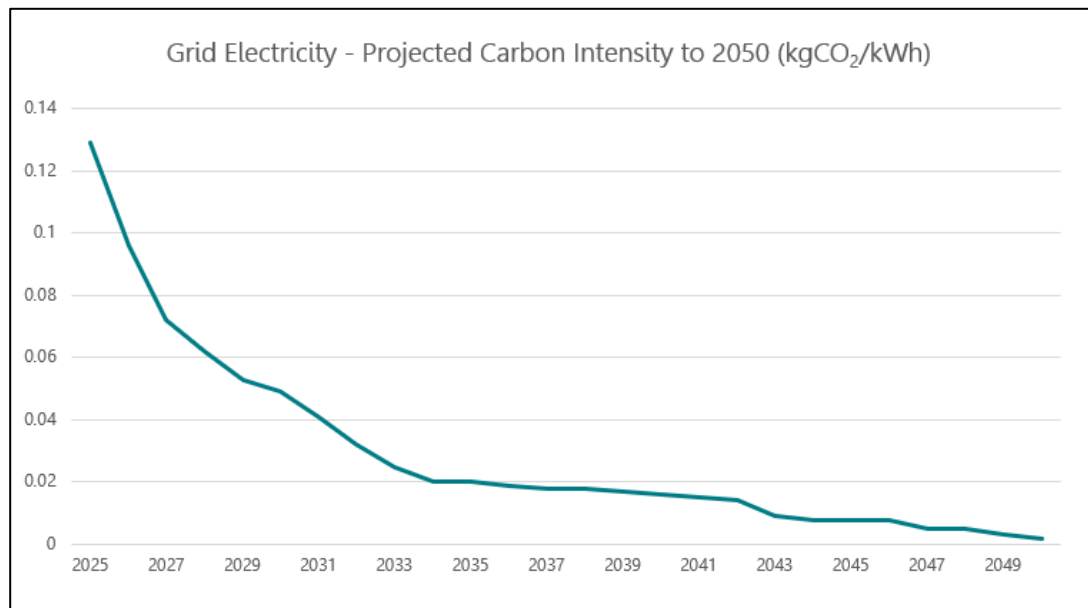


Figure 3: Projected Grid Decarbonisation
(Source: UK Government Green Book, Supplementary Guidance, November 2023)

3.8 Solar Photovoltaics

- 3.8.1 The site layout and roof plan have been designed to enable roof integrated solar photovoltaic (PV) panels to be installed to complement the heat pump solution.
- 3.8.2 The quantity and layout of the solar PV to be installed at each property will be determined once site and plot specific energy compliance calculations have been completed.

3.9 Control Systems

- 3.9.1 The dwellings will feature smart controls to help future residents control their energy use and maximise the efficiency of their heating systems. This is likely to include time and temperature zoned control for the heat pump systems. Clear and straightforward user guides will be provided to incoming residents as part of their welcome packs.

3.10 Building Energy Performance

- 3.10.1 The recent announcement confirming the arrival of the Future Homes Standard and the changes to Building Regulations has confirmed the timing and overall approach needed for compliance. It is still however too early to provide detailed energy compliance calculations, pending the launch of SAP10.3 and the Home Energy Model. It is therefore not possible to provide a final thermal specification for the dwellings.
- 3.10.2 Instead, Table 1 below provides illustrative levels of performance for the different building elements for the proposed development:

Element Type	Illustrative Specification for the Proposed Development
Roof / Sloped Roof	0.11 W/(m ² .K)
External walls	0.18 W/(m ² .K)
Ground floor	0.13 W/(m ² .K)
Glazing	1.2 W/(m ² .K)
Doors	1.0 W/(m ² .K)
Air permeability	5.0m ³ /m ² /hour@50Pa or less
Ventilation system	Natural ventilation with intermittent extract fans in houses. Exhaust air heat pump units in flats to provide whole house mechanical ventilation with heat recovery.
Heating system	Air source heat pump in houses. Exhaust air heat pump unit in flats.
Photovoltaic system	High efficiency panels on appropriate roof spaces.

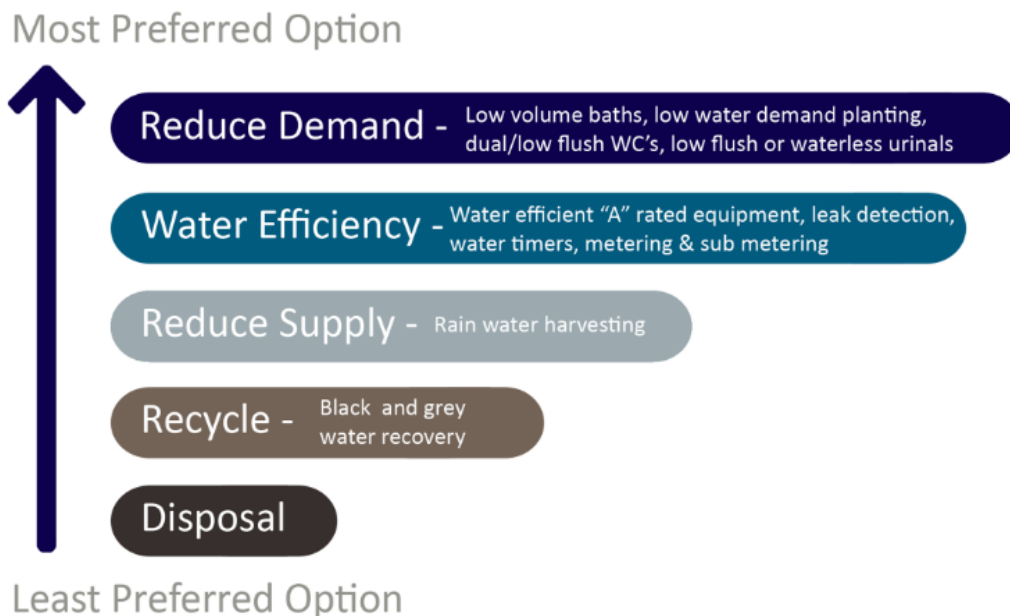
Table 1: Summary of Illustrative U-Values and Specifications

- 3.10.3 This specification will be refined and adapted as the application proceeds to ensure that each housetype and the development as a whole complies with the planning and regulatory framework in place at the point of determination.
- 3.10.4 At this point, energy performance calculations will be completed to demonstrate compliance with the required standards.

4 Water Efficiency Strategy for the Residential Units

4.1 The Water Hierarchy

- 4.1.1 Water efficiency becomes increasingly important in a changing climate with diminishing water resources.
- 4.1.2 Local Plan Policy DM21 includes a specific target for all new residential developments to achieve a water efficiency equivalent of 110 litres or less per person per day (l/p/d). This matches the enhanced standard described within Building Regulations Approved Document G.
- 4.1.3 By way of comparison, the national average for water consumption is around 143 l/p/d.
- 4.1.4 In order to achieve the 110l/p/d target, the management of water at the proposed development will follow the principles of the Water Hierarchy:



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Figure 4: The Water Hierarchy

4.2 Water Reduction Measures

- 4.2.1 Water efficient fixtures, fittings and appliances are installed as standard across all of the Applicant's developments to ensure that the target daily water use does not exceed 110 l/p/d, in line with prevailing regulatory standards.
- 4.2.2 While the actual specification varies at each development according to factors including product availability, two example Approved Document G Water Consumption Calculation Sheets are provided overleaf to demonstrate the impact of the Applicant's Group Level Specification in each case.
- 4.2.3 The final specification to be applied at this development will be confirmed at construction design stage, at which point the Approved Document G Water Calculator will be used to demonstrate that it will meet the required standard.

Category 'A' House Type Water Efficiency Calculation

Installation Type	Unit of Measure	Capacity/Flow rate (1)	Use Factor (2)	Fixed use (litres/person/day) (3)	Litres/person/day = [(1)x(2)] + (3) (4)
WC (single flush)	Flush Volume (litres)		4.42	0.00	0
WC (dual flush)	Full flush Volume (litres)	6	1.46	0.00	8.76
	Part flush Volume (litres)	3	2.96	0.00	8.88
WC (multiple fittings)	Average effective flushing Volume (litres)		4.42	0.00	0
Taps (excluding kitchen/utility room taps)	Flow rate (litres/min)	4.00	1.58	1.58	7.90
Bath (where shower also present)	Capacity to overflow (litres)	155.00	0.11	0.00	17.05
Shower (where bath also present)	Flow Rate (litres / minute)	6.00	4.37	0.00	26.22
Bath Only	Capacity to overflow (litres)		0.50	0.00	0
Shower Only	Flow Rate (litres/minute)		5.60	0.00	0
Kitchen/Utility room sink taps	Flow rate (litres/minute)	6.00	0.44	10.36	13.00
Washing Machine	(Litres/kg dry load)	8.17	2.1	0.00	17.157
Dishwasher	(Litres/place setting)	1.25	3.6	0.00	4.5
Waste disposal unit	(Litres/use)	☐ Present	3.08	0.00	0
Water Softener	(Litres/person/day)		1.00	0.00	0
(5)	Total Calculated use (litres/person/day) = SUM(column 4)				103.47
(6)	Contribution from greywater (litres/person/day)				0
(7)	Contribution from rainwater (litres/person/day)				0
(8)	Normalisation factor				0.91
(9)	Total internal water consumption = [(5)-(6)-(7)]x(8) (litres/person/day)				94.15
(10)	External water use				5.0
(11)	Total water consumption (Building Regulation 17.K) = (9)+(10)(litres/person/day)				99.2

Installation Type	Make/Model (mandatory)	Litres/Person/Day
WC (dual flush)	Roca Basic Tank with AG valve (under window) 3/6 litre flush (A8901212A0)	17.64
Taps	Bristan - PISA Chrome Mixer (PS BAS C) + Bristan Flow Restrictor (ECO Tap4)	7.90
Baths (shower(s) present)	Roca Oslo Acrylic Bath 155 litre capacity (Z247998500)	17.05
Showers (bath(s) present)	Mira Minimal EV + 6l/m Flow Restrictor Supplied with product (1.1943.001)	26.22
Kitchen Taps	Leisure - Aquaspace Single Lever Tap Chrome (TAQPACE40CM) + Bristan Flow Restrictor (Eco Tap6)	13.00
Washing Machines		17.157
Dishwasher		4.5



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Figure 5: Illustrative Water Efficiency Calculation – Category A Housetype

Category 'M' House Type Water Efficiency Calculation

Installation Type	Unit of Measure	Capacity/Flow rate (1)	Use Factor (2)	Fixed use (litres/person/day) (3)	Litres/person/day = [(1)x(2)] + (3) (4)
WC (single flush)	Flush Volume (litres)		4.42	0.00	0
WC (dual flush)	Full flush Volume (litres)	6	1.46	0.00	8.76
	Part flush Volume (litres)	3	2.96	0.00	8.88
WC (multiple fittings)	Average effective flushing Volume (litres)		4.42	0.00	0
Taps (excluding kitchen/utility room taps)	Flow rate (litres/min)	3.75	1.58	1.58	7.51
Bath (where shower also present)	Capacity to overflow (litres)	155.00	0.11	0.00	17.05
Shower (where bath also present)	Flow Rate (litres / minute)	8.00	4.37	0.00	34.96
Bath Only	Capacity to overflow (litres)		0.50	0.00	0
Shower Only	Flow Rate (litres/minute)		5.60	0.00	0
Kitchen/Utility room sink taps	Flow rate (litres/minute)	6.00	0.44	10.36	13.00
Washing Machine	(Litres/kg dry load)	8.17	2.1	0.00	17.157
Dishwasher	(Litres/place setting)	1.25	3.6	0.00	4.5
Waste disposal unit	(Litres/use)	☐ Present	3.08	0.00	0
Water Softener	(Litres/person/day)		1.00	0.00	0
(5)	Total Calculated use (litres/person/day) = SUM(column 4)				111.82
(6)	Contribution from greywater (litres/person/day)				0
(7)	Contribution from rainwater (litres/person/day)				0
(8)	Normalisation factor				0.91
(9)	Total internal water consumption = [(5)-(6)-(7)]x(8) (litres/person/day)				101.75
(10)	External water use				5.0
(11)	Total water consumption (Building Regulation 17.K) = (9)+(10) (litres/person/day)				106.8

Installation Type	Make/Model (mandatory)	Litres/Person/Day
WC (dual flush)	Roca Basin Tank with AG valve (under window) 3/6 litre flush (A8901212A0)	17.64
Taps	Cloaks - Bristan - PISA Chrome Small Mixer (PS SMBAS C) + Bristan Flow Restrictor (ECO Tap3) / Basin - Bristan - PISA Chrome Mixer (PS BAS C) + Bristan Flow Restrictor (ECO Tap4)	7.51
Baths (shower(s) present)	Roca Oslo Acrylic Bath 155 litre capacity (Z247998500)	17.05
Showers (bath(s) present)	Mira Minimal EV (1.1943.001) + Bristan Flow Restrictor (ECO SHW 08)	34.96
Kitchen Taps	Leisure - Aquapace Single Lever Tap Chrome (TAQPACE40CM) + Bristan Flow Restrictor (ECO Tap6)	13.00
Washing Machines		17.157
Dishwasher		4.5



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Figure 6: Illustrative Water Efficiency Calculation – Category M Housetype

5 Sustainability Strategy for the Commercial Units

5.1 Introduction

- 5.1.1 The proposals for the development include commercial units which will be located in the western parcel of the Martlets Way Site.
- 5.1.2 This commercial element will be Planning Use Class B2-B8 and it is currently proposed that the space will be divided into 10 separate units. However, the final configuration will be determined by the required end use which is to be confirmed. As such, the planning application is seeking approval for commercial units built to shell and core only.

5.2 BREEAM Assessment

- 5.2.1 Local Plan Policy DM16 requires all new non-residential development of at least 1,000sqm to achieve BREEAM New Construction 'Very Good' standard as a minimum.
- 5.2.2 BREEAM (Building Research Establishment Environmental Assessment Method) is an assessment tool for masterplanning non-residential projects, infrastructure and building. It rewards designs and operations that take positive steps to minimise environmental impact within a series of specific categories.
- 5.2.3 A BREEAM Pre-assessment has therefore been completed for the proposed commercial space using the BREEAM UK New Construction V6.1 methodology. This determines the feasibility of achieving a BREEAM New Construction Very Good grade.
- 5.2.4 The Pre-Assessment Report, produced by Enevo, includes a summary of the key actions which must be undertaken to achieve the BREEAM Certification required. The implementation of these requirements will be assessed and evaluated during the design and construction process, and once the building is completed.
- 5.2.5 The Report concludes that, based on current plans, a 'Very Good' grade is achievable for the development.
- 5.2.6 The Pre-Assessment Report should be referred to for full details, including the BREEAM assessment process, the key actions to be implemented and the evidence to be submitted.

6 Climate Resilience and Adaptation

6.1 Introduction

- 6.1.1 The ability of the development to adapt to anticipated future changes in the climate is an important aspect of its longevity, and ultimate habitability. The principle of adaptation applies to both the built and external environment, and indeed how they interact.
- 6.1.2 Policy SP2 of the Local Plan requires new developments to be adaptable and responsive to changing environmental conditions while Policy DM16 requires overheating risk to be addressed.

6.2 Reducing Overheating Risk Through Design

- 6.2.1 The risk of overheating living spaces is of increasing concern, given predictions of future climate. Approved Document O details requirements for mitigating this risk and methods for demonstrating compliance, including the use of the *CIBSE Guide TM59 Design Methodology for the Assessment of Overheating Risk in Homes* (CIBSE, June 2017) or the *CIBSE Guide TM52: Limits of Thermal Comfort Avoiding Overheating in European Buildings* (CIBSE, 2013) for non-residential development.
- 6.2.2 Overheating analysis will be undertaken for all the properties on the site. As discussed in Section 3.4, a proportion of the dwellings may be affected by noise from the railway line to the north and the commercial park to the west, and this will have an impact on their ventilation strategy. Understanding the risks using TM59 compliant tests and providing appropriate mitigation is discussed in the Acoustic Assessment. The final design solutions will be dependent on detailed recommendations from the Applicant's M&E consultant and will be fixed at the time of construction.
- 6.2.3 Any intervention will comply with Approved Document O requirements, including the options for reducing overheating risk:
- Limiting solar gains:
 - Fixed shading devices such as shutters, external blinds, overhangs or awnings;
 - Glazing design including size, orientation, glass g-value and depth of window reveal;
 - Shading provided by adjacent permanent structures.
 - Removing excess heat:
 - Opening windows and ideally cross ventilation;
 - Ventilation louvres in external walls;
 - A mechanical ventilation system;
 - A mechanical cooling system as a last resort.
- 6.2.4 These options align with the priority order set out in the Passive Cooling Hierarchy in the Local Plan.

1. Passive design to minimise unwanted heat gain and manage heat – for example by using building orientation, shading, a well-insulated and air tight building envelope, high levels of thermal mass and energy efficient lighting and equipment.
2. Passive/natural cooling – using outside air to ventilate and cool a building without the use of a powered system, for example by maximising cross ventilation (single aspect developments are generally discouraged), passive stack ventilation, night-time cooling and/or ground coupled passive cooling.
3. Mixed mode cooling with local mechanical ventilation/cooling provided where required to supplement the above measures using (in order of preference):
 - a. Low energy mechanical cooling (e.g. fan-powered ventilation with/without evaporative cooling or ground coupled cooling)
 - b. Air conditioning (not a preferred approach as these systems are energy intensive)
4. Full building mechanical ventilation/cooling system using (in order of preference):
 - a. Low energy mechanical cooling
 - b. Air conditioning

Figure 7: Passive Cooling Hierarchy (Worthing Borough Local Plan 2023)

6.3 The Multiple Benefits of Open Space and Vegetation

6.3.1 The landscape strategy includes the retention of the existing trees along the eastern and southern boundaries of the SGN and Nib parcels, and the northern boundary of the Martlets Way parcel. Access to the Martlets Way parcel will be taken to the south of the connection point with the SGN site, avoiding the ransom strip, and the majority of the hedgerow along the intervening boundary will be retained. An area of green space within the residential parcel will provide amenity space, while attenuation basins will provide opportunities for wetland marginal species.

6.3.2 This approach will provide multiple benefits in a changing climate:

- The retained trees and those planted as part of the landscape design will together provide shading in the summer months, reducing heat gain into dwellings and therefore reducing the need for mechanical cooling;
- Trees throughout the site will also help maintain a comfortable external environment in hot periods by providing shading in gardens and shared spaces;

- The selection of native, deciduous tree species will ensure this shading is most effective during the summer months when it is needed, but will allow sunlight to filter through in the winter, when the trees are leaf-free;
- The areas of greenspace and planting throughout the site will reduce any urban heat island effect;
- The trees, hedges and shrubs will contribute to the reduction of wind speeds, improving comfort levels by reducing air infiltration (draughts) into buildings on windier days;
- Vegetation sequesters carbon dioxide and improves air quality through dry deposition of gases (including NO_x, SO_x, PM₁₀ and O₃).

6.3.3 The required 10% net gain will be achieved through a combination of on-site enhancements and off-site measures. The Ecological Assessment should be referred to for full details.

Managing Water in a Changing Climate

- 6.3.4 The proposed development will increase the amount of hard standing (roofs, roads, pavements) and therefore the amount of surface water run-off. Furthermore, rainfall levels in 20-30 years' time are expected to be very different to current levels, not necessarily in annual total volume, but with respect to the rainfall distribution throughout the year and the number of heavy downpours and storm events.
- 6.3.5 The integration of different SuDs features into the landscape layout will therefore be pivotal in its development, in order to enable the necessary storage volumes associated with a 1 in 100 year storm event, plus a 40% allowance for the impacts of climate change.
- 6.3.6 The Flood Risk and Surface Water Assessment which accompanies this application provides further detail in relation to the level of flood risk and the management of surface water flows at the proposed development and this should be referred to for full details in this regard.

7 Reducing Carbon Emissions from Transport

7.1 Accessibility and Sustainable Transport

- 7.1.1 The Transport Statement which accompanies this application demonstrates that the site is well situated to make the most of existing road networks and public transport routes.
- 7.1.2 A Travel Plan Statement has also been developed for the site which sets out a suite of measures which will be put into place to promote more sustainable travel (walking, cycling and public transport) with the aim of reducing reliance on the private car.
- 7.1.3 To encourage cycling, all the proposed properties will include a secure and weatherproof means of cycle storage in line with local policy requirements.

7.2 Provision of Electric Vehicle Charging Points

- 7.2.1 The power network will be designed and managed to provide the level of EV charging infrastructure required by Approved Document S. This will include a dedicated EV charging point for every dwelling with associated parking, and the required EV charging points and cabling at the car parking areas associated with the apartments and the commercial units.

7.3 Provision of Fibre to the Premises

- 7.3.1 The availability of high-quality, reliable broadband infrastructure is increasingly viewed as critical to the functioning of a development and its continued attractiveness to incoming residents.
- 7.3.2 Indeed, such provision can facilitate better home working, enabling clear video calling and effective file sharing, which can contribute to a reduction in commuting.
- 7.3.3 Better quality, reliable internet connections for all have wider social ramifications too – reducing the risk of exclusion, a lack of access to services (which are increasingly internet based) and enabling people to better connect with society as a whole.
- 7.3.4 The provision at the development will align with Approved Document R Volume 1 (2022 Edition) which sets out requirements to ensure that, during construction, new homes are installed with the fastest broadband connections available within a cost cap. Where a gigabit-capable connection is not possible within the defined cost cap, it requires that new homes are future-proofed with physical infrastructure to support gigabit-capable connections when they become available.

8 Materials and Sustainable Waste Management

8.1 Introduction

- 8.1.1 Local Plan Policy SP2 requires that development proposals seek to reduce the amount of energy used in the construction of buildings. It also requires developers to follow the waste hierarchy to minimise, reuse and recycle waste during the construction phase and to encourage greater levels of recycling over the lifetime of the development.
- 8.1.2 This section therefore discusses how the construction design process will include a focus on sustainable building materials to reduce the embodied energy and carbon of construction, and how construction and operational waste will be managed.

8.2 The Waste Hierarchy

- 8.2.1 Waste generation, storage, treatment and disposal will be managed in accordance with the Waste Hierarchy in line with local policy requirements:

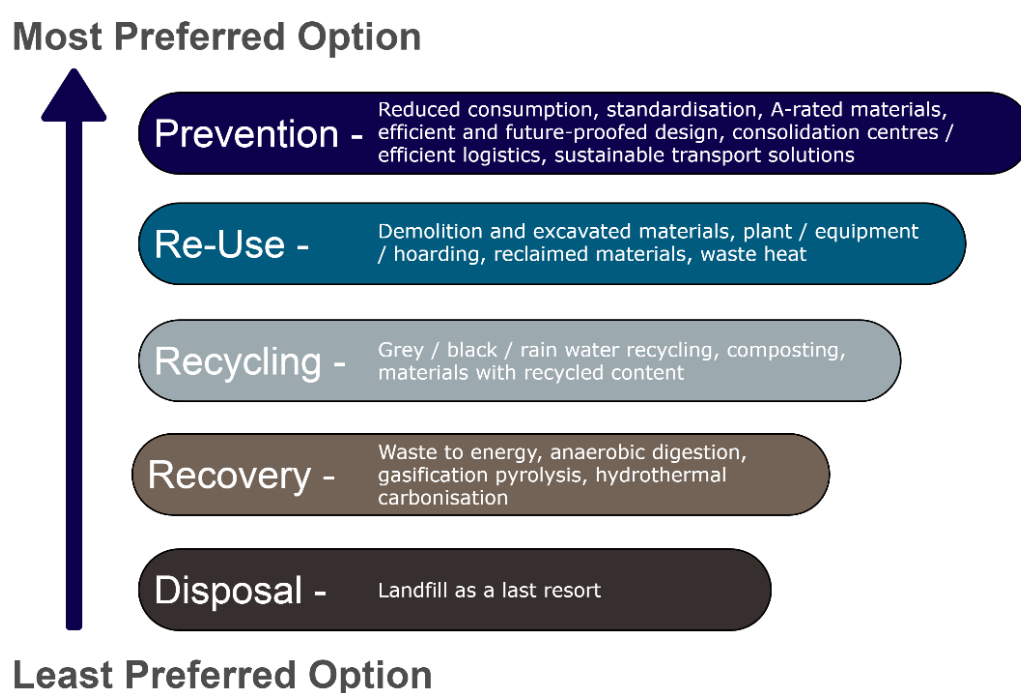


Figure 8: The Waste Hierarchy

8.3 Sustainable Building Materials

- 8.3.1 Materials to be used on the development will be sourced using suppliers that have recognised environmentally focused accreditations and management systems such as ISO:14001. Materials with low embodied carbon will be prioritised, all timber will be sustainably sourced with full FSC or PEFC accreditation, and materials derived from recycled or reused products will be specified where appropriate.
- 8.3.2 Local suppliers of materials will be used where viable, and the homes will be designed with a palette of materials that is both appropriate and in keeping with the local architectural vernacular. As such the form of construction will not require the use of unusual materials, those with significant environmental impact or those that require significant off-site processing and development before use on site.

8.4 Sustainable Waste Management

Construction Waste

- 8.4.1 Waste will be sustainably managed throughout the development process.
- 8.4.2 During the design stage, opportunities for the on-site reuse of materials arising from site clearance and preparations will be identified. For example, the detailed design of gardens and other outdoor spaces will take account of retained soils to ensure they can be incorporated into the site.
- 8.4.3 Where earth moving activity is needed, excavated materials will be retained on site where possible and, during the process of movement of that material, any storage will follow best practice guidelines to reduce loss to the weather and/or erosion.
- 8.4.4 A Waste Management Plan (WMP) will be produced ready for the construction stage which will require all contractors to implement strict waste management processes on site, including:
- Identifying a key individual responsible for the delivery of the WMP;
 - Providing site induction and training to all staff;
 - Obtaining all appropriate licences/permits from contractors to confirm contractual requirements;
 - Identifying waste streams, planning for their management and setting targets for waste reduction;
 - Identifying suitable locations for the efficient separation and storage of waste prior to removal from site to encourage higher levels of recycling;
 - Identifying opportunities for the on-site reuse of materials
 - Re-using scaffolding, hoarding and other such materials on subsequent construction projects;
 - Measuring and reporting waste disposal, reuse and recycling.

- 8.4.5 The WMP will be a live document that will be updated throughout the design and construction process to reflect and respond to progress on site.
- 8.4.6 In addition, it will be a requirement that any contractor operating on the site commits to the Considerate Constructors Scheme and aims to achieve best practice under assessment. This will help further minimise the impact on the surrounding area and neighbours to the site.

Operational Waste

- 8.4.7 Property occupants will be encouraged to manage waste sustainably and this has been considered in the development design. For example, the houses will have a private rear garden area with direct external access to provide sufficient space for bins and composting facilities, keeping waste storage away from the public domain. Discrete refuse collection points will also be provided along any shared private drives in line with regulations.
- 8.4.8 Facilities will be easy to access and will be designed in line with the collection regime of the council.
- 8.4.9 Refuse collection arrangements for the commercial units will typically be determined through commercial waste removal contracts.

9 Summary

- 9.1.1 This *Energy & Sustainability Statement* has been commissioned by Bellway Homes Limited (South London) to describe how the proposed development at Durrington Gasworks (Elizabeth Square Phase 2) in Worthing, West Sussex incorporates sustainable construction principles.
- 9.1.2 Throughout the Statement, national and local planning policy objectives and standards have been addressed to demonstrate the Applicant's commitment to these issues.
- 9.1.3 In particular, the Statement provides as much detail as is possible at this stage in the planning process to demonstrate that the proposals meet the relevant requirements of the *Worthing Borough Council Local Plan 2020-2036 (Adopted March 2023)* and current Building Regulations while looking ahead to the Future Homes Standard:
- The development will be 'zero-carbon ready' in line with emerging requirements of the Future Homes Standard;
 - There will be no natural gas connection to the site;
 - The dwellings will be highly energy efficient, adopting a fabric first approach. They will be orientated to maximise solar gain where possible;
 - Heating and hot water will be supplied via low carbon air source heat pumps;
 - Solar photovoltaic panels will be installed as required by the Future Homes Standard;
 - The development will employ a combination of highly efficient fixtures, fittings and appliances to reduce domestic water use to achieve the 110 l/p/d target;
 - The non-residential development will achieve the 'Very Good' BREEAM rating required;
 - The development will be designed to adapt to a changed climate:
 - Overheating will be managed through a combination of passive design features and mechanical ventilation;
 - The retention of existing trees and additional planting will provide more comfortable microclimates in warmer weather;
 - The landscape design will provide multi-functional benefits, supporting biodiversity and enhancing the overall aesthetic;
 - Surface water will be managed via the integration of SuDS into the development;
 - Electric vehicle charging points will be provided in line with Approved Document S requirements;
 - Construction and operational waste will be managed according to the principles of the Waste Hierarchy with a focus on waste prevention, re-use and recycling.
- 9.1.4 This design approach maximises the site's assets and layout in relation to sustainable design, creating an attractive, environmentally sound development. Further work will be necessary to ensure continued compliance throughout the latter planning phases and as construction progresses.

10 Appendix A – Summary Heating and Cooling System Summary Feasibility Assessment

10.1.1 This development will not be connected to the mains gas network. This Summary Feasibility Assessment therefore considers alternative systems and technologies for the development, in line with the Heating and Cooling Hierarchy as described in Local Plan Policy DM17 and shown below in Figure 8:

Systems:

- Worthing Heat Network
- Site wide network
- Building wide network
- Individual systems

Technologies:

- Air source heat pumps
- Ground source heat pumps
- Biomass heat and power
- Solar photovoltaic
- Solar thermal

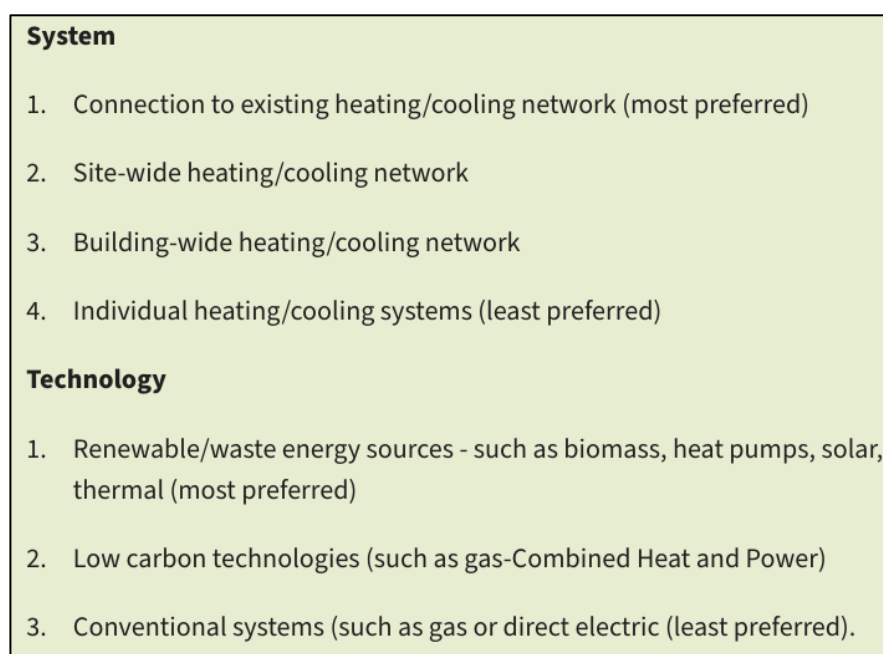


Figure 9: Heating and Cooling Hierarchy (Worthing Borough Local Plan 2023)

Systems

Worthing Heat Network

- 10.1.2 Policy DM17 of the Local Plan requires applicants for major developments within areas identified as heat network opportunity clusters to demonstrate how they have considered connecting to the networks available.
- 10.1.3 The heat network opportunity clusters are focused around the Worthing Heat Network being developed in Worthing town centre, which is some distance from the proposed site in Goring-by-Sea. Connection is therefore not viable on either technical or financial grounds.

Site Wide Network vs Individual Systems

- 10.1.4 The introduction of a site wide heating/cooling network is not considered viable for this site:
- The infrastructure costs required would be disproportionately high for a relatively low-density development;
 - Technical viability of a decentralised system would be compromised given the relatively low heat demand from a small number of highly thermal efficient units (and the associated heat profiles this generates);
 - Low density developments of this kind are not typically subject to long-term agreements which lock residents into one heat network. There are therefore concerns about the market viability and attractiveness to residents of such an arrangement and the appropriate consumer protections that would be required.

Technologies

Ground Source Heat Pumps

- 10.1.5 Ground source heat pumps have been discounted for this development: practical and cost implications of borehole drilling on this site make this option unfeasible. Air source heat pump solutions as described below offer a far more manageable, cost-effective solution.

Biomass

- 10.1.6 There are many reasons why biomass is inappropriate in this location, including air quality concerns, supply chain reliability issues and on-site management costs. Biomass has therefore been discounted.

Air and Exhaust Air Source Heat Pumps

- 10.1.7 High quality heat pump systems can deliver efficiencies in excess of 300%. This significantly reduces both operational costs for occupiers and carbon emissions when compared to gas or direct electric baselines.

Solar Photovoltaics

- 10.1.8 Solar photovoltaic (PV) systems are technically possible and cost effective. PV has therefore been selected as the most appropriate renewable technology to complement the heat pump solution proposed.

Solar Thermal

- 10.1.9 Whilst solar thermal is technically feasible, photovoltaic panels have been identified as the most appropriate solar technology for this development.

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