

hayle harbour :: regeneration

South Quay

Development Proposal for South Quay/Foundry Yard Hayle Harbour

December 2010



Sustainability and Energy Statement

QA

ING Red UK (Hayle Harbour) Ltd

Sustainability & Energy Statement

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1.0 Executive Summary

- 1.1 Environmental Perspectives LLP were commissioned by ING Red UK (Hayle Harbour) Ltd to prepare this Sustainability & Energy Statement for the proposed mixed-use development at South Quay and Foundry Yard, Hayle Harbour, within Cornwall County.
- 1.2 The purpose of the Sustainability & Energy Statement is to provide an independent verification that the design of the proposed development is in accordance with sustainable objectives of relevant planning policy at all levels and is an example of best practice in sustainable design. This Statement reports the performance of the proposed development using local, regional and national level guidance on sustainability indicators from both government and industry.
- 1.3 It is important that the proposed development at South Quay and Foundry Yard, Hayle Harbour contributes to the County's sustainability aims, fits in well with the environmental and sustainability objectives of other development taking place within the wider area, as well as ensuring that regional and national objectives for sustainable development are being met.
- 1.4 This sustainability statement shows that the proposals for ING Red UK (Hayle Harbour) Ltd are meeting a number of key policy objectives, responding to local needs and requirements and conforming to current best practice. To implement and monitor the sustainability initiatives proposed for the development, the team are undertaking a Code for Sustainable Homes (CSH) assessment of the residential dwellings, and a BREEAM assessment of the proposed retail elements. The CSH pre-assessment has identified a framework for the residential elements to achieve a CSH Level 4 rating and the BREEAM pre-assessment demonstrates a pathway for the commercial element will achieve a 'Very Good' rating based on a BREEAM Retail 2008 assessment tool. The team are committed to securing these target ratings and this will be monitored and verified throughout the detailed design phase by the process of the certified assessment.
- 1.5 This Sustainability & Energy Statement highlights the features and areas where the development is meeting best practice in the field of sustainable development, in particular with regards to the key sustainability issues of: energy, transport, water, materials, waste and site management, pollution, ecology and health and wellbeing.

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2.0 INTRODUCTION

- 2.1 Environmental Perspectives LLP were commissioned by ING Red UK (Hayle Harbour) Ltd (the applicant) to prepare this Sustainability & Energy Statement for the proposed development at South Quay and Foundry Yard, Hayle Harbour (the 'application site'), within Cornwall County.
- 2.2 This report presents the outcome of the sustainability appraisal of the proposed development and details the approach that the applicant and the design team have collectively taken towards achieving a high standard of sustainable development and environmental performance. This Statement outlines the features that have been incorporated into the design proposals and the measures that will be implemented during the construction and operation phases, which aim to reduce the environmental impact of the scheme and contribute positively to sustainable development.
- 2.3 The purpose of the Statement is to provide an independent verification that the design of South Quay and Foundry Yard, Hayle Harbour is in accordance with sustainable objectives of relevant planning policy at all levels and is an example of good practice in sustainable design. This Statement reports the performance of the proposed development using local, regional and national level guidance on sustainability indicators from both government and industry.
- 2.4 The Statement includes:
- A brief description of the proposed development;
 - A definition of sustainable development;
 - A summary of the relevant international, national, regional and local sustainable development policy drivers; and
 - An examination of the performance of the scheme in accordance with key sustainable policies at all levels, including the Regional Planning Guidance for the South West, the Cornwall Structure Plan, the South West Sustainability Checklist and the Penwith Local Plan.
- 2.5 A review of the proposed development's sustainability against set planning objectives and good practice identifies opportunities and constraints of both the application site and the proposals. By undertaking the sustainability appraisal at this stage in the design process, the potential to contribute positively to sustainable development is optimised. The Sustainability & Energy Statement, therefore, also provides a framework for the team to monitor the scheme's performance throughout its development.

THE PROPOSED DEVELOPMENT

Site Location and Extent

- 2.6 The application site comprises of approximately 4.48ha of predominantly vacant, previously developed brownfield land at South Quay within the town of Hayle on the north coast of Cornwall.
- 2.7 The application site has an extensive industrial history, with the town of Hayle originally functioning as a coal importing and ore exporting port. Subsequently, owing to the growing mining industry, the first modern quay was constructed (as the first major development at Hayle) in the 1800s, which expanded to include a successful copper smelter at Ventonleague (Copperhouse Creek).
- 2.8 Owing to its success, a canal was built to bring vessels right up to the works and additional land was purchased on both sides of the creek for further industrial use and housing for the workers. In addition, the smelting process generated large amounts of waste; this copper slag was manufactured into building material to the local area, which can be seen in many buildings in the town today.
- 2.9 In 1779, a small foundry and engineering works in the area (now known as Foundry) was established to supply the local mining industry. This flourished and the firm (Harvey & Co) was best remembered for producing beam engines, which served not only the Cornish mines, but were exported worldwide. In addition, the firm produced a range of products ranging from hand tools to ocean going ships.
- 2.10 The application site is now largely derelict, with small areas used for parking and vehicle access to the quaysides by fishermen. The majority of the site is open, unvegetated land, with small areas of sparse grassland along a narrow strip along the eastern margin of the quay, and sparse scrub with ruderal vegetation, which has colonised tipped material on the western side of the quay. The foundry car park site is a cleared area of land that is currently used as a pay & display car park.
- 2.11 Penpol Creek lies along the eastern boundary of the application site, beyond which lies an area comprised of predominantly commercial and residential uses. To the south, the B3301 (Carnsew Road) provides access from the site to Hayle town centre to the east, with the wider harbour area to the north. Along the south western border, the application site lies adjacent to an area of land owned by Jewsons, comprised of large warehouses. The application site is isolated by the railway viaduct to the south, which is a prominent structure in the landscape.

- 2.12 South Quay is one of three quays that make up Hayle Harbour, and is the closest quay to the town centre at Foundry Square. Whilst the actual quay is currently derelict and the harbour fabric considered to be of poor condition, South Quay was given a group value Grade II listing in 1998, which includes the harbour walls and furniture. Currently, the harbour walls are in a bad state of repair, and one area of the harbour wall collapsed prior to the applicant's purchase of the site. A subsequent collapse of the northern tip of South Quay was repaired by the applicant in 2005.
- 2.13 South Quay is also located within the wider area that forms the Cornwall and West Devon Mining Landscape World Heritage Site. It also falls within the Hayle Conservation Area. In addition, whilst the application site at South Quay does not fall within any nature conservation designations, the site lies adjacent to the Hayle Estuary and Carrack Gladden SSSI boundary to the east, and is bordered by the St Ives Bay Sensitive Marine Area along the east, north and western boundary.

The Proposed Development

- 2.14 The application site comprises approximately 4.48 hectares of predominantly under used brownfield land, and is located at South Quay, within the town of Hayle on the north coast of Cornwall.
- 2.15 In order to address the identified need for a food store, the proposals for South Quay have progressed, varying slightly from the Hayle Harbour Masterplan outline application to a retail-led mixed-use development consisting of the following, components as detailed below.
- 2.16 Elements that have been submitted in detail are comprised of:
- A retail foodstore with a gross internal area (GIA) of approximately 5,230m²;
 - Unit D adjoining the retail foodstore for a cinema with a gross internal area (GIA) of approximately 430m²;
 - Non-food retail units A, B and C with a combined gross internal area (GIA) of approximately 1,990m²;
 - Stand-alone units F and G for a retail or restaurant with a combined gross internal area (GIA) of approximately 410m²;
 - Associated access and car parking (comprised of 276 car parking spaces for the foodstore and Units D, F and G, 7 parking spaces for visitors/users of the moorings, and 43 parking spaces associated with the non food retail units A, B & C);

- Service arrangements;
- Dedication of a site for a heritage feature (i.e. the Goonvean Engine)
- Landscaping and pedestrian promenade to the whole quayside; and
- Flood prevention measures (including the raising of the existing ground level).

2.17 Elements that have been submitted in outline are comprised of:

- 30 residential units comprised of 24 two and three bed townhouses and 6 two bed apartments;
- Northern restaurant with a GIA of approximately 370m²;
- 40 car parking spaces for the residential uses – access to be determined;
- New pedestrian footbridge over Penpol Creek; and
- Public realm and landscaping improvements to the residential areas and to Isis Gardens.

2.18 In addition, a Listed Building Consent has been submitted which relates to:

- Proposed works of mitigation/repair to the Grade II Listed (Group Value) South Quay, which include repairs to the breach to the quay wall, general repairs and maintenance, construction of a new quay wall, flood protection measures (including the raising of the existing ground level) and the creation of the pedestrian quayside promenade).
- Associated infrastructure; and
- Landscaping and amenity space.

2.19 A more detailed description and full details of the scheme are given within the stand-alone Planning Statement and the Design & Access Statement that accompany this hybrid planning application.

2.20 Sustainability and environmental performance have been considered from the outset – the scheme will be highly energy efficient, reduce water consumption and will seek opportunities to enhance biodiversity. The team will address materials selection and waste management

throughout the design process and sustainable construction techniques will be reviewed. Overall, the development will target a BREEAM rating of 'Very Good' and a Code for Sustainable Homes (CSH) Level 4 for the dwellings.

Figure 2.1 Sketch Image of Proposed Development



3.0 THE DESIGN TEAM

- 3.1 The design team comprises a range of design disciplines that are collaborating from the outset to fully understand each other's briefs and identify common goals. This mutual approach to design enables the development of holistic solutions that compliment the different requirements of each discipline and, wherever possible, provides multiple environmental benefits.
- 3.2 The ultimate goal of the design team is to achieve high standards of environmental performance that meet the requirements of the planning policy in addition to delivering a sustainable development that compliments the wider Hayle Harbour Masterplan area.

HOW WILL IT HAPPEN?

ING Red UK (Hayle Harbour) Ltd

- 3.3 ING Red UK (Hayle Harbour) Ltd is a subsidiary of ING Real Estate Development, a leading pan-European developer, focusing on retail-based mixed use schemes. Established in 1961, originally as the real estate development subsidiary of NMB Bank, the ING Real Estate Development have more than 40 years of experience, with a strong track record of high quality large and smaller projects at prime locations that meet the needs of occupiers and investors, whilst satisfying the demand from retailers and consumers.
- 3.4 ING Real Estate Development have adopted a sustainability policy, in line with the ING Group's Corporate Social Responsibility Policy, which defines their vision, business principles, sustainability criteria, ambition and objectives. The Policy adopts the 'People, Planet and Profit' principle, which identifies the key role of real estate in relation to sustainability. The following principles are adopted within the policy:
- *'We believe sustainability will deliver better business and above average returns;*
 - *We promote categorising real estate on sustainability aspects;*
 - *We gather proof and collect evidence on the value of sustainable real estate;*



-
- *We are open and clear about our sustainability achievements; and*
 - *We incorporate sustainability in our core processes.'*
- 3.5 The principles above will be met by a set of criteria (relating to adaptability; location and accessibility; energy & water; longevity; appeal to occupant; and sustainable urbanism), which are identified as being relevant to real estate and are based on current and anticipated statutory requirements, current knowledge about the impact of real estate as well as market demand for sustainability as experienced.
- 3.6 To further embed sustainability into the business culture, ING Real Estate Development participate in a number of initiatives including the Dutch Green Building Council, Gigaro 2050, International Council of Shopping Centre committees and discussions with the EU in Brussels. In addition, the organisation participates in sustainability platforms including BREEAM, the European roundtable on sustainability and the Rotterdam Climate Initiative.

4.0 SUSTAINABLE DEVELOPMENT

WHAT IS IT?

- 4.1 The past 20 years have seen a growing realisation that the current model of development is unsustainable. In other words, we are living beyond our means. From the loss of biodiversity due to the felling of rainforests or over-fishing, to the negative effect our consumption patterns are having on the environment and the climate, our way of life is placing an increasing burden on the planet.
- 4.2 The goal of sustainable development, therefore, is to seek to simultaneously progress economic, social and environmental goals and policies in ways that develop and maintain a good quality of life for us all and enable future generations to do the same.
- 4.3 In the UK, the UK Government and Devolved Administrations have clearly set out what sustainable development means for them and the approach they will take to pursue their goal. They offer the following interpretation:

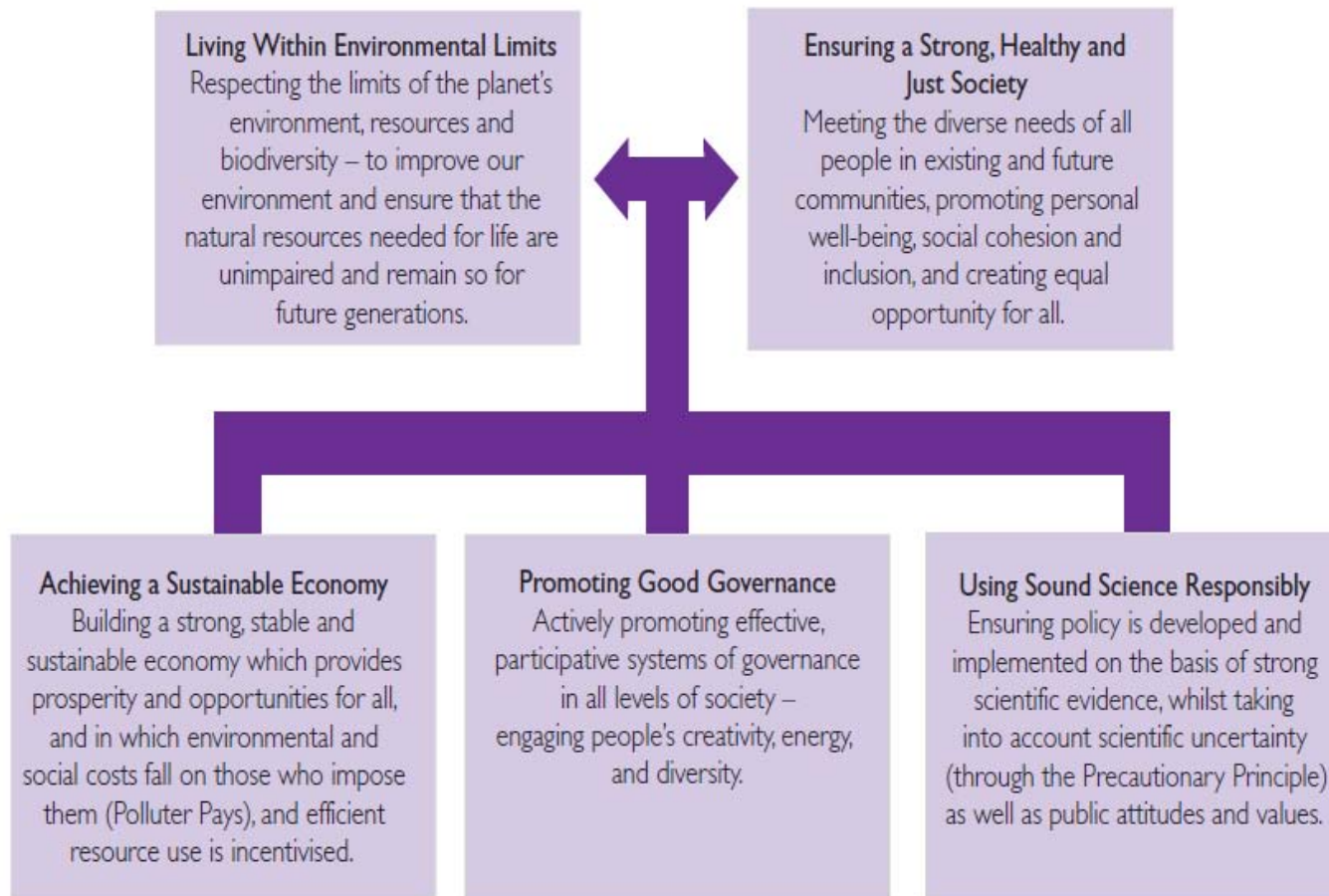
"The goal of sustainable development is to enable all people throughout the world to satisfy their basic needs and enjoy a better quality of life, without compromising the quality of life of future generations..."

- 4.4 To provide a clearer picture of what they mean in practice, such definitions are often underpinned by key principles that serve to guide policy-making and decisions. The UK Government has outlined a shared set of guiding principles for sustainable development in the UK Framework for Sustainable Development, *'One future - different paths'*¹ - they are the *'Five principles of sustainable development'* (see Table 4.1 below).



Table 4.1 Five Principles of Sustainable Development

Figure 4.1



KEY SUSTAINABILITY POLICY

4.5 Strategies for sustainable development – broad, long-term plans of action aimed at achieving the goals of sustainable development – have been developed by national governments and a range of organisations throughout the world in order to set out a blueprint for action on sustainable development.

4.6 In 1994, the UK became the first country to publish such a strategy with *Sustainable Development, the UK Strategy*. A revised strategy, *A Better Quality of Life*² was published in 1999. The Government has since made commitments on a wide range of social, economic and environmental targets through its implementation of national planning policy, including:

- *Planning Policy Statement 1: Delivering Sustainable Development (PPS1)*³;
- *Policy Statement: Planning and Climate Change - Supplement to Planning Policy Statement 1*⁴;
- *PPS 3: Housing*⁵;
- *PPS 5: Planning for the Historic Environment*⁶
- *PPS 9: Biodiversity & Geological Conservation*⁷;
- *PPS 10: Planning for Sustainable Waste Management*⁸;
- *Planning Policy Guidance 13: Transport (PPG13)*⁹;
- *PPS 22: Renewable Energy*¹⁰;
- *PPG 24: Planning and Noise*¹¹; and
- *PPS 25: Flood Risk*¹².

4.7 Strategies for sustainable development are not only used at the level of national government. They also provide strategic visions of sustainable development for:



- International organisations;
- Business;
- Individual government departments;
- Regions; and
- Local government

4.8 The following sections describe key regional and local planning policy that seeks to drive sustainable development and that will be of most relevance to the proposed Manhattan Loft Gardens development.

Regional Planning Policy

Regional Planning Guidance for the South West

- 4.9 The Regional Planning Guidance for the South (RPG10), approved in September 2001, sets out the broad development strategy for the South West of England for the period to 2016 and beyond.
- 4.10 Ensuring sustainable development remains a key aspect of the RPG10's vision, which seeks to ensure the '*developing the region, in a sustainable way, as a national and European region of quality and diversity, where the quality of life for residents, the business community and visitors will be maintained and enhanced.*'
- 4.11 Within this vision, RPG10 identifies four underlying Aims, which express at the regional levels, the four objectives for sustainable development set out by the Government:
- *'Protection of the environment – the effective safeguarding and enhancement of the region's environmental resources, both natural and built, including those which are crucial to maintaining its overall attractiveness as an area in which to live, work and play;*
 - *Prosperity for communities and the regional and national economy – improving the competitive position of the South West within the EU and internationally to increase sustainable prosperity for all its residents and businesses;*



- *Progress in meeting society's needs and aspirations* – recognising people's requirements for good and improving standards of housing and accessibility to facilities; reducing inequalities; and promoting social inclusiveness throughout the region;
- *Prudence in the use and management of resources* – reducing the consumption of irreplaceable natural resources and making best use of past investment including buildings and infrastructure.'

4.12 Through the application of the above vision and aims in its objectives, the RPG seeks to ensure that local planning authorities and other agencies adopt the principles of development and the policies set out within the document.

Sub-Regional Planning Policy

The Cornwall Structure Plan

4.13 *The Cornwall Structure Plan*¹³ sets out policies to guide changes in development and transport over the next 10-15 years and although the Plan will be replaced by the RSS, until this time, these policies are used by local councils as a basis for making planning decisions and for drawing up more detailed plans. Within the Plan the following policy is considered to be relevant to the proposed development and sustainability.

- *'Policy 1 – Principles of Sustainable Development*
 - *The regeneration of towns and villages in meeting the needs of their population and surrounding area;*
 - *Fostering the links between the environment and the economy;*
 - *A reduction in the need to travel, whilst optimising the choice of modes; particularly opportunities for walking, cycling and the use of public transport;*
 - *Access for all sectors of the community to well paid and rewarding employment, satisfactory housing and adequate services and facilities; and*
 - *Meeting needs when they arise.'*

The South West Sustainability Checklist

- 4.14 *The South West Sustainability Checklist*¹⁴ has been devised specifically to guide the design of new developments by making sense of current policy; the Checklist highlights best practice, complementing Ecohomes and the Code for Sustainable Homes (CSH). The Checklist covers regionally specific sustainability and planning issues, emphasising those of higher priority. The Checklist complements the CSH and Ecohomes by looking at issues relevant to the overall development scale, helping developers, local authorities and other interested parties to deliver sustainable communities. The tool identifies a range of sustainability issues covered in the Draft RSS for the South West enabling users to assess to what extent a design proposal accords with each issue, assisting in the delivery of regional policy.
- 4.15 The Checklist includes questions and criteria organised under eight, easy to understand categories. These are listed below with a brief summary of the objectives and aims of each criteria:
- Climate Change & Energy - To ensure that new developments are appropriately adapted to the impacts of present and future climate change and to minimise their own impact on greenhouse gases, flooding, heat gain, water resources and water quality;
 - Community - To ensure that the development supports a vibrant, diverse and inclusive community which integrates with surrounding communities;
 - Place Making - To ensure that the most sustainable sites are used for development and that the design process, layout structure and form provide a development that is appropriate to the local context and supports a sustainable community;
 - Transport and Movement - To ensure people can reach facilities they need by appropriate transport modes, encouraging walking and public transport use and reducing the use of private cars for shorter journeys;
 - Ecology - To ensure that the ecological value of the site is conserved and enhanced maintaining biodiversity and protecting existing natural habitats;
 - Resources - To promote the more sustainable use of resources related to both the construction and the operation of new developments;
 - Business - To ensure that the development contributes to the sustainable economic vitality of the local area and region; and
 - Buildings - To ensure that the design of individual buildings does not undermine the sustainability of the overall development.

Local Planning Policy

The Penwith Local Plan

- 4.16 The Penwith Local Plan demonstrates an increasing awareness of, and emphasis on, sustainability. A definition of sustainability is referred to as: *'Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.'*
- 4.17 Sustainable development is the aim of the plan set out in the following principles:
- To safeguard the environment (in the broadest meaning of the word);
 - To provide for the employment, housing, recreational and social needs of the local community and, in order to reconcile these two; and
 - To pursue and encourage development which is sustainable.
- 4.18 To achieve the aim of sustainable development the Plan identifies the need to differentiate between the genuine 'needs' of the local community and the wider 'demands' that inevitably lead to pressure for development that may be of an inappropriate type or scale. In endeavouring to meet these needs it is essential to make the best and most efficient use of available resources, including land. There is an emphasis, therefore, throughout the Plan on the re-use of previously developed land provided that it is in the right location.
- 4.19 The Local Plan Strategy is:
- *'To protect and improve environmental resources and assets;*
 - *To consider the long term, as well as short term, effects in assessing development proposals;*
 - *To manage land use change so as to avoid damaging environmental consequences and enhance environmental quality;*
 - *To strengthen the local economy, and provide for housing and other development, in ways that are sustainable, meet the needs of the community as a whole and respect the special character of the District; and*
 - *To focus new development on the three main urban areas or, in the case of serviced industrial land, in the main transport corridor at transport nodes where accessibility to non-car modes can be maximised.'*

5.0 INTEGRATING SUSTAINABILITY INTO THE PROPOSED DEVELOPMENT

- 5.1 With respect to sustainable development at South Quay and Foundry Yard, a number of key policy objectives have been identified at national, regional and local level. This Sustainability Statement will therefore assess the performance of the proposed development against these key sustainability policies.
- 5.2 In addition, however, there are a number of other industry drivers that promote the delivery of sustainable built environments, and these will also be considered for the proposed development in order to ensure that a holistic approach is taken towards design development, which considers all aspects of environmental and sustainability performance.



BUILDING SPECIFIC DRIVERS

- 5.3 Several tools exist for improving the sustainability of new buildings:

The Code for Sustainable Homes

- 5.4 The *Code for Sustainable Homes*¹⁵ (CSH) was introduced by the UK Government in April 2007 as a single national standard intended to facilitate a step change in the environmental performance of new housing.
- 5.5 The CSH aims to encourage and reward best practice through the recognition of improvements made to the design of residential buildings. It evaluates buildings against a number of environmental criteria captured under nine key environmental categories, ranging from:
- **Energy** – rewards energy efficiency and renewable energy generation;
 - **Water** – promotes water efficiency and water recycling;
 - **Materials** – rewards the responsible sourcing of materials;

- **Surface water run-off** – encourages a reduction in surface water run-off from sites and management of flood risk;
- **Waste** – promotes best practice with regards to waste management including greater recycling of waste during construction, and the provision of facilities to enable household recycling throughout occupation;
- **Pollution** – promotes measures to reduce air and water pollution;
- **Health and wellbeing** – promotes a healthy and comfortable internal environment;
- **Management** – rewards good construction site practises, provision of information to building occupants to encourage environmental awareness and addresses home security; and
- **Ecology** – encourages ecological protection and enhancement.

5.6 The CSH has six rating levels, which are awarded on the basis of achieving both a set of mandatory minimum standards and a minimum overall score as set out in Table 5.21 below.

Table 5.1 Code for Sustainable Homes Level ratings

CSH Level		Total Points Score Required (equal to or greater than)
LEVEL 1	Equivalent to the Energy Saving Trust's (EST) Good Practice Standard for energy efficiency.	36
LEVEL 2		48
LEVEL 3	Equivalent to the EST's Best Practice Standard for energy efficiency.	57
LEVEL 4	Approximately equivalent to the PassivHaus/EST's Advanced Standard for energy efficiency.	68
LEVEL 5		84
LEVEL 6	Aspirational standard based on zero carbon emissions and high performance across all environmental categories.	90

CSH Performance

- 5.7 A CSH Preliminary Assessment (pre-assessment) has been carried out on the proposed development at South Quay, Hayle Harbour. During the pre-assessment, the opportunities and constraints of the application site and design proposals are identified and the design team are able to commit to the incorporation of environmental and sustainability features in order to optimise the CSH Level that is targeted.
- 5.8 The CSH pre-assessment of the proposed development has provided a framework for a design that is likely to achieve a score of 68.98%, which equates to a Level 4 rating. The minimum points score for a Level 4 is 68%. A summary of the CSH Level 4 credit framework that the design team have committed to following the pre-assessment is included in Appendix 1.0.
- 5.9 By committing to the achievement of a Level 4 rating, the design team are ensuring that they have maximised the opportunities to enhance the environmental performance of the design and ultimately that the best practice sustainability standards demanded by the CSH will be implemented in practical terms within the proposed development.

BREEAM Retail

- 5.10 The Building Research Establishment's Environmental Assessment Method (BREEAM) is a nationally recognised means of reviewing and improving the environmental performance of buildings. BREEAM incorporates various 'off-the-shelf' assessments that aim to encourage and reward best practice through the recognition of improvements made to the design of those buildings. Less common building types are assessed against tailored criteria under the relatively new BREEAM other Buildings (BoB) system.
- 5.11 BREEAM considers key global and local environmental issues and the internal environment for building occupants under eight categories, ranging from:
- **Management** - rewards good construction site practices, provision of information to building occupants and security;
 - **Health and Wellbeing** - promotes a healthy internal environment;
 - **Energy** - rewards energy efficiency and renewable energy generation;
 - **Transport** - encourages locations with good access to public transport;
 - **Water** - promoting water efficiency and water recycling;
 - **Materials & Waste** - rewards the responsible sourcing of materials and recycling;
 - **Land use and Ecology** - encourages ecological enhancement; and
 - **Pollution** - promotes measures to reduce air and water pollution.
- 5.12 A certified assessment is third party verified by the Building Research Establishment (BRE) ensuring comparable benchmarking and high standards of assessment across the UK. Carried out by trained assessors, BREEAM provides an easily understood independent, transparent label of environmental performance.
- 5.13 At the certified assessment stage, the design and specification is assessed against the BREEAM criteria and credits are awarded where it can be demonstrated by an auditable trail of supporting evidence that the credit requirements have been met. The overall environmental performance across the categories is calculated as a percentage score and expressed as a single rating on a scale of 'Pass', 'Good', 'Very Good', 'Excellent' or 'Outstanding'. Table 5.2 shows the BREEAM level rating and the associated percentage score required.

The BREEAM logo is displayed in a large, lowercase, yellow-green font.

Table 5.2 BREEAM Level ratings

BREEAM Level	Percentage Score Required (equal to or greater than)
PASS	≥30 - <45
GOOD	≥45 - <55
VERY GOOD	≥55 - <70
EXCELLENT	≥70 - <85
OUTSTANDING	<85

BREEAM Performance

- 5.14 A BREEAM pre-assessment has been undertaken for the proposed development using the BREEAM 2008 Retail assessment tool to identify, at this early stage in the design process, the potential credits that may be targeted within a framework to achieve a BREEAM rating of 'Very Good'. To note, the pre-assessment has identified a framework for achieving a 'Very Good' rating; as the scheme progresses into certification, the credits that have been identified at this stage may be subject to change. Moreover, not all commercial elements may be assessed under BREEAM Retail; for other use classes, such as the cinema and restaurant, these are assessed are likely to be assessed under BREEAM 'Other Buildings' or other relevant version.
- 5.15 The aim of the pre-assessment was to identify the opportunities and constraints of the application site and the proposed development at the early design stage and maximise the opportunities to enhance the environmental performance of the design.
- 5.16 During the pre-assessment review, the likely credits that are considered achievable with regard to attaining the target rating have been identified and listed, which the team can consider in more detail as the design evolves.
- 5.17 The BREEAM pre-assessment score that has been predicted for the proposed development is 57.20%, which equates to a 'Very Good' rating.

5.18 The BREEAM process is iterative and flexible; therefore, using the pre-assessment framework, the benchmarking process will continue throughout design development and procurement in order to monitor the progress towards attaining the target rating. A summary of the BREEAM credit framework that the design team have committed to following the pre-assessment is included in Appendix 2.0.

The Building User Guide

5.19 Under the CSH and BREEAM assessments of the proposed development, future tenants and users of both the commercial element and the residential dwellings will be supplied with a non-technical Building User Guide, which will be designed to give information to the tenant/owner on the operation and environmental performance of their home/building.

5.20 The Building User Guide therefore represents an important tool by which the team who design and deliver a sustainable development on the ground can ensure that the building is used in such a way as to ensure its sustainability not only in design but also in operation.

5.21 The following environmental and sustainability appraisal will therefore include, where relevant, information to demonstrate how the operation of the building can be influenced via the Building User Guide to bring about lasting environmental and sustainability performance for the proposed development.

ENVIRONMENTAL & SUSTAINABILITY APPRAISAL

5.22 The sustainability features that will be implemented within the proposed development are discussed below and details on how the development will respond to objectives of sustainable design and construction are outlined for each key sustainability issue.

6.0 KEY SUSTAINABILITY ISSUES

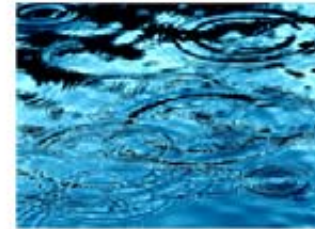
ENERGY



TRANSPORT



WATER



POLLUTION



MATERIALS



WELLBEING



ECOLOGY &
BIODIVERSITY



WASTE & SITE MANAGEMENT



7.0 ENERGY

Sustainability Objective:

To address the causes of climate change by reducing emissions of greenhouse gases, in particular carbon dioxide (CO₂). To reduce the local and global impact of pollution on the environment, by improving the energy efficiency of properties and generating energy from low or zero carbon technologies.



Context

- 7.1 The energy that we use as part of our day-to-day functions and activities (including heat, electricity, light and kinetic energy) is generated primarily from two main sources: non-renewable sources (i.e. fossil fuels such as oil, gas and coal) and renewable sources (e.g. wind, solar, hydro, biofuel and ground). Unless generated from renewable sources, energy generation and consumption results not only in depletion of these non-renewable sources, but also in the release of greenhouse gases such as carbon dioxide (CO₂), nitrogen oxide (NO_x), and airborne particulate matter from the combustion of these gases. These greenhouse gases contribute to climate change and other environmental effects that are considered to occur with increasing global temperature.
- 7.2 With increased pressure to meet growing energy demands and concerns over the impacts of greenhouse gases on climate change, governments around the world are putting in place commitments and targets to mitigate these impacts. In the UK, the Government has set targets of reducing overall CO₂ emissions by 80% by 2050 (compared with 1990 levels).
- 7.3 To help meet these targets, the focus is not only on expanding the use of renewable sources to generate energy, but also on energy conservation and, more particularly, on ensuring the energy efficiency of buildings in the UK is dramatically improved. This last focus is unsurprising considering that buildings account, directly and indirectly, for 44% of the UK's carbon emissions. The Government has long signalled its intention to move to zero carbon buildings, starting with homes in 2016 and finishing with all other buildings by 2019.
- 7.4 The energy assessment will take guidance from the Energy Hierarchy, which is a recognised and adopted structure in energy assessments and strategies as referenced and detailed within the REvision 2020 report and the draft Renewable and Low Carbon Energy SPD. The Energy

Hierarchy adopts a set of design development and decisions regarding energy, balanced with the need to optimise environmental and economic benefits under the following steps:

- *'Reduce the need for energy;*
- *Use energy more efficiently;*
- *Supply energy from renewable sources; and*
- *Ensure that any continuing use of fossil fuels should use clean technologies and be efficient.'*

Baseline Emissions

- 7.5 Based on the area schedule, the annual CO₂ emissions from the proposed development constructed to 2010 Building Regulations standards have been estimated.
- 7.6 In order to establish the unmitigated scheme or worst-case scenario for the proposed development, Part L of the current Building Regulations (2006) has been used as the minimum benchmark. This is captured within the Target Emission Rate (TER) – the maximum allowable carbon dioxide (CO₂) emissions per m² for the building, as designed for energy in use for heating, hot water and lighting and as defined by Approved Document L1A (residential) and L2A (non-residential buildings).
- 7.7 Pursuant to this, initial energy demand calculations associated with the proposed uses on-site have been undertaken, providing a 'worst-case' scenario from which mitigation measures (i.e. energy efficiency measures and opportunities to incorporate or connect to low and zero carbon renewable energy systems) can be provided.
- 7.8 An estimate of the energy loads and demand for the commercial element proposed development has been undertaken by applying 'good practice' published benchmark data (kWh/m²) from Table 20.1 of CIBSE Guide F and Table 1 of CIBSE TM46 Energy Benchmarks. These benchmark figures are based on upper limits of pre-2006 energy consumption data, as benchmark data from buildings built to comply with Building Regulations Part L2 2006 is currently not available. However, as Part L 2006 has brought about a significant improvement in energy efficiency from buildings, the 'good practice' benchmark data from CIBSE Guide F has been updated to reflect the anticipated CO₂ savings by

reducing the 2002 benchmark data by an average of 25% in accordance with the average improvement factor from Approved Document Part L2A.

7.9 In addition, the emissions likely to be generated during the operation of the residential element of the proposed development have been estimated by using the target emission ratings (TERs) developed by the Energy Savings Trust. This EST report presents a number of scenarios that have generated emissions targets associated with Building Regulation Part L1A compliant dwellings; in turn these figures have been used as benchmarks to estimate likely emissions at the proposed development. The benchmark data applied in this assessment is shown in Table 7.1 and Table 7.2 below.

Table 7.1 2002 'Good Practice Energy Benchmarks Updated to 2006 Benchmarks for Proposed Development

	2002 Good		2006 Good	
	kWh/m ² /yr			
	Gas	Elec	Gas	Elec
Foodstore ^a	200	915	150	686
Retail Warehouse ^b	170	70	128	53
Food Production, and Food and Beverage 'Restaurant (with bar)' ^a	1,100	53	825	30
Residential (flats) ^c	55	50	40	35
Residential (houses) ^a	62.5	43.75	50	35
^a From <i>CIBSE Guide F</i> Table 20.1 'Fossil and electric building benchmarks' From <i>CIBSE TM46 Energy Benchmarks</i> Table 1 'Benchmark categories and values' ^c From Energy Savings Trust – CE291 Energy Efficiency and the Code for Sustainable Homes Level 4 scenarios				

Table 7.2 Baseline Energy Demand (kWh/year rounded to nearest 500's).

	Predicted Annual Delivered Energy Requirements for:		CO ₂ Emissions Arising from ¹		Total CO ₂ Emissions
	Gas	Electricity	Gas	Electricity	
	kWh/year	kWh/year	kgCO ₂ /year	kgCO ₂ /year	
Foodstore	823,500	3,767,500	160,000	1,590,000	1,750,000
Retail	366,000	151,000	71,000	64,000	135,000
Food Production, and Food and Beverage <i>'Restaurant (with bar)'</i>	348,000	206,000	68,000	87,000	155,000
Residential (combined)	360,000	309,000	70,000	130,000	200,000
Site Total	1,897,500	4,433,500	369,000	1,871,000	2,240,000

¹ Using DEFRA's Greenhouse Gas Conversion Factors

Passive Design Measures and Energy Efficiency Measures

Foodstore and Retail Units

- 7.10 A number of passive design measures and energy efficiency measures have been incorporated, which have informed the design progress for the retail element of the proposed development. Further measures are also recommended with respect to installing energy efficient equipment, which will be considered and incorporated, where appropriate and necessary, once the tenant for each of the units become known.

Passive Solar Design

- 7.11 Passive design measures allow heating through solar gain and as such, reducing the need for heating. It is considered that this technique will be particularly useful in ancillary office or staff areas, which could include optimising natural ventilation through the use of openable windows, and the incorporation of shades and/or blinds on the glazing to provide occupant control.
- 7.12 In addition, the foodstore will incorporate fenestration to balance season heat gain and the provision of daylighting, which would reduce the need for artificial lighting.
- 7.13 The building fabric will be designed to have low U-values, improving upon maximum Building Regulation values, to help retain heat in winter months and exclude heat during summer months.
- 7.14 The need for heating and cooling will further be reduced by constructing a more airtight building and reducing the air permeability to well below the maximum values described in the Building Regulations.

Efficient Lighting

- 7.15 The opportunity to reduce lighting levels has been assessed and will result in the >1,000 lux standard level associated with a retail store being reduced to <500 lux.

- 7.16 The use of high efficacy light fittings (such as low bay and dimmable fittings) in switched zones and P.I.R (Proximity Infra-Red) sensor-controlled lighting in unoccupied zones will also reduce electrical energy use whilst ensuring minimum safe lighting standards are maintained in the commercial spaces.
- 7.17 External lighting in the car park will be made as energy efficient as possible through use of the highest efficacy lighting, with the minimum lux level required for safe lighting and dawn to dusk time switches that also utilise photo cell operation.

Fan Efficiency

- 7.18 The use of high efficiency fans and economical duct sizing to ensure pressure losses are kept to a minimum will help to reduce energy use. Fan inverters will also ensure that the speed of each fan is controlled to more accurately match the duty and the fan load, which can reduce average fan energy use by as much as 50%.
- 7.19 As with fans, selected pumps will be high efficiency models, which will be contained within a pipe network designed to minimise frictional energy losses. Inverter drives will also ensure that the energy required to operate the system matches demand.

Heating and Hot Water Control

- 7.20 Wherever possible, a good level of heating and hot water control will be provided, equally in terms of programming daily on-off times and supplying thermostatic radiators for occupant control as required.
- 7.21 In addition, a modern pre-insulated variable flow piping system for low-pressure hot water distribution will be incorporated. Variable flow pipework systems utilise variable speed pumps, which respond to reduced demand and decrease the flow of the pumps to match the load of the system. This is a highly cost effective measure that, importantly, will achieve considerable savings in pump energy.

Heat Recovery System

- 7.22 The proposed development will incorporate a heat recovery system, which utilises the heat produced as a by-product from the proposed development's cold room condensers to pre-heat the supply air handling units and the building's domestic hot water.

- 7.23 A typical cooling system uses refrigerant to remove heat from the area to be cooled; the refrigerant absorbs heat and changes to a gas. Without a heat recovery system, this heat is dissipated to the surrounding area and is wasted. The heat recovery system uses the 'waste' energy that would normally be dissipated by passing the refrigerant gas through a heat exchanger and using the heat produced to warm the water storage tank.
- 7.24 Use of this technology would require installing a heat exchanger to operate in parallel with the normal air cooled condenser units, with controls to ensure that the heat produced by the condensers can be recovered by passing the refrigerant through the water heat exchangers so it can be pumped as a low grade hot water source (at around 25-35°C) through the circuit.
- 7.25 This low grade hot water can then be used either to pre-heat the supply air to the warehouse via a coil mounted in each of the air handling units, placed in front of a coil operating on the high grade heat recovered from a CHP unit; or to pre-heat the domestic water storage cylinder before it is brought up to higher temperatures by a CHP or other boiler type unit.

Cooling

- 7.26 Some spaces within the buildings will need mechanical cooling to provide an environment where fresh produce can be stored. Other spaces will require cooling to provide a productive workspace. In order to provide this amenity with the minimum of carbon dioxide emissions, the following measures are recommended:
- High summer temperature setpoint: > 24°C; and
 - Cooling plant with high seasonal Coefficient of Performance (CoP).
- 7.27 Similarly to the heating infrastructure, a modern pre-insulated variable flow piping system for water distribution will also be incorporated.

System Performance and Monitoring

- 7.28 A good control system with the ability to identify areas where energy use is high will ensure that energy use is managed and energy waste is minimised.

- 7.29 The use of computer-based control and management systems such as DDC (Direct Digital Control) or BEMS (Building Energy Management System) will provide accurate and robust control of equipment and monitor resulting energy use. A well installed and commissioned control system will reduce energy use and maintain comfort levels within each area of the building, whilst also providing updates to ensure regular maintenance and inspection is carried out.
- 7.30 In addition, the DDC/BEMS can be combined with energy metering to provide feedback to the building management team who can target and monitor energy saving measures. An alarm can also be fitted to the system that will alert the building user when energy use to a particular system exceeds the calculated or expected use thereby facilitating fault-finding amongst the building systems.

Thermal Mass

- 7.31 The UK is experiencing hotter and drier summers, as demonstrated by the fact that the last 10 years have seen nine of the ten warmest years since records began¹⁶ (up to 2006). Consequently, current thinking is about designing for climate change and a warmer future UK climate. Therefore, the ability to ventilate a property adequately and minimise the risk of summertime overheating is being given greater priority than ever before.
- 7.32 Whilst it is important to design for increasing summertime temperatures, there is still a need to minimise heat loss and use of fuel for winter heating (and at the same time increasing profits for commercial businesses). In this regard, the design of the external envelope and structural frame of the proposed development has been given much consideration and utilises materials that not only provide high insulation values, but also have a high thermal mass. The use of a concrete floor would constitute a reasonable thermal mass that will provide a level of natural attenuation of heat gains during hot weather and the positive effects of retaining heat during cold weather if the slab is contained within the thermal envelope. This therefore, would reduce the requirement to cool or heat the buildings.

Residential Dwellings

- 7.33 The proposed residential dwellings will be designed to incorporate a number of passive design measures and energy efficiency measures to reduce heating, cooling and electrical loads it, which will be informed by best practice guidance provided by the Energy Savings Trust. This is considered to result in beneficial reductions in overall CO₂ emissions when compared with previous Building Regulations, and are integral to meeting current 2010 Building Regulations. Passive design mitigation measures to be incorporated include:

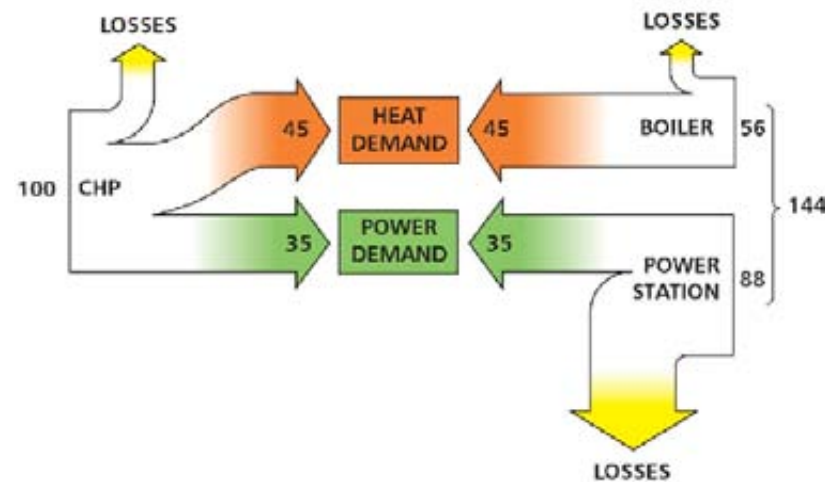
- High performance building facades designed to promote shading in the summer and passive solar heating in the winter, to target fabric with improved U values of:
 - Roof: 0.13 W/m²K;
 - Exposed walls: 0.15 W/m²K;
 - Doors: 1.0 W/m²K
 - Windows: 1.4 W/m²K;
- Solar reflective coatings with high light transmission factors to reduce solar heat gains while maintaining good daylight penetration;
- Average daylight factors in dwelling areas to be maximised as far as practicable to promote the use of natural daylight over artificial light;
- 100% of all fixed internal lighting is dedicated low energy with suitable lighting controls;
- Air permeability of 3m³/m².hr @ 50Pa or less;
- Use of Accredited Construction Details to reduce thermal bridging to 0.04 y value;
- Local control to each heating/cooling (where applicable) zone; and
- Isolation and set back control of non-occupied areas.

Combined Heat and Power

- 7.34 Currently, there are no viable sources of heat within the vicinity of the application site that the proposed development could connect to; as such the appropriateness of installing a Combined Heat and Power (CHP) engine for the proposed development has been undertaken, taking into account of the technical feasibility as well as the operation, management and maintenance of a CHP unit on-site.
- 7.35 CHP is only a renewable source when it is powered by biofuel. However, even when it is used in combination with fossil fuels such as gas and diesel, it is still more energy efficient than obtaining energy from the national grid.

7.36 Power stations that generate electricity for the national grid are only 35%-45% efficient. This is reduced a further 5% due to the transmission losses arising from the long distances between the power stations and the buildings they serve. This is a poor use of fossil fuel and has high carbon emissions per unit of electricity produced. CHP can increase the efficiency of power generation and the fuel use up to 75-80%, see Figure 7.1. By making use of the waste heat created as a by-product of producing electricity, and using this heat to warm buildings. Transmission losses are minimised by on site generation and so gas fired CHP can be seen as a relatively carbon efficient means of energy supply.

Figure 7.1 Sankey Diagram of Gas fired CHP versus Grid Electricity and Gas Fired Heating



7.37 Although the use of CHP results in an overall net reduction in emissions, as identified in Figure 7.1, the increase in fuel combustion would result in an increase in localised emissions and an impact upon local air quality. The application site is not defined as being within an Air Quality Management Area (AQMA)¹⁷; nonetheless, point source modelling to identify any potential impacts arising from a CHP unit for the proposed development has been undertaken. Details of this assessment are provided within Chapter 7.0: Air Quality of this ES, and are not replicated here.

- 7.38 CHP is effectively a mini power station with heat reclaim and minimal distribution losses due to its close proximity to the load. The power and heat usually serve a single building or site.
- 7.39 As CHP incurs a significantly higher capital cost compared to conventional gas fired boilers, to maximise efficiency it is important that the CHP plant operates for as many hours as possible and matches closely the base heat and power loads so that neither heat nor electricity is generated but not utilised (resulting in 'dumping'). For example, although it would be more cost-effective to size the CHP to match electricity demand, this would require an unacceptable amount of heat dumping. In terms of running hours, as a 'rule of thumb', CHP should be running for approximately 5,000 hours per year.
- 7.40 Therefore, as the thermal demand is usually the limiting factor and to ensure the CHP system operates for as many hours as possible, the summer thermal demand (principally hot water) is generally a key factor used for sizing gas CHP. Excess electricity can be exported to the grid but as gas and diesel CHP is not considered a renewable technology, the electricity does not attract Renewable Obligation Certificates (ROCs) and as such the financial gains are minimal when compared to the capital cost of a larger CHP system.
- 7.41 It is assumed that conventional gas fired boilers will provide the top up heat for the sites peak winter requirements. It will be necessary, however, to balance the summertime thermal demand with the sites electrical demand for optimum efficiency.
- 7.42 Given the hybrid nature of the planning application, and as the tenants for the commercial retail elements (including the foodstore) is currently unknown, the approach has not been to bring forward a centralised site-wide heating network to serve all elements of the proposed development. A site-wide system at this stage is likely to be less attractive to any potential retailers as this may require the involvement of an Energy Servicing Company (ESCO) to finance, operate, maintain and manage such a system. Involvement of an ESCo may help to raise initial capital to contribute towards the costs of installing a CHP. ESCos may reach an agreement with a developer, usually prior to the design and construction of projects, to supply the energy services for the owners/tenants for a set period, usually 20-30 years. For this exclusivity of supply the ESCo will make a capital contribution towards the central plant costs, which contains a CHP, and will oversee the management and operation of the equipment and billing arrangements.
- 7.43 However,, due to the relatively small scale of the proposed development, and therefore heating loads at South Quay, the likely revenues to be generated from the sale of heating and power to the management company is likely to be so small that the business case for an ESCo to get involved is poor. Most ESCos do not entertain proposals from developers unless they can provide their services to 250 homes. This in itself would pose some questions in terms of how the infrastructure would be financed, as well as ensuring the long-term maintenance and

management of the system. In addition, the involvement of an ESCo will mean less flexibility and is likely to be more costly to the retailer (making the scheme less attractive to potential tenants). It is noted that following the involvement of a retailer to the foodstore operation, a re-assessment of the district heating provision to the residences should be undertaken.

Foodstore

- 7.44 It is considered that a local CHP system providing a localised heating system could become economically and technically viable and can be accommodated on-site. The base heating load is the determining factor which will size a potential CHP for the foodstore; the proposed foodstore indicate that the base load is likely to be present even in summer months. Following the incorporation of energy efficiency measures to achieve a 2010 Building Regulations compliant building, an on-site gas-fired CHP unit may provide up to a **15.9%** CO₂ reduction against a 2010 Building Regulations compliant building.
- 7.45 From initial calculations, cooling is likely to be required all year round and therefore a base load is present at the development. However, the size of the baseload is not big enough to be served by commercially available absorption chiller; these requiring a base cooling load of around 750kW to become viable. The loads to be met therefore mean that is not practicable for the proposed development. Additionally the carbon reducing potential of absorption chillers is very dependant upon the carbon penalty associated with grid sourced electricity – national plans to increase the renewable content of grid electricity may in the long-term mean that vapour compression chillers are more carbon efficient over the life of the buildings.

Residential

- 7.46 The provision of a CHP to meet the base thermal load for the residential units alone at South Quay is not considered to be economically viable due to the small load to be met by a potential CHP. Arguably a renewable technology (assessed below) could serve this load more economically.
- 7.47 Nonetheless, should the selected retailer for the foodstore choose to offer or sell any excess heat to its adjacent buildings on or near-site (including the residential units), this is something that can be considered pending further investigation without the operational and contractual challenges associated with the involvement of an external ESCo as described above. On this basis, the indicative spacing

reserved for the energy centre within the foodstore has been adequately sized to accommodate a larger CHP unit, to serve not only the foodstore but for other elements being brought forward as part of this proposed development.

Future Proofing

- 7.48 The scheme has been designed to be future ready so that it may make best use of efficient distribution, with current and future technologies. The necessary infrastructure will be provided to link with other potential decentralised energy generation schemes should these come forward in the vicinity, (e.g. should the Wavehub scheme be considered technically feasible and commercially viable) and connection is practical and feasible, following completion of the proposed development. It should be noted, however, that permission to connect to decentralised schemes in the vicinity will be subject to agreement with third parties and not guaranteed.
- 7.49 Subject to discussions and agreements with third parties, the proposed development could benefit from potential networks as they become operational. The integration of the proposed development into a district-heating infrastructure supplying energy would result in significant carbon reductions.
- 7.50 Finally, the provision of the compatible heating systems and the accessibility of the central plant for the proposed development (in addition to the ability to connect to potential energy distribution networks in the vicinity) also facilitates the adoption of emerging, and as yet, undeveloped technologies, such as fuel cells and 'the hydrogen economy', once these become commercially and technically viable.

Renewable Technologies

Heating and Hot Water Provision

- 7.51 It should be noted that renewable technologies such as biomass boilers and solar thermal panels are designed to meet thermal loads (heating and hot water). Ground source heating will also provide thermal energy for heating (and reverse cycle ground source systems can also provide cooling where there is a demand). Biomass boilers would be sized to meet the summertime hot water load, as these boilers operate best as a 'baseload' technology and do not work well as 'top up' boilers. CHP plants are also designed to meet 'baseload' heat demand. Solar thermal panels are generally sized to meet up to 50-60% of the total annual hot water demand and therefore, supply a significant proportion of the summertime hot water requirements, thus, reducing the 'baseload' available for other technologies.

- 7.52 Consequently, technologies supplying a thermal output do not complement CHP, particularly biomass and solar thermal, as their use would reduce the baseload heat demand available to be met from the CHP and thus, lower CO₂ reductions savings from CHP.
- 7.53 Therefore, with respect to the foodstore, renewable technologies supplying heat have been excluded within this assessment. However, as the feasibility of connecting to the on-site CHP unit is dependant upon further investigation by the tenants, once known and occupied, heat supplying renewable technologies have been considered as appropriate for the stand-alone retail units and the residential units.

Solar Hot Water

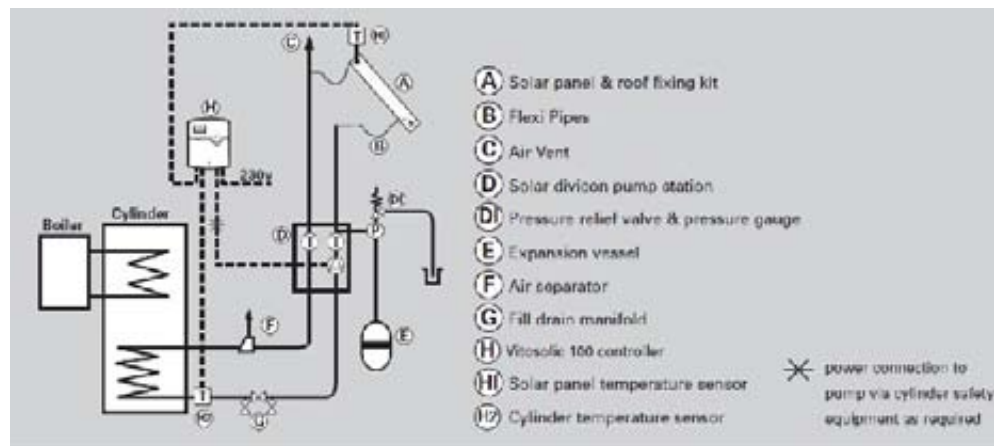
- 7.54 Solar thermal panels are used to produce hot water and consist of roof mounted collector panels that make use of heat energy from the sun and use it to heat water circulating in a closed loop. Usually this heat is then transferred via a heat exchanger into a hot water storage tank that is also heated by a gas or other boiler.
- 7.55 Two main types of solar water heating system are used in the UK; flat plate collectors and evacuated glass heat tubes. Flat plate collectors circulate water around a black coloured receiver plate that is heated by direct sunlight and to some extent by indirect light; heat being retained by a thermally glazed panel above. Evacuated glass heat tubes are more efficient, particularly in the UK, as they can work more effectively at low solar radiation levels. They are however, more expensive than flat plate collectors. They consist of rows of parallel transparent glass tubes, each containing an absorber tube which converts the sunlight into heat energy.
- 7.56 It is considered that solar technologies are appropriate for the scheme. As the residential element progresses to detailed design, the team will consider the specification of solar thermal panels on available roofspace to help achieve the 25% reduction against 2010 Building Regulations, in order to achieve the target CSH Level 4 rating, particularly where connection to the on-site CHP unit of the foodstore is not deemed to be technically or financially viable. Any savings from solar thermal panels will be in addition to savings associated with energy efficiency measures above the current 2010 Building Regulations, as well as from other renewable technologies such as PVs.
- 7.57 For the stand-alone non-food retail buildings, there is potential for solar technologies to be accommodated on roofspace. However, owing to the small demand and load for domestic hot water, the sizing of solar thermal technologies will be restricted by this (retail building uses will require significantly less domestic than other uses, such as residential dwellings or hotels). Therefore, while it is technically feasible to

integrate solar thermal panels on the roofs, the team have considered other renewable technologies, which are likely to be more cost-effective and provide greater carbon savings.

Figure 7.2 Solar Thermal Evacuated Tube Panels



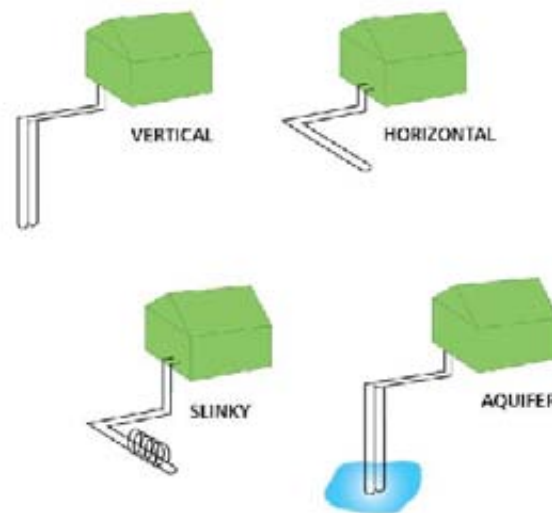
Figure 7.3 Diagram of Large Scale Solar Thermal Installation



Ground Source Heat Pumps

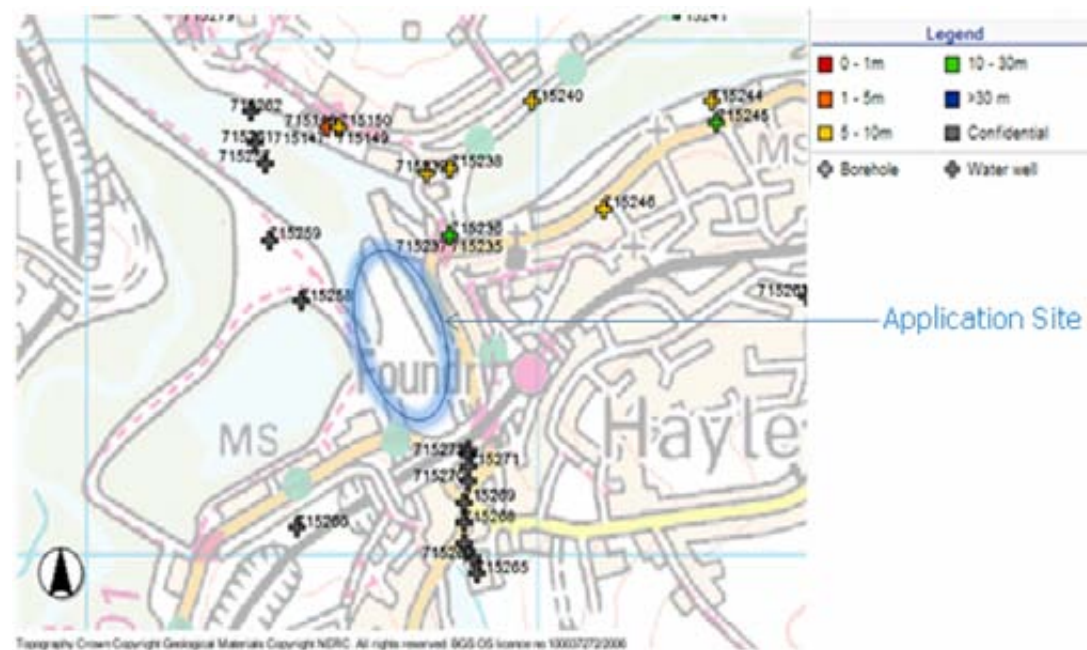
- 7.58 Ground source heat pumps (GSHP) extract heat from the ground. GSHPs work on the principle that the below ground temperature is more constant compared to above ground. In the winter months, the belowground temperature is warmer than above ground and the heat carrier fluid circulating within the absorber pipes absorbs the heat. This heat energy is then raised by a compressor (using the compression cycle) and through a heat exchanger, distributed via a low temperature distribution system such as under floor heating, to satisfy a proportion of space heating requirements. GSHP systems are not suitable for satisfying high temperature hot water demands.
- 7.59 As Figure 7.4 indicates, there are a number of configurations for GSHP systems. A horizontal collector system is likely to be the more preferred option, compared with a vertical collector system, which are considered more appropriate for site's with limited area. A key component of this technology is the heat exchanger. Larger heat exchangers deliver greater heat transfer and are, therefore, more efficient but they have a higher capital cost.

Figure 7.4 Diagram of Different Configurations of Ground Source Heat Pumps Systems



- 7.60 'Reversible' heat pumps systems are also available that give the potential for provision of space cooling, if required. These systems extract coolth from the ground during the summer months and heat during the winter months.
- 7.61 It is important to establish ground conditions (depth of soil cover, the type of soil or rock and the ground temperature) at the application site; as confirmed within Chapter 9.0: Soil Conditions, Groundwater & Contamination, the application site is underlain by Marine and Estuarine Alluvium.
- 7.62 Figure 7.5 below shows the existing borehole records that are recorded by the British Geological Survey, which demonstrates that there are currently no recorded boreholes on-site.

Figure 7.5 Existing Borehole Records¹⁸



7.63 While further investigation is required to assess the suitability of incorporating a ground source heating system on-site, this is likely to be cost-prohibitive as these types of systems would require instruction of a specialist installer; these additional costs would undermine the financial viability of the project. On this basis, ground source heat pumps have not been considered appropriate for the proposed development at South Quay.

Air Source Heat Pump

7.64 Air source heat pumps (ASHPs) absorb heat from the outside air; the heat is then used to warm water for radiators or underfloor heating systems, or to warm the air within a dwelling. ASHPs work on a similar principle to a fridge, which extracts heat from its inside. An evaporator coil, mounted outside absorbs the heat; a compressor unit then drives refrigerant through the heat pump and compresses it to the right level to suit the heat distribution system. Finally, a heat exchanger transfers the heat from the refrigerant for use, depending on which of the two main types of systems (identified below) is installed:

- Air to air system - produces warm air which is circulated by fans to heat a home; and
- Air to water system - uses heat to warm water. Heat pumps heat water to a lower temperature than a standard boiler system; therefore, these systems are more suitable for underfloor heating systems than radiator systems, requiring less space to incorporate, compared with an air to air system.

7.65 The efficiency of ASHPs is measured by a coefficient of performance (CoP) - the amount of heat produced compared to the amount of electricity needed to run them. As ASHPs produce less heat than traditional boilers, buildings must be well insulated and draught-proofed to ensure that the heating system is effective.

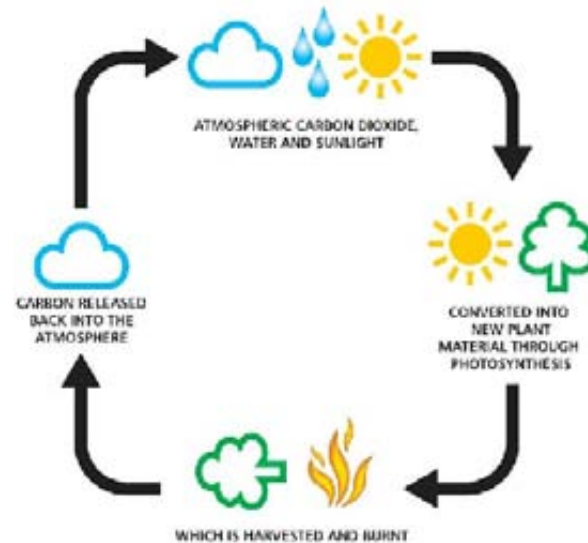
7.66 Using air instead of the earth as a heat source mean that ASHPs have a lower CoP than GSHPs, resulting in less carbon savings for a similar sized heat pump. However, the key issue when considering the potential carbon savings of ASHPs is the carbon content of grid electricity. The cleaner the grid electricity, the better the carbon savings from ASHPs; given the legally binding UK carbon reduction targets, it is likely that ASHPs installed with an estimated operational period of 25 years will be better in carbon terms compared with traditional condensing gas fired boilers.

- 7.67 In addition, ASHPs are becoming increasingly popular in the UK, largely due to the fact that there is no need for extensive excavation, requiring far less space and are more easily installed than GSHPs. Buildings do not have to be re-engineered to obtain heat from a different fuel source should gas become scarce, expensive or a 'dirty' fuel, compared to electricity.
- 7.68 The incorporation of ASHPs have been considered for the stand-alone retail units, the cinema and the restaurant for the proposed development and have been sized on the estimated heating and cooling loads (based on benchmarks provided within BSRIA Rule of Thumb guidance¹⁹).
- 7.69 Based on these benchmarks, it is proposed that ASHPs with a maximum combined thermal capacity of 264kW, a CoP of 3.5 and an operational period of 500 hours per year will result in a maximum **10.4%** CO₂ reduction for the stand-alone retail elements. For the cinema, based on a thermal capacity of 61kW, this will result in a maximum **5.3%** reduction of CO₂ emissions, and a **1.7%** reduction of CO₂ emissions for the restaurant, which has a 52kW thermal capacity. The sizing of the ASHPs will be refined and determine once the final building use and tenants for these units are confirmed.

Biomass Boiler(s)

- 7.70 Biomass boilers replace conventionally powered boilers with an almost carbon neutral fuel such as wood pellets. The fuel is classed as an almost carbon neutral because the CO₂ released during the burning of biomass is balanced by that absorbed by the plants during their growth, see Figure 7.6. below.

Figure 7.6 Biomass Life Cycle



- 7.71 The site could allocate space for these boilers and storage of the fuel and it may be possible to source the fuel from within the south of England, although this will need to be designed in. It should also be noted, however, that fossil fuels are utilised in the production, processing and transportation of biomass fuels and therefore care should be taken when choosing the fuel supplier and the distance and method for transportation.
- 7.72 Furthermore, although many biomass burners will meet Clean Air Act requirements, combustion of woody biomass releases higher quantities of NO_x compared to a comparable system fuelled by natural gas and as a consequence many councils (particularly in urban areas) have concerns about the potential impact on air quality that the widespread uptake of biomass boilers would have.
- 7.73 In addition to this, as the tenants for the proposed development are currently unknown, a traditional system fuelled by natural gas has been preferred. Therefore, biomass boilers have not been considered further as part of this application, at this stage.

Electrical Provision

- 7.74 Small-scale renewable electricity generation has received the recent boost of a Feed-in-tariff (FiT) scheme that guarantees that small-scale electricity generators receive a return on investment of between 5-8% over the course of the life of the scheme for the energy generated by their equipment. For further details of the FiT scheme see the Appendix 7.1.

Photovoltaic Cells

- 7.75 Solar Photovoltaics (PVs) are solar panels which generate electricity through photon-to-electron energy transfer, which takes place in the dielectric materials that make up the cells. The cells are made up from layers of semi-conducting silicon material which, when illuminated by the sun, produces an electrical field which generates an electrical current. PVs can generate electricity even on overcast days, requiring daylight, rather than direct sunlight. This makes them viable even in the UK, although peak output is obtained at midday on a sunny summer's day. PVs offer a simple, proven solution to generating renewable electricity.
- 7.76 Provision of electricity from a photovoltaic roof mounted system has been considered where south-facing unshaded roof areas have been identified for the different elements of the proposed development that could accommodate PV panels on racks orientated south at an optimum angle of 30°.
- 7.77 For maximum electrical output this study assumed that monocrystalline silicon PV modules would be selected.

Residential

- 7.78 It is considered that solar technologies are appropriate for the scheme. As the residential element progresses to detailed design, the team will consider the specification of photovoltaic panels on available roofspace to help achieve the 25% reduction against 2010 Building Regulations, in order to achieve the target CSH Level 4 rating. Any savings that the PVs will deliver will be in addition to savings associated with the on-site CHP unit of the foodstore (where connection is considered technically and financially feasible), or from other renewable technologies such as solar thermal panels or ASHPs.

Foodstore

- 7.79 As described in paragraph 7.52, the application of PVs are considered to be appropriate for the foodstore and complement the proposed CHP, as the technology will provide power and will not reduce the baseload heat demand to be met from the CHP.
- 7.80 At this stage, as shown in Figure 14.1, the proposed development will accommodate up to 572m² of PVs on available and appropriate south-facing roofspace, which will result in up to a **2%** reduction in addition to the low carbon heating mitigation measures. When taking into account the combined CO₂ reduction from low and zero carbon technologies (i.e. CHP and PVs), this would result in a **17.9%** reduction in CO₂ emissions against an energy efficient development.

Restaurant

- 7.81 Available south-facing roofspace has been identified for the restaurant, which forms part of the outline element of the hybrid application. In order to achieve a 10% reduction of CO₂ emissions against a 2010 Building Regulations Compliant building, it is estimated that up to 200m² of this area is reserved for photovoltaic panels, which will result in a reduction of approximately 8.4%. When combined with ASHPs, the restaurant will achieve a 10.1% reduction in CO₂ emissions.

Cinema

- 7.82 In addition to ASHPs, south facing pitched and flat roofs that are suitable for PVs have been identified for the cinema element of the proposed development. It is recommended that in order for a 10% reduction against a 2010 Building Regulations compliant building to be achieved, that 50m² of PV is provided, which will result in an additional **5.6%** reduction in CO₂ emissions (when combined with ASHPs, will result in approximately a **10.9%** reduction for the cinema element alone.

Retail Units

- 7.83 At this stage, while PVs can be technically accommodated on-site, the preferred option has been to specify ASHPs to the stand-alone retail units to achieve a minimum 10% reduction against an energy efficient scheme built to 2010 Building Regulations. While PVs are complementary to ASHPs, at this stage, they have not been specified for these retail units on the basis of cost to the applicant. In addition, when compared with the potential carbon savings and cost-effectiveness between PVs and ASHPs, it is anticipated that ASHPs will result in a greater level of carbon savings.

Figure 7.7 Photovoltaic (PV) Panels



Wind Turbines

- 7.84 Wind turbines are an established means of capturing wind energy and converting it into usable electricity and come in various sizes depending on the location and the electrical requirements. A wind turbine usually consists of a nacelle containing a generator connected, sometimes via a gearbox, to a rotor consisting of three blades.
- 7.85 As described in Chapter 2.0: Proposed Development and Chapter 12.0: Archaeology & Cultural Heritage within Volume 1: Main Text & Appendices of the stand-alone Environmental Statement, the application site lies within the Cornwall and West Devon Mining Landscape World Heritage Site and Hayle Conservation Area, and also has listed buildings (i.e. the quay walls) on-site. It is understood that given the extensive planning history associated with South Quay and the wider Hayle Harbour area, landscape and visual impacts associated with the cultural heritage assets, and the impacts of the proposed development on 'outstanding universal value' to its status as a World Heritage Site, is recognised as being of major significance. In addition, as described in Chapter 11.0: Ecology, the application site lies adjacent to the Hayle Estuary and Carrack Gladden SSSI (designated principally due to the populations of waterfowl and shorebirds that occur in winter, and pass through spring and autumn), as well as the Gwithian to Mexico Trowans SSSI approximately 1.5km from the westernmost boundary of the SSSI to the application site. The specification of a wind turbine is likely to cause a detrimental impact to the statutory designations of the

local area. Other issues that have been identified include health and safety implications for occupiers or users on-site and on adjacent areas as a result of noise and light flicker associated with the wind turbines.

- 7.86 Finally, it should also be noted that the rated power and energy output of micro-wind turbines is also subject of further independent investigation. On this basis, wind turbines have not been considered further as part of mitigation measures for the proposed development.

Summary of Measures

Residential

- 7.87 Based on the principles of the Energy Hierarchy, a number of mitigation measures have been recommended to reduce the energy consumption associated with the residential element of the proposed development against the worst-case scenario.
- 7.88 There are two options that the team will consider in further detail, once the tenant for the food retail is known, and the design of the residential units progresses to detailed design stage. Following the incorporation of energy efficiency measures to improve the performance of the building, the first option is to incorporate a combination of solar technologies to provide heating for domestic hot water consumption (solar thermal panels) and electricity (photovoltaics) on available and appropriate roofspace, and to consider other renewable technologies as appropriate including ASHPs. The second option is to connect to a low carbon heating system, either to the proposed on-site CHP system servicing the food retail store, or an alternative nearby source of low carbon heating, which will be combined with photovoltaic panels across available roofspace.
- 7.89 Both of the identified options will ensure that as a minimum, the residential units will achieve the targeted CSH Level 4 rating, achieving a minimum 44% reduction against the 2006 Building Regulations, equivalent to a 25% reduction against the 2010 baseline scheme (i.e. the worst-case scenario).

Commercial Elements

- 7.90 As a first step and in line with the Energy Hierarchy, mitigation measures considering passive design and energy efficiency measures were incorporated within the overall design of the proposed development. From this, a feasibility study for an on-site district heating network was

considered. Based on commercial practicalities in the operation, management and maintenance for the site, an on-site CHP unit serving the foodstore was identified as the most appropriate way forward, with the option of exporting excess heat to other nearby uses, including the proposed residential units.

- 7.91 From this, a number of renewable technologies were identified, to ensure that emissions were reduced further. For the foodstore, the allocation of PVs was considered most suitable and complementary to the proposed CHP unit, achieving a total **17.9%** reduction of CO₂ emissions against an energy efficient scheme (from PVs and CHP).
- 7.92 For the stand-alone retail units, as per the approach taken for the foodstore and residential units (and in line with the Energy Hierarchy), passive design measures and energy efficiency measures have been specified for these units. As these units will not be served by the CHP unit, the technology considered to be most cost-effective whilst providing a significant reduction to CO₂ emissions on-site was ASHPs. By sizing the ASHPs based on the cooling demand for these retail units, it is estimated that the technology will result in a maximum **10.4%** reduction of CO₂ emissions against an energy efficiency scheme.
- 7.93 The summary table below provides an estimation of the likely carbon savings associated with proposed development from a worst-case scenario development that have been designed with energy efficiency measures (to comply with current Building Regulations 2010), compared with a development that incorporates the mitigation measures identified above, particularly the commitment towards achieving a minimum 25% reduction of CO₂ emissions for the residential dwellings from 2010 Building Regulations, and a CO₂ index of 40 on the EPC rating, which is equivalent to approximately a 27% improvement against a 2006 compliant scheme (as defined by BREEAM) for the non-residential elements, which is considered to be of minor positive impact. Based on an area-weighted average, it is considered that the combination of energy efficiency measures and low and zero carbon technologies across the proposed development will result in approximately a **17.1%** reduction of CO₂ emissions against a worst-case scenario.

Table 7.3 Improvement of Mitigated Scheme Against Unmitigated Scheme (in kgCO₂/year and rounded to the nearest '500s)

	Unmitigated Scheme	Mitigated Scheme	Total % Improvement
Foodstore	1,244,500	1,021,800	17.9%
Retail	84,000	75,200	10.4%
Cinema	38,000	33,900	10.9%
Restaurant	101,600	45,300	10.1%
Residential	61,100	91,300	25%
Site Total	1,529,200	1,267,500	17.1%

7.94 Delivery of the above will mean that the proposed development is compliant with the following sustainability criteria:

- Regional and Local Planning Policy; and
- BREEAM and CSH (see below).

7.95 Under the CSH, mandatory standards for energy (as well as other environmental categories) must be met, before even the lowest level of CSH can be achieved. In addition, the CSH demands incrementally higher standards for energy to be met at each performance level. For Credit Ene 1 (Dwelling emission rate as defined by 2006 Building Regulations), in order to secure a Level 4 rating, dwellings must achieve an improvement of the Dwelling Emissions Rate (DER) over the Target Emissions Rate (TER) greater than or equal to 44%, which is equivalent to 8 credits.

7.96 While there are no mandatory requirements under Credit Ene 1 – Reduction of CO₂ emissions to achieve a 'Very Good' rating, the team are currently targeting a minimum of 6 credits, equivalent to an EPC rating of 40 on the CO₂ index or roughly a 27% improvement against the current Building Regulations.

-
- 7.97 In addition, as part of the framework, a number of measures have been incorporated, as identified above, which is considered to have a positive impact with respect to reducing the energy consumption associated with the proposed development, compared with the worst-case scenario.
- 7.98 Credits that have currently been targeted under the CSH and BREEAM, which is considered to help mitigate for energy consumption on-site at the operational stage, include the following:
- Building/Home User Guide – to encourage and provide guidance enabling building occupiers/residential to understand and operate their building efficiency and make the best use of local facilities (i.e. behavioural awareness);
 - Provision of Drying Space to residential dwellings;
 - Provision of A+ rated energy efficient labelled goods and information on the EU Labelling Scheme;
 - Provision to accommodate a 'home office' within the dwelling to help reduce commuting;
 - Provision of metering for substantial energy uses within the retail elements; and
 - Travel Plan and cycle storage to promote sustainable means of transport.
- 7.99 The proposed development supports objectives outlined by the highlighted planning policy above and other specified national, regional and local guidance by encouraging the use of energy both efficiently and from sustainable sources (i.e. renewable technologies).

8.0 TRANSPORT

Sustainability Objective:

To reduce road congestion and pollution levels by enabling walking, cycling and use of public transport, and reducing the need for travel by private car.

Context

- 8.1 Transport currently accounts for a quarter of the UK's carbon emissions. In order to meet the UK's ambitious target of an overall 80% cut in emissions by 2050, extensive decarbonisation of the transport sector will be essential. Ninety percent of all transport emissions are generated from road transport and whilst a considerable proportion of road transport emissions will be addressed through technical developments in car engines and greater use of biofuels, a significant move to greener consumer behaviour is also required.
- 8.2 Walking, cycling, and public transport, including buses and rail, are all alternative green travel options. Persuading and enabling people to use these alternative forms of transport is key in tackling the UK's transport issues; intrinsic to this is ensuring that new developments and key services are accessible.
- 8.3 Policy 1 of the *Cornwall Structure Plan* refers to a reduction in the need to travel, whilst optimising the choice of modes; particularly opportunities for walking, cycling and the use of public transport.
- 8.4 The *South West Sustainability Checklist* refers to questions regarding Transport. In particular question 4.1 aims 'To encourage and enable the use of public transport' and question 4.2 aims to 'Ensure the availability of frequent and convenient public transport links to train, tram or tube.' Questions 4.6 and 4.7 refer to pedestrians and cyclists and aim to 'Enable residents to use and enjoy space around homes whilst maintaining vehicular access' and 'Promote cycling as a real alternative to the use of private cars for shorter journeys'.



8.5 The Local Plan has saved policies that refer to transport, in particular policy TP-6 states that:

'Proposals for development which would adversely affect, or result in the loss of, routes within towns and villages which provide convenient or attractive links for pedestrians will not be permitted.'

8.6 Policy TP-12 relates to carparking provision of new developments and states that:

'The provision of car parking in development must be related to the proposed use, the location, the availability of or potential for access by any other means than the private car and the amount of existing public parking provision in the locality. The level of car parking provision in development will not exceed the maximum standards given on page 222 of the Local Plan.'

Delivery

8.7 The proposed development will be designed from the outset to be a place that prioritises the movement of pedestrians and other vulnerable users over the needs of car drivers. This is not an anti-car philosophy but a pragmatic balance of the obvious need to deliver sound ecological, health and community benefits whilst recognising the need for personal transport options, particularly relevant in this largely rural area of north Cornwall.

8.8 The proposed development will have excellent internal pedestrian permeability. Links to the surrounding highway network footways and footpaths will be explored and delivered as opportunity allows.

8.9 The proposed development will provide suitable car parking facilities that will be appropriate to the size and number of the dwellings within the scheme.

8.10 A Travel Plan will be produced for the proposed development, identifying the impact of both the retail and residential users behaviour and travel patterns on the environment. The Travel Plan will aim to make a real contribution towards encouraging and promoting alternatives to the car and the personal benefits of changing travel behaviour; raising awareness of the choices available to individuals. Site specific, with the aim of reducing car usage (particularly single occupancy) and increasing the use of other, more environmentally-friendly modes of transport, relevant information from the Travel Plan will also go into the Transport section of the Building User Guide to ensure that



sustainable transport and travel options are highlighted to tenants so that the objectives of the Travel Plan can continue to be met throughout the occupation phase.

8.11 Delivery of the above will mean that the proposed development is compliant with the following sustainability criteria:

- Regional and Local Planning Policy; and
- BREEAM – the proposed retail element achieves 9 out of 13 credits available under the Transport category and in particular meets the BREEAM requirements for cyclist facilities.

8.12 The proposed development supports objectives outlined by the highlighted planning policy above and other specified national, regional and local guidance by encouraging the use of sustainable sources of transport, including cycling, walking and the use of public transport methods such as bus travel, whilst providing an appropriate number of car parking spaces for the number of dwellings.

9.0 WATER

Sustainability Objective:

To conserve water by promoting water efficiency, water recycling and Sustainable Drainage Systems (SuDS).



Context

- 9.1 The average person in England uses 150 litres of water a day and research has shown that the average family's annual water consumption results in as much CO₂ as two transatlantic flights (1.54 tonnes of carbon each year). Yet water is becoming an increasingly scarce resource, with only 3% of the world's water being held as fresh water and less than 0.3% of this being available to humans. As more houses are built and the population increases, the pressures on the UK's water resources are growing. Climate change will only add to these pressures. To ensure a sustainable water supply for the future, it is therefore vital that water is used more efficiently and methods of harnessing and reusing water are developed and implemented.
- 9.2 Furthermore, just as climate change seems likely to mean less water on average, it is also likely to mean more extreme weather events; therefore the issue of 'surface water' flooding is becoming more and more important. Many existing urban drainage systems can cause problems of flooding, pollution or damage to the environment and are not proving to be sustainable. Use of Sustainable Urban Drainage Systems (SUDS) is a cost effective solution to harnessing and reusing water with a low environmental impact which can easily be incorporated into developments; they drain away surface water run-off through collection, storage and cleaning before allowing it to be released slowing back into the environment.
- 9.3 The *South West Sustainability Checklist* refers to questions relating to Water in Section 1 – Climate Change and Energy. In particular question 1.1 and 1.2 relate to flooding and aim to 'Reduce the risk of flooding on proposed development sites and adjacent areas of land' and 'To reduce the risk and impact of flooding on the development and reduce the longevity of any effects' through introducing surface water

management methods beyond the minimum PPS25 requirements. There are also questions that relate to water management in this section, question 1.5 aims to 'Reduce the overall consumption of clean water for non-potable uses' by encouraging water re-use within the home and wider development.

9.4 Policy GD4, saved within the Penwith Local Plan states that proposals for development will not be permitted where they would cause significant harm as a result of inadequate provision for:

- Sewerage, sewage treatment, surface water drainage and water supply;
- The prevention of water pollution; or
- The prevention of flooding, on site or elsewhere.

Delivery

9.5 The proposed development will aim to develop a water strategy that reduces water demand through its design and specification and incorporates a drainage system with increased retention times and/or rainwater collection capacities. Consideration has been given to the efficient use of water in the construction phase and the team will require the contractor to monitor water consumption during this phase.

9.6 In accordance with the mandatory requirements of the CSH level that has been committed to, the design team will ensure that each dwelling limits its water consumption to 105 litres per person, per day. To reduce water consumption during the operation of the proposed development, water efficient appliances will be specified to conserve water at its point of use. Where possible, the proposed development will incorporate the following water efficiency measures:

- 4/2.5 litre dual flush cisterns;
- All taps (bathroom and kitchen) to have low flow aerated fittings;
- Water efficient washing machines and dishwashers.
- A smaller shaped bath; and



- Showers with a nominal flow rate of less than or equal to 6 litres per minute.
- 9.7 Details of the above water saving measures and how to use them correctly will be included, where appropriate, in the Building User Guide for both the retail element and the residential dwellings, thus ensuring their efficient use throughout operation of the buildings.
- 9.8 As defined by the Environment Agency, the application site lies within all three Flood Zones, with a significant proportion within Flood Zones 2 and 3; therefore an FRA has been prepared for the proposed development and is included within Appendix 10.1 of Volume 2: Technical Appendices of the stand-alone ES. However, the proposed development will be constructed in such a way that is entirely self contained in terms of flood risk management, which includes raising the site levels so that the setting of minimum finished floor levels and thresholds are at 6.17m AOD.
- 9.9 In addition, and in line with the recommendations of the CSH credits relating to surface water run-off, the team are committed to incorporating SUDS attenuation techniques on-site in order to ensure that the peak rate of run-off is no greater for the developed site than for the pre-development site.
- 9.10 The proposed development supports objectives outlined by the highlighted planning policy above and other specified national, regional and local guidance by, wherever possible, encouraging the use of water efficiency and conservation measures and minimising flood risk through surface water management and not increasing the risk of flooding elsewhere or obstructing the flow of flood waters unless appropriate flood protection measures can be undertaken.

10.0 MATERIALS

Sustainability Objective:

To reduce the global, social and environmental impact of the consumption of resources by using sustainably produced and local products.

Context

- 10.1 The embodied energy of a building material can be taken as the total primary energy consumed (the amount of carbon released over its life cycle). Building materials have a vast environmental impact in terms of energy and resources in their production, use and disposal. Therefore, if environmentally responsive building materials are chosen, a significant amount of CO₂ can be saved during construction as well as during operation.
- 10.2 Consideration should also be given to materials' performance under potentially changing climatic conditions over the lifetime of the buildings by ensuring that the final selection facilitates the proposed development's ability to maintain comfortable temperatures - for example the use of a high thermal mass in the design of the buildings will help keep buildings cool during warm periods, and vice versa.
- 10.3 The *South West Sustainability Checklist* includes questions that aim to promote use of *Green Guide to Specification*²⁰, reclaimed, reused and recycled materials. Question 6.2 aims to 'Increase the volume of low environmental impact materials used during construction of the infrastructure and public realm of developments' and question 6.3 aims to 'Increase the percentage of timber used in construction sourced from sustainably managed and temperate sources. Recognised accreditations include the Forest Stewardship Council Certification Scheme.'



10.4 Policy GD2 saved in the Local Plan states the design and layout of development should:

- Respect traditional patterns of development and building styles, form and detailing;
- Incorporate materials that are in keeping with the locality; and
- Ensure that the development respects the scale, character and appearance of the immediate surroundings and the wider environment.

Delivery

10.5 The design team are currently targeting credits under the CSH and BREEAM for specifying materials with a low environmental impact under the *Green Guide to Materials Specification*²¹. Credits are awarded where the materials used in the major building elements of the proposed development (roof, walls, floors and windows) achieve a high rating under the Green Guide, taking into account the full life cycle of the materials.

10.6 Wherever possible, therefore, the materials specification and products used for the proposed development will display the following characteristics:

- Low embodied energy that require little processing;
- High recycled content including steel, glass and certain cladding and flooring products;
- Reused materials including reclaimed materials;
- Durable;
- Can be re-used, recycled, refilled, recharged or reconditioned;
- Lightweight in order to reduce the volume of materials within the building superstructure and require less fuel during transport;
- Accredited to a recognised environmental standard such as:
 - Forestry Stewardship Council (FSC);



-
- Environmental Management Systems (EMS) of certification;
 - EU energy ratings of white goods; and
 - The Mobius Loop for products containing recycled materials.

10.7 The proposed development supports objectives outlined by the highlighted planning policy above and other specified national, regional and local guidance by encouraging the use of sustainable building materials wherever possible, that will be in keeping with local character and surroundings.

11.0 WASTE & SITE MANAGEMENT

Sustainability Objective:

To reduce waste generation and disposal through the facilitation of recycling and to use sustainable methods of construction.

Context

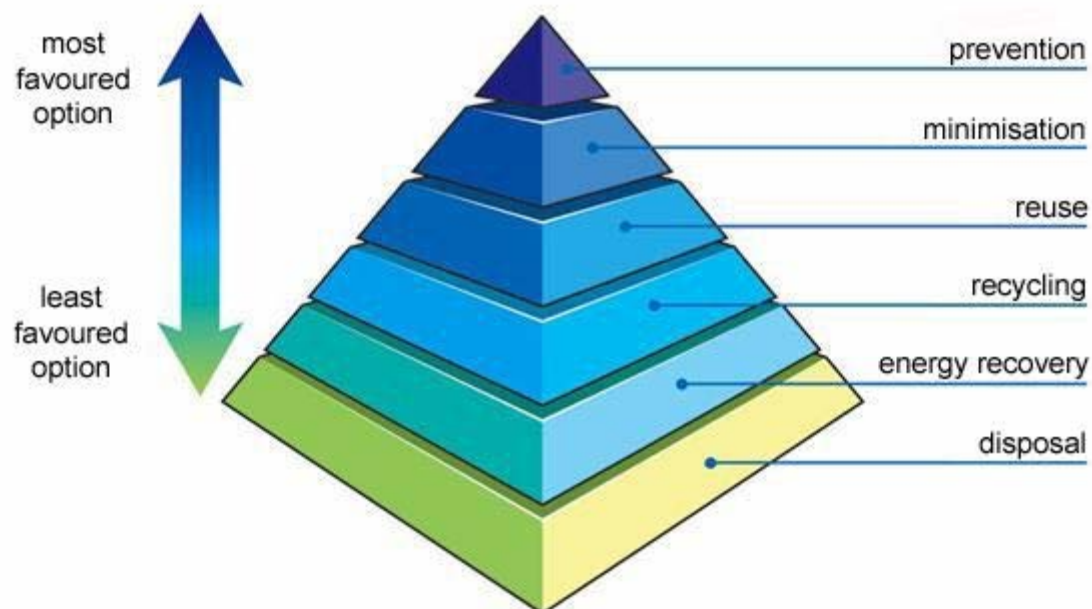
11.1 All building activity is environmentally damaging. The key to sustainable design and construction is to minimise the impact the building has on the environment. Good construction site practices are essential to minimise potential impacts during this phase, such as noise and dust nuisances. Effective site waste management must also be implemented.

11.2 The UK faces major challenges to sustainable waste management - each year, it is estimated that we generate about 100 million tonnes of waste from households, commerce and industry. About 30% of solid waste produced in the UK is construction waste, and 96% of all waste produced goes direct to landfill, creating risks of contamination from leaching of toxic materials and missing the opportunity to recover latent embodied energy and valuable materials for recycling.

11.3 The minimisation of waste and the increased use of recycled materials therefore form an intrinsic key to resource protection. PPS10⁸ includes the Waste Hierarchy, which is a framework for sustainable waste management setting out the preferential treatment of waste, as Figure 11.1 shows.



Figure 11.1 The Waste Hierarchy



- 11.4 The *South West Sustainability Checklist* refers to questions relating to waste, recycling and composting. This includes Question 6.5 which aims to ‘allow for storage of recyclables in occupied buildings prior to the collection and remove the need for frequent journeys to the local recycling facilities’. Question 7 aims to minimise/manage the waste produced on site to limit diversion to landfill through techniques such as Site Waste Management Plans.
- 11.5 Policy GD-2 of the Local Plan highlights how the design and layout of a development should allow for recycling and waste collection facilities.

Delivery

Waste Management – Construction Phase

- 11.6 The design for the proposed development has addressed, and will continue to take into consideration, measures to prevent and minimise waste while also delivering foodstore, cinema, retail, restaurant and residential apartments that are cost effective to build, maintain and occupy.
- 11.7 The design team will aim to 'design out' waste through the consideration of construction techniques, the use of prefabricated elements, and the selection of standard component sizes, in order to prevent and minimise waste generation, and make the construction stage more time efficient and cost effective.
- 11.8 The team is committed to adhering to all relevant waste legislation and implementing best practice with regards to waste management including the following guidance:
- DTI '*Site Waste Management Plans: Guidance for Construction Contractors and Clients Voluntary Code of Practice*';
 - DTI '*Sustainable Construction Brief 2*' - identifies waste minimisation and good construction practises as key to sustainable construction and also identifies other good practice guidance and drivers for sustainability;
 - The ICE Demolition Protocol²²;
 - The Considerate Constructors Scheme; and
 - British Standard 5906: 2005 '*Waste Management in Buildings - Code of Practice*²³.
 - BREEAM and the CSH targets for construction site waste management; and



- The Government's '*Strategy for Sustainable Construction*', which includes a number of milestone targets addressing procurement, design, innovation, people skills, and health and safety, climate change, natural resource protection, and sustainable consumption and production.

11.9 A Construction Environmental Management Plan will be prepared by the contractor to indicate the general management arrangements that should be adopted to control potentially significant impacts during construction, including those relating to waste management. It is anticipated that waste generated from the proposed development will be minimal; as the site will require raising for flood prevention measures, any non-contaminated material from the site will be reused on-site.

11.10 Specific requirements for waste minimisation at individual package/building level will then be set out in the form of a Site Waste Management Plan (SWMP), which will apply the preferred Waste Hierarchy. Further details on the content of the CEMP are provided within Chapter 15.0: Waste and Chapter 16.0: Construction Environmental Management Plan of the stand-alone ES.

11.11 The SWMP will be produced in line with the BREEAM requirements, which will ensure procedures and commitments are put in place for the following:

- Monitoring of waste generated on-site; and
- Setting of targets for minimising the amount of waste generated on-site.

11.12 The principal contractor will be responsible for implementing the SWMP and priority will be given to the re-use of waste on-site or to ensure materials taken off-site are re-used elsewhere or recycled.

Waste Management – Operational Phase

11.13 Sustainable waste management will reduce the production of waste arising from the operation of the building to a minimum. In accordance with best practice guidance, the scheme will ensure that the building has appropriate space allocated for waste storage and containers to hold at least the minimum waste storage volume recommended by British Standard: 5906.

11.14 In order to ensure that residents of the proposed development maximise the opportunities provided for recycling, the applicant has committed to providing internal recycling bins within each dwelling for recyclable waste (separate to any bin provided for other non-

recyclable waste), in line with the CSH requirements. Details of the recycling facilities available to residents and employees of the commercial elements, how to use them and how they are operated will be provided to tenants within the Building User Guide to ensure that sustainable waste management objectives are delivered during the operation of the proposed development.

- 11.15 As such, the provision of both internal and external storage space for recyclable waste is considered to encourage minimisation of waste, in line with the principles of the Waste Hierarchy.

Site Management

- 11.16 In accordance with the standards set by BREEAM and the CSH, best construction practices and methods will be used in executing the construction works so as to avoid or reduce impacts associated with air quality, as well as noise and vibration, as far as possible. These practices and methods should be a contractual requirement. The team have committed to the achieving a best practice score in the Considerate Constructors Scheme (CCS), which ensures the considered management of construction sites.
- 11.17 The site management team will be committed to managing the construction site in an environmentally sound manner in terms of resource use, energy consumption, waste management and pollution. It aspires to ensure the items listed below are complied with during the construction phase:
- Monitor, report and set targets for CO₂ production or energy use arising from site activities;
 - Monitor and report CO₂ or energy use arising from commercial transport to and from site;
 - Monitor, report and set targets for water consumption from site activities;
 - Adopt best practice policies with respect to air (dust) pollution arising from site activities;
 - Adopt best practice policies with respect to water (ground and surface) pollution arising from site activities; or
 - Ensure at least 80% of site timber is reclaimed, reused or responsibly sourced.
- 11.18 It is recommended that a number of mitigation methods and best practice measures are implemented on-site during the construction phase as appropriate, including:



- Vehicles carrying loose aggregate and workings should be sheeted at all times;
- Implementation of design controls for equipment and vehicles designed for materials handling;
- Any completed earthworks should be covered or vegetated as soon as is practicable;
- Regular inspection and, if necessary, cleaning of local highways and site boundaries to check for dust deposits (and removal if necessary);
- Minimise surface areas of stockpiles (subject to health and safety and visual constraints regarding slope gradients and visual intrusion) to reduce area of surfaces exposed to wind pick-up;
- Use of dust-suppressed tools for all operations;
- Ensuring that all construction plant and equipment is maintained in good working order and not left running when not in use;
- Restrict on-site movements to well within the application site and not near the perimeter, if possible;
- Use of water sprays for dampening surfaces/haul roads if necessary; and
- No unauthorised burning of any material anywhere on the application site.

11.19 The proposed development supports objectives outlined by the highlighted planning policy above and other specified national, regional and local and guidance through the production of a SWMP, introducing mitigation measures during construction, using recycled products wherever possible in design, and providing space for recyclables in addition to normal refuse.

12.0 POLLUTION

Sustainability Objective:

To reduce inequalities in the health of the population by improving air quality, and preventing noise and light pollution.

Context

- 12.1 There are many forms of environmental pollution arising from building operation, including noise, smells, light and vibration. A significant proportion of pollution is airborne and is the direct result of fumes, combustion materials, chemicals used in industrial processes, or polluted air from ventilation systems and air conditioning plants. Some pollutants can also escape to soil and groundwater courses. Internal noise and disturbance to neighbours are also important considerations; and light spill from external lighting can sometimes be an annoyance and aggravation to neighbours.
- 12.2 To reduce the depletion of the earth's ozone layer CFCs are banned under the international 'Montreal Protocol' and HCFCs are being phased out. However, these have often been replaced with HFCs, which have an ODP of zero but have a high potential to contribute to global warming and the green house gas effect. The measure of a substance's Global Warming Potential (GWP) is relative to 1 unit of CO₂. Some Halons and HFCs have a GWP in excess of 4,000.
- 12.3 Many substances used in the built environment also contain Volatile Organic Compounds (VOCs). Methane VOCs contain greenhouse gases that contribute towards climate change and non-methane VOCs also have an environmental impact principally related to the formation of ground level ozone or 'smog' that can lead to respiratory problems. In addition, some aromatic compounds (non-methane VOCs) are toxic to human health, are considered carcinogens, and are thought to be associated with 'sick building syndrome'²⁴.



12.4 The *South West Sustainability Checklist* refers to questions relating to Pollution. This includes Question 6.4 regarding protecting water quality, which aims to 'To ensure that the quality of the groundwater, water courses and aquifers is protected during construction and when the site is completed.'

12.5 Policy GD-4, saved in the Local Plan relates to pollution control and public safety and infers that development will not be permitted where it would cause significant harm as a result of inadequate provision for pollution.

Delivery

12.6 During the construction phase, best practice measures will be undertaken to ensure that potential air, noise and vibration, and water pollution will be effectively managed and controlled in line with the BREEAM and CSH requirements. In addition, there will be a requirement for the contractor to achieve a best practice score under the Considerate Constructors Scheme relating to the prevention of pollution on-site.

12.7 Further measures have been committed to in order to ensure that any potential form of pollution associated with the proposed development will be mitigated. To minimise the environmental impacts associated with the release of building related air pollutants, all insulation used within the residential dwellings will have an ODP of zero and GWP of less than 5.

12.8 Furthermore, there is a commitment from the team to minimise watercourse pollution by reducing the potential for silt, heavy metals, chemicals or oil pollution to enter natural watercourses via surface water run-off from buildings and hard surfaces. BREEAM requirements relating to reducing night time light pollution will also be followed to ensure that external lighting is concentrated in appropriate areas and that upward lighting is minimised, reducing unnecessary light pollution, energy consumption, nuisance to neighbouring properties and disturbance to local wildlife.

12.9 The above measures will ensure that the proposed development at South Quay and Foundry Yard, Hayle Harbour complies with the following sustainability criteria:

- BREEAM – credits targeted for low VOCs, minimising watercourse pollution, reducing light pollution and noise attenuation; and
- CSH – credits targeted for low GWP insulants and sound insulation.



12.10 The proposed development supports objectives outlined by the highlighted planning policy above as well as other specified national, regional and local policies as the assessments show the proposed development will, through mitigation as necessary, not have a significant impact with regard to pollution from air quality, noise and vibration and contaminated land.

13.0 ECOLOGY & BIODIVERSITY

Sustainability Objective:

To conserve and enhance the biodiversity of the region by conserving and enhancing areas valued for their diversity of wildlife, habitats, and landscape value.

Context

- 13.1 Biodiversity is the variability among living organisms within an ecosystem; a highly diverse ecosystem is an indicator of a healthy and thriving natural environment. Since we rely so heavily upon the natural environment it is in our best interest, and the interest of future generations, to protect and enhance the biodiversity that surrounds us.
- 13.2 The UK has seen a dramatic loss in biodiversity and ecosystem integrity especially through the latter half of the twentieth century, therefore, the protection and enhancement of biodiversity is a key component throughout the development process.
- 13.3 Species are currently going extinct at a faster rate than any other time in the history of the earth; at present, approximately 16,000 species are threatened with extinction. There are several methods of incorporating biodiversity enhancing techniques into new developments which can be tailored to certain protected species that are likely to be present.
- 13.4 The *South West Sustainability Checklist* has specific questions that relate to Ecology; in particular they refer to Conservation, Enhancement of Ecology and Planting. Question 5.1 aims 'to determine the ecological value of the habitats in and around the site in order to maintain and enhance biodiversity and protect existing natural habitats'. Question 5.2 and 5.3 aim to 'to improve and strengthen the ecological value of the site and existing habitats' and 'to improve the ecological value of the site and support the viability of species by linking populations and habitats.' The checklist suggests that these can be achieved if the site has been appropriately surveyed and consideration has been given to new habitats/vegetation and linking with wider ecological units in the design of the proposed development.



13.5 Policy CC-6 to CC-13 address the importance of nature conservation. Policy CC-7 states:

'Proposals for development which would significantly harm the nature conservation value interest of a site of special scientific interest will not be permitted.'

13.6 Policy CC-9 explains that:

'Proposals for development which would cause significant harm to a protected species or its habitat will not be permitted.'

Delivery

13.7 The terrestrial habitat within the application site is of limited value compared to the surrounding land and development sites in the vicinity of Hayle Harbour.

13.8 The most important species found at the application site was petalwort, which is fully protected under Schedule 8 of the Wildlife & Countryside Act 1981 and listed in the EC Habitats Directive. Only relatively small numbers of the plant are found on South Quay. Mitigation is proposed in the form of translocation of any sizeable colonies of petalwort found on South Quay, as agreed with the LPA and Natural England through the production of the Petalwort Translocation and Monitoring Plan.

13.9 The limited impacts of the proposed development would be experienced during the construction and the operational phase and will affect both species and habitats. Nevertheless, the design team have stated a number of objectives with regards to ecology and biodiversity to maximise opportunities to bring about a positive change in the biodiversity of the location and increase access to nature for future users of the site including:

- Positively manage the Triangular Spit and its key features (through the implementation of the Access Management Plan and the incorporation of information boards that will inform visitors on the significance of the local natural environment and key features of the Triangular Spit, including advice about responsible use);
- Creation of suitable habitat for petalwort within the public realm element of the proposal, enabling potential translocation within the development area, if possible;



-
- Creation of suitable habitat that would support other plant species of note that occur on South Quay: balm-leaved figwort and ivy broomrape, if possible;
 - The incorporation of bird and bat boxes; and
 - Landscape planting that includes flowering species of known wildlife benefit (see email below).
- 13.10 The planned open spaces will include landscaped areas, which the team will aim to maximise in terms of their ecological value, as shown by the commitment to achieve credits under BREEAM and the CSH for ecological enhancement. As detailed design of the building progresses, advice will be sought from a suitably qualified ecologist to ensure that the landscaping of the open space areas will play a positive role in mitigating the impacts of increased pressures on urban land and contributes towards both an increase in the quality of the urban environment and the biodiversity value of the site.
- 13.11 The above ecological strategy accords with the following sustainability criteria:
- Regional and Local Planning Policy; and
 - CSH and BREEAM – the maximum possible number of credits have been targeted by the team under the land use and ecology categories.

14.0 WELLBEING

Sustainability Objective:

To create and sustain vibrant communities, addressing a deficiency in the provision of services to the local community and recognising the needs of everyone.

Context

- 14.1 Well-being differentiates itself from considerations such as standard of living by not focussing solely on economic factors; rather, it is closer in definition to quality-of-life and so takes a more holistic approach. As such, promoting well-being focuses on enabling communities and individuals to live healthy, happy lives. This includes ensuring that individuals have good access to housing, health care, education, open space and employment opportunities but also that individuals' pursuit of these is not at the detriment of their wider communities' well-being. In this sense, well-being embodies true sustainability in all its three facets: environmental, economic, and social.

Delivery

- 14.2 The proposed development will provide optimum use of a previously developed site, with a development density that has been fully maximised based on local context and design principles. Its location within Hayle is ideal to support both residential and retail uses, with excellent planned provision of local transport and community facilities; therefore the proposed development is considered to be consistent with the local area.
- 14.3 The proposed development is anticipated to result in the generation of construction employment opportunities in addition to the anticipated operational employment opportunities from the proposed retail uses on-site. Both the construction and operational employment generation is considered to result in a highly beneficial impact for the local area, particularly given the lasting impacts of the recent economic crisis and



the continued effects on out-migration of the 16-25 year old population seeking employment as discussed in further detail within Chapter 13.0: Socio-Economic within the ES.

- 14.4 The proposed development will provide 30 housing units that will afford Hayle with a greater breadth of dwelling type built to a high sustainability and liveability standard. The scheme has been designed in order to maximise the wellbeing benefits to these occupants, without detriment to the surrounding buildings and users. As part of the development, private amenity spaces will be provided to create a series of spaces for all building users to enjoy – a commendable achievement on a constrained site of this nature.
- 14.5 In addition, the introduction of the considerable public realm provision particularly the promenade and proposed footbridge linking the site to Penpol Terrace and the Foundry town centre will create a unique new civic amenity space that can be enjoyed by both future residents and the existing local community.
- 14.6 In accordance with the requirements of the targeted BREEAM and CSH credits, the proposed development will incorporate the principles of 'Secured by Design' to assist in reducing the opportunity for crime and fear of crime to create a safer and more secure environment for the residents and the local community. Finally, the applicant has committed to designing all of the proposed dwellings to comply with the Lifetime Homes standards, which will ensure that each home within the proposed development is accessible to everybody and the layout can be easily adapted to fit the needs of future occupants.
- 14.7 Overall, the proposed development will also bring about important socio-economic benefits for the local community and is considered to bring forward considerable benefits to the local area and kick-start the regeneration of the harbour at a time when the current baseline social and economic conditions require intervention to alleviate the deprivation experienced.
- 14.8 The socio-economic and health and wellbeing benefits of the proposed development accord with a number of best practice sustainability criteria, including:
- National, Regional and Local Planning Policy Drivers; and
 - CSH and BREEAM – the majority of health and wellbeing credits have been targeted by the team.

15.0 SUMMARY

- 15.1 Cornwall Council are committed to achieving the sustainable development of the County while having regard to the future of not only Hayle but Cornwall and the South West of England as a whole. As a result, the planning policies and development standards set for this area emphasise the importance of ensuring social progress and equality of opportunity; protection of the built and natural environment; the prudent use of natural resources; and the maintenance of high and stable levels of economic growth and employment.
- 15.2 It is imperative, therefore, that the proposed development of South Quay and Foundry Yard contributes to local sustainability aims as well as meeting regional and national objectives for sustainable development.
- 15.3 This sustainability statement shows that the proposals are meeting a number of key policy objectives, responding to local needs and requirements and conforming to best practice sustainability criteria applicable to this development.
- 15.4 The proposed development seeks to optimise the use of land, by developing an underused brownfield site, which will contribute to the regeneration aims of the local area.
- 15.5 The proposed development will achieve a minimum 10% reduction of CO₂ emissions against the existing Building Regulations (2010) across the site-wide, incorporating the principles set within Cornwall's Energy Hierarchy. The foodstore element will incorporate a gas-fired CHP in combination with photovoltaic panels. While the tenants for the retail units are unknown (and therefore, the specific building uses are unknown at this time), following the incorporation of energy efficient measures, a number of potential renewable technologies have been identified for these buildings, including air source heat pumps.
- 15.6 Energy efficient measures will be incorporated in the residential element of the proposed development in order to achieve the challenging target for improved energy performance set by the commitment to achieve a CSH Level 4 rating, which requires an improvement in the energy performance of the dwellings by 44% compared to 2006 Building Regulations Part L. Passive design features using the building fabric will be included to reduce the energy consumption and associated carbon dioxide emissions from the development. Two options have been identified to achieve further reductions in CO₂ emissions; the first is to connect to the foodstore's CHP, or an alternate source of low carbon heating, combined with photovoltaic panels. Alternatively, if this is not feasible, the residential development will benefit from a combination of solar technologies – solar thermal panels and photovoltaic panels – to achieve the minimum CSH Level 4 rating. In this way carbon emissions from the development will be reduced in line with the carbon reduction targets set by Cornwall Council.

- 15.7 To reduce pollution associated with increased private car use – such as CO₂, NO_x and particulates emissions, noise and congestion, local public transport opportunities will be highlighted to all new tenants. The development will also incorporate cycle storage facilities to help encourage alternative forms of transport to limit dependency on private car use.
- 15.8 The proposed development has addressed waste minimisation at the early design stage to reduce waste arising during both the construction and operational phases. A Site Waste Management Plan (SWMP) will be developed and implemented during construction and good site management practice will be implemented. Recycling facilities will be provided within all dwellings in addition to appropriate external waste recycling provision.
- 15.9 Potential forms of pollution arising from the construction of the proposed development will be prevented due to the use of sustainable construction methods. In addition, materials used during construction will have minimised environmental impact wherever possible, such as responsibly sourcing of timber should this be used on-site.
- 15.10 To reduce internal water consumption, the dwellings in the proposed development will incorporate water efficient appliances. Ecological recommendations have also been identified for the site, and opportunities for ecological enhancements on-site have been maximised through the incorporation of open spaces with soft landscaping measures throughout the site, which will improve the biodiversity value of the area as part of the overall landscaping strategy.
- 15.11 Finally, the proposed mixed-use of the proposed development will integrate well with existing and proposed developments within the wider Hayle Harbour area, will contribute towards the high demand for additional housing and employment within Hayle and Cornwall, and the design of the buildings will help to promote a healthy and comfortable internal environment for building users and occupants.
- 15.12 In summary, the sustainability assessment has informed the design process by identifying opportunities and constraints for sustainable development, and the appraisal process has considerably strengthened the proposals in terms of its sustainability performance.

16.0 GLOSSARY & ABBREVIATIONS

AQ	Air Quality
BRE	Building Research Establishment
CO₂	Carbon Dioxide
DCLG	Department for Communities and Local Government
DEFRA	Department for Environment, Food and Rural Affairs.
DfT	Department for Transport
EA	Environment Agency
Element	A component part of the landscape (e.g. roads, hedges, trees, walls, buildings).
Emission rate	The quantity of a pollutant released from a source over a given period of time.
Enhancement	Landscape improvement through restoration, reconstruction or creation.
Façade	The face of a reflecting object, such as a building
Flood Plain	A flood plain is an area of land over which river or sea water flows or is stored in times of flood.
FRA	An assessment of the potential risks to a development, the likely effects of the proposals on flood risk to others and whether mitigation would be likely to be effective and acceptable.
FSC	Forestry Stewardship Council
GEA	Gross External Area
Greywater	Wastewater generated from processes such as washing dishes, laundry and bathing.
Groundwater	Groundwater is water located beneath the ground surface in soil pore spaces and in the fractures of geologic formations.
HSE	The Health and Safety Executive

IEEM (MIEEM)	Institute of Ecology and Environmental Management (Member of)
IEMA	Institute of Environmental Management and Assessment
LA	Local Authority
Land use	The primary use of land, including both rural and urban activities.
LDF	Local Development Framework
NO₂	Nitrogen dioxide.
NO_x	Nitrogen oxides.
PM₁₀	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
PPG	Planning Policy Guidance
PPS	Planning Policy Statement
Rainwater Harvesting	Rainwater Harvesting is the collection of water that would otherwise have gone down the drainage system, into the ground or been lost to the atmosphere through evaporation.
RPG	Regional Planning Guidance
SPD	Supplementary Planning Document
SuDS	Sustainable Drainage Systems: An alternative approach to conventional drainage design and implementation that replicates natural drainage and deals with run-off where it occurs.
Surface Run-Off	Surface run-off occurs when rainfall exceeds a soil's maximum saturation level and all surface depressional storage is filled to capacity.
Sustainability	The principle that the environment should be protected in such a condition and to such a degree that ensures new development needs the needs of the present without compromising the ability of future generations to meet their own needs.
TER	Target Emissions Rate
TSO	The Stationary Office

- END -

17.0 REFERENCES

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APPENDIX 1.0: CSH PRE-CERTIFICATION ASSESSMENT SUMMARY

A summary of the predicted Code for Sustainable Homes performance for the proposed development is shown in Table 1.0 below. The table identifies the credits to be targeted in order to achieve the required rating, whether any mandatory elements exist for each credit, and the design team member responsible for actioning the credit requirements. Where more than one design team member has been allocated, this reflects the varying actions required to ensure appropriate compliance evidence is provided.

The design team consists of the following members:

- Client: ING Real Estate Development UK (ING);
- Architect: Mountford Piggot (MP);
- CSH Assessors: Environmental Perspectives LLP (EP);
- Planning Consultant: Planning Perspectives LLP (PP);
- Ecological Consultant: Spalding Associates (SA);
- Mechanical and Electrical Engineer: Buro Happold (BH);
- Acoustic Consultants: Sharps Redmore (SR)

Table 1.0 CSH Pre-Certification Assessment Summary

Section	Credit Ref	Credit Title	Available Credits	Targeted Rating: Level 4	Mandatory Elements?	Responsible	
Energy	ENE 1	Dwelling Emission Rate as defined by 2006 Building Regulations	15	8	YES	MP/BH	
	ENE 2	Building Fabric	2	2	No	MP	
	ENE 3	Internal Lighting	2	2	No	BH	
	ENE 4	Drying Space	1	1	No	MP	
	ENE 5	Energy Labelled White Goods	2	2	No	ING	
	ENE 6	External Lighting	2	2	No	BH	
	ENE 7	Zero or Low Carbon (ZLC) Energy Technologies	2	2	No	EP	
	ENE 8	Cycle Storage	2	0	No	-	
	ENE 9	Home Office	1	1	No	MP	
	Total Credits			29	20		
	Weighted Score (%)			36.5	26.35		
Water	WAT 1	Indoor Water Use	5	3	YES	ING	
	WAT 2	External Water Use	1	1	No	BH/MP	
	Total Credits			6	4		
	Weighted Score (%)			9	6.00		

Section	Credit Ref	Credit Title	Available Credits	Targeted Rating: Level 4	Mandatory Elements?	Responsible
Materials	MAT 1	Environmental Impact of Materials	15	8	YES	MP
	MAT 2	Responsible Sourcing of Materials – Basic Building Elements	6	2	No	ING
	MAT 3	Responsible Sourcing of Materials – Finishing Elements	3	1	No	ING
	Total Credits		24	11		
	Weighted Score (%)		7.2	3.3		
Surface Water Run-off	SUR 1	Management of Surface Water Run-off	2	2	YES	BH
	SUR 2	Flood Risk	2	1	No	BH
	Total Credits		4	3		
	Weighted Score (%)		2.2	1.65		
Waste	WAS 1	Storage of Non-recyclable Waste and Recyclable Household Waste	4	4	YES	MP
	WAS 2	Construction Site Waste Management	2	2	YES	ING
	WAS 3	Composting	1	1	No	ING
	Total Credits		7	7		
	Weighted Score (%)		6.4	6.40		

Section	Credit Ref	Credit Title	Available Credits	Targeted Rating: Level 4	Mandatory Elements?	Responsible
Pollution	POL 1	Global Warming Potential (GWP) of Insulants	1	1	No	MP/BH
	POL 2	NO _x Emissions	3	0	No	-
	Total Credits		4	1		
	Weighted Score (%)		2.8	0.70		
Health and Wellbeing	HEA 1	Daylighting	3	2	No	MP
	HEA 2	Sound Insulation	4	3	No	SR
	HEA 3	Private Space	1	1	No	MP
	HEA 4	Lifetime Homes	4	4	No (Yes for Level 6)	MP
	Total Credits		12	9		
	Weighted Score (%)		14	10.50		
Management	MAN 1	Home User Guide	3	3	No	ING
	MAN 2	Considerate Constructors Scheme	2	2	No	ING
	MAN 3	Construction Site Impacts	2	2	No	ING
	MAN 4	Security	2	2	No	-
	Total Credits		9	9		
	Weighted Score (%)		10	10		

Section	Credit Ref	Credit Title	Available Credits	Targeted Rating: Level 4	Mandatory Elements?	Responsible	
Ecology	ECO 1	Ecological Value of Site	1	0	No	SA	
	ECO 2	Ecological Enhancement	1	1	No	SA	
	ECO 3	Protection of Ecological Features	1	0	No	SA	
	ECO 4	Change in Ecological Value of Site	4	2	No	SA	
	ECO 5	Building Footprint	2	1	No	SA	
	Total Credits			9	4		
	Weighted Score (%)			12	5.33		
OVERALL WEIGHTED SCORE			100%	68.98%			
RATING				Level 4			

APPENDIX 2.0: BREEAM RETAIL PRE-CERTIFICATION ASSESSMENT SUMMARY

A summary of the credit framework for achieving a BREEAM 'Very Good' rating for the proposed development is shown in Table 2.0 below. The summary table highlights the credits that have been targeted as part of the 'Very Good' rating. Against each of the credits, the acronym/abbreviation of the relevant design team member is listed where possible, indicating where we understand the responsibility lies for demonstrating achievement of the credits targeted.

The credit framework we have identified for achieving the target ratings is based on a number of assumptions that will need to be substantiated by team members prior to final confirmation of their feasibility.

Table 2.0 BREEAM Pre-Certification Assessment Summary

Section	Credit Ref	Credit Title	Credits Available	Targeted Credits	Responsible	
				BREEAM Retail 2008		
Management	Man 1	Commissioning	2	1	ING	
	Man 2	Considerate Constructors	2	2	ING	
	Man 3	Construction Site Impacts	4	4	ING	
	Man 4	Building User Guide	1	1	ING	
	Man 8	Security	1	0	-	
	Total Credits			10	8	
	Weighted Score (%)			12	9.60	

Section	Credit Ref	Credit Title	Credits Available	Targeted Credits	Responsible	
				BREEAM Retail 2008		
Health & Wellbeing	Hea 1	Daylighting	1	1	MP	
	Hea 4	High Frequency Lighting	1	1	BH	
	Hea 5	Internal & External Lighting Levels	1	1	BH	
	Hea 8	Indoor Air Quality	1	1	BH/MP	
	Hea 9	Volatile Organic Compounds	1	0.5	MP	
	Hea 10	Thermal Comfort	1	0	-	
	Hea 12	Microbial Contamination	1	1	BH	
	Hea 15	Office Space	2	1	MP	
	Total Credits			9	6.5	
	Weighted Score (%)			15	10.38	
Energy	Ene 1	Reduction of CO ₂ Emissions	15	6	BH	
	Ene 2	Sub-metering of Substantial Energy Uses	1	0.5	BH	
	Ene 3	Sub-metering of High Energy Load Areas & Tenancy	1	0.5	BH	
	Ene 4	External Lighting	1	1	BH	
	Ene 5	Low or Zero Carbon Technologies	3	2	EP	
	Ene 6	Building Fabric Performance & Avoidance of Air Infiltration	1	1	MP/BH	

Section	Credit Ref	Credit Title	Credits Available	Targeted Credits	Responsible
				BREEAM Retail 2008	
	Ene 7	Cold Storage equipment	3	3	BH
	Ene 8	Lifts	2	2	BH
	Total Credits		27	16	
	Weighted Score (%)		19	11.26	
Transport	Tra 1	Provision of Public Transport	5	2	ING
	Tra 2	Proximity to Amenities	1	1	ING
	Tra 3	Cyclist Facilities	2	2	MP/ING
	Tra 4	Pedestrian and Cycle Safety	2	2	MP
	Tra 5	Travel Plan	1	1	ING
	Tra 7	Travel Information Point	1	0	-
	Tra 8	Deliveries & Manoeuvring	1	1	MP
		Total Credits		13	9

Section	Credit Ref	Credit Title	Credits Available	Targeted Credits	Responsible	
				BREEAM Retail 2008		
Weighted Score (%)			8	5.54		
Water	Wat 1	Water Consumption	3	1.5	ING	
	Wat 2	Water Meter	1	1	BH	
	Wat 3	Major Leak Detection	1	1	BH	
	Wat 4	Sanitary Supply Shut-Off	1	0.5	BH	
	Wat 5	Water Recycling	2	0	-	
	Wat 6	Irrigation Systems	1	1	SA	
	Total Credits			9	5	
	Weighted Score (%)			6	3.33	
Materials	Mat 1	Materials Specification	4	2	MP	
	Mat 2	Hard Landscaping and Boundary Protection	1	0	-	

Section	Credit Ref	Credit Title	Credits Available	Targeted Credits	Responsible	
				BREEAM Retail 2008		
	Mat 3	Re-use of Building Façade	1	0	-	
	Mat 4	Re-use of Building Structure	1	0	-	
	Mat 5	Responsible Sourcing of Materials	3	0	-	
	Mat 6	Insulation	2	0	-	
	Mat 7	Designing for Robustness	1	1	MP	
	Total Credits			13	3	
	Weighted Score (%)			12.5	2.88	
	Waste	Wst 1	Construction Site Waste Management	4	2	ING
Wst 2		Recycled Aggregates	1	0	-	
Wst 3		Recyclable Waste Storage	1	1	MP	
Wst 4		Compactor/Baler	1	1	MP	

Section	Credit Ref	Credit Title	Credits Available	Targeted Credits	Responsible
				BREEAM Retail 2008	
	Wst 5	Composting	1	0	-
	Total Credits		8	4	
	Weighted Score (%)		7.5	3.75	
Land Use & Ecology	LE1	Reuse of Land	1	1	SA
	LE2	Contaminated Land	1	1	SA
	LE3	Ecological Value of Site & Protection of Ecological Features	1	0	SA
	LE4	Mitigating Ecological Impact	2	1	SA
	LE5	Enhancing Site Ecology	3	1	SA
	LE6	Long-term Impact on Biodiversity	2	1	SA
	Total Credits		10	5	
	Weighted Score (%)		10	5	

Section	Credit Ref	Credit Title	Credits Available	Targeted Credits	Responsible
				BREEAM Retail 2008	
Pollution	Pol 1	Refrigerant GWP – Building Services	1	0.5	BH
	Pol 2	Preventing Refrigerant Leaks	2	1	BH
	Pol 3	Refrigerant GWP	1	0	-
	Pol 4	NO _x Emissions from Heating Source	3	0	-
	Pol 5	Flood Risk	3	2	BH
	Pol 6	Minimising Watercourse Pollution	1	1	BH/MP
	Pol 7	Reduction of Night Time Light Pollution	1	1	BH/MP
	Pol 8	Noise Attenuation	1	1	SR
	Weighted Score (%)			10	5
Total Overall Score			100	57.20	
Rating				Very Good	

