

Barry Waterfront

Sustainability Statement

August 2009

Main Report

Notice

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Glossary of Terms/Abbreviations

Term/ Abbreviation	Explanation
ABP	Associated British Ports
ASHP	Air Source Heat Pumps
BREEAM	Building Research Establishment Environmental Assessment Method
CEMP	Construction Environmental Management Plan
CHP	Combined Heat and Power
DAS	Design and Access Statement
Dwelling CO2 emission rate ("DER") ¹	"Dwelling CO2 emission rate" means the annual CO2 emissions per unit floor area for space heating, water heating, ventilation and lighting, less the emissions saved by energy generation technologies in or on the dwelling (kilograms per square metre (kg/m ² /year))
EA	Environment Agency
EIA ²	EIA is a procedure that must be followed for certain types of development before they are granted development consent. The requirement for EIA comes from a European Directive (85/33/EEC as amended by 97/11/EC). The procedure requires the developer to compile an Environmental Statement (ES).
ES	The Environmental Statement (ES) is the formal written statement of the findings of the development's environmental impact assessment (EIA). The ES addresses the predicted positive and negative impacts on the environment during the construction, operation and decommissioning of the development.
ESCO	Energy Services Company
GSHP	Ground Source Heat Pumps
Global Warming Potential	Measure of how much a given mass of greenhouse gas is estimated to contribute to global warming.
Heat Loss Parameter ³	"Heat loss parameter" means the heat loss per unit of temperature difference per unit floor area determined by the internal dimensions of surfaces bounding the dwelling, the thermal performance of the materials used in construction and the air permeability of the dwelling envelope (Watts per square metre Kelvin (W/m ² K))
Noise	Unwanted or undesirable sound derived from sources such as road traffic, air traffic or construction works that interfere with normal activities, including conversation, sleep or recreation.
Ozone Depletion Potential	Relative amount of degradation to the ozone layer that a chemical compound can cause
Pedshed	Area within easy walking distance
PS	Planning Statement

¹ http://www.opsi.gov.uk/si/si2007/pdf/uksi_20073437_en.pdf

² <http://www.communities.gov.uk/planningandbuilding/planning/sustainabilityenvironmental/environmentalimpactassessment/>

³ http://www.opsi.gov.uk/si/si2007/pdf/uksi_20073437_en.pdf

PV	Photovoltaics
RIA	Retail Impact Assessment
SPG	Supplementary Planning Guidance
SS	Sustainability Statement
TA	Transport Assessment
UDP	Unitary Development Plan
U value ⁴	The U-value measures how well a building component, e.g. a wall, roof or a window, keeps heat inside a building. For those living in a warm climate the U-value is also relevant as it is an indicator of how long the inside of the building can be kept cold. (W/(m ² K))
Vibration	The transmission of energy through the medium of ground or air resulting in small movements of the transmitting medium, such as a building, which can cause discomfort or even damage to structures if the movements are large enough.
VoGC	Vale of Glamorgan Council
WSHP	Water Source Heat Pumps

⁴ <http://www.builddeskonline.com/sw56126.asp>

1. Introduction

Background

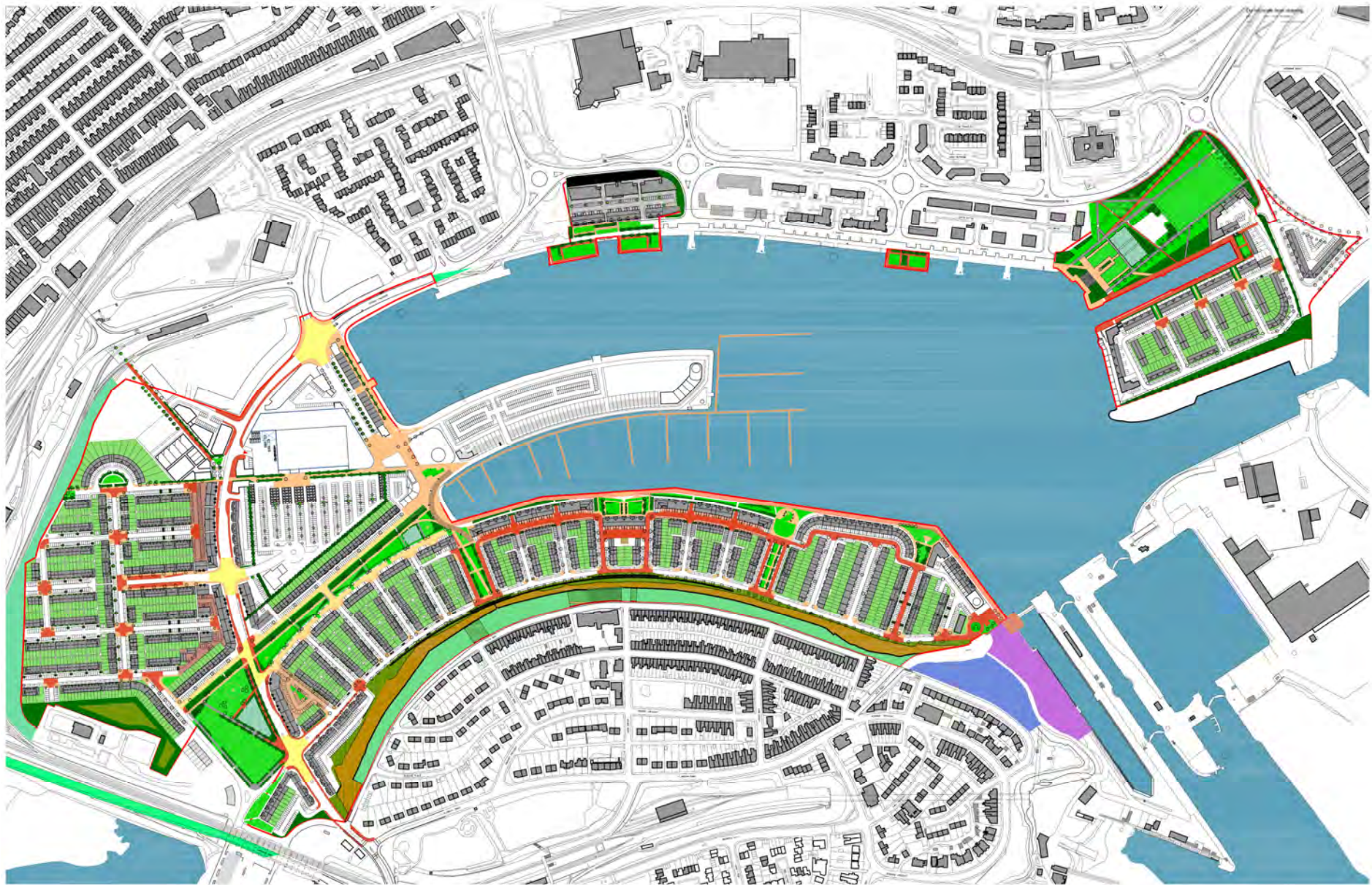
- 1.1 This Sustainability Statement (SS) for the Barry Waterfront development has been prepared by Atkins on behalf of Persimmon Homes, Barratt Homes and Taylor Wimpey (The Consortium). This document has been developed to accord with the requirements of The Vale of Glamorgan Council (VoGC) Supplementary Planning Guidance: Sustainable Development (2006). The SS is a requirement of the VoGC for applications for planning permission.
- 1.2 This statement forms one of a series of documents prepared in support of the outline planning application submitted to the Vale of Glamorgan Council for the regeneration of vacant and derelict land at Barry Waterfront. These include the Planning Statement, abbreviated hereafter to 'PS'. This SS should therefore be read in conjunction with the PS and the plans and supporting documentation to which the PS refers.

Description of Proposed Development

- 1.3 The proposal is located in the heart of the Vale of Glamorgan in Barry. The town of Barry is situated eight miles south-west of Cardiff. The Waterfront is located to the south-west of Barry town centre and is strategically positioned between the town centre, Barry Island and the harbour, presenting an extensive waterfront opportunity.
- 1.4 The development will aim to deliver the Council's vision for the area and will therefore seek to create a *"sustainable new urban quarter with distinctive neighbourhoods, attractive places and community facilities that complement, integrate and link with Barry Town and Barry Island, whilst taking full advantage of the maritime setting of the No.1 Dock"*. (PS)
- 1.5 The rationale informing the development of the vision for the site also highlighted the need to ensure that community facilities and open spaces were considered to enable integration of the development with the existing community. Energy requirements and minimising the carbon footprint of the development are two other key objectives of the Consortium. These priorities have been incorporated into the masterplan through the iterative process described in this report.
- 1.6 The PS describes the development as:
- "Development of vacant land at Barry Waterfront for residential (C3); retail (A1); cafés, bars and restaurants (A3); hotel (C1) and offices (B1). Development of vehicular and pedestrian/cycle access including a new link road, re-grading of site to form new site levels and associated infrastructure works, parking, servicing, landscaping, public realm and public open space provision."*
- 1.7 Further information with regards to location and mix of uses; height of buildings; movement corridors; public open space and public realm, can be found on the four parameter plans submitted in the Design and Access Statement (DAS) as part of the planning application.
- 1.8 The size of the development area is approximately 43ha and could present the introduction of approximately 4,680 new residents.
- 1.9 The development currently under consideration is shown in Figure 1.1, and is composed of four areas around the former no. 1 Dock:
- West Pond
 - South Quay
 - Arno Quay
 - East Quay

- 1.10 The West Pond site is bounded by the mainline rail and Steam Railway lines to the north, west and south. Dock no. 1 and the cliff of Barry Island form the boundaries to the east. The South Quay site is bounded by Dock no. 1 to the north and east, the cliff of Barry Island to the south and the West Pond site to the west. Arno Quay is located on the waterfront in a prime position, acting as a gateway to Barry Waterfront. East Quay is somewhat isolated from the rest of Barry Waterfront, by its geographic location as well as the surrounding infrastructure and built form; however, it has a strong visual connection to the site as a whole.

Figure 1.1 – Illustrative Masterplan SK117G (source: HMA 2009)



Delivering Sustainable Development

UK

1.11 There is international commitment to delivering sustainable development. The UK's shared framework for sustainable development⁵ has interpreted the Brundtland Report's definition of sustainable development: "development which meets the needs of the present without compromising the ability of future generations to meet their own needs," via four key priority areas:

- Sustainable Consumption and Production;
- Climate Change and Energy;
- Natural Resource Protection and Environmental Enhancement; and
- Sustainable Communities.

Wales

1.12 Sustainable Development is seen as the "central organising principle for Government and the wider public sector in Wales,⁶" under the sustainable development scheme prepared by the Welsh Ministers as part of the responsibilities conveyed through the Government of Wales Act 2006, section 79. The Consultation on a new Sustainable Development Scheme for Wales⁷ has interpreted sustainable development as:

"In the context of Wales, sustainable development means enhancing the economic, social and environmental wellbeing of people and communities, achieving a better quality of life for our own and future generations. This must be done in ways which...promote social justice and equality of opportunity, and which enhance the natural and cultural environment and respect its limits - using only our fair share of the earth's resources and sustaining our cultural legacy. Sustainable development is the process by which we reach the goal of sustainability."

1.13 To achieve forms of development that are more sustainable than previous development, proposals must strike an acceptable balance between maximising resource and energy efficiency; minimising environmental impacts; delivering social benefits; and supporting a healthy economy. This is also reflected in the One Wales: One Planet consultation document (November 2008), which states within the Vision that:

"Within the lifetime of a generation [the Welsh Assembly Government] want to see Wales using only its fair share of the earth's resources, and where our ecological footprint is reduced to the global average availability of resources – 1.88 global hectares per person, with each Spatial Plan Area making its full contribution...To achieve this goal over a generation, we will need to reduce by two thirds the total resources we currently use to sustain our lifestyles."

1.14 The land use planning process therefore offers the opportunity to deliver substantial progress towards achieving the Welsh Assembly Government Sustainable Development priorities. In order to achieve this goal, the Sustainable Development Scheme Consultation (One Wales: One Planet) sets the following targets:

- 80-90% reduction in use of carbon-based energy to build on existing 3% per annum reduction target in Wales and ambitions to make all new buildings zero carbon buildings and to move to producing as much electricity from renewable sources by 2025 as consumed;

⁵ Scottish Executive, Welsh Assembly Government, Northern Ireland Office, HM Government 2005, The UK's shared framework for sustainable development, <http://www.defra.gov.uk/sustainable/government/documents/SDFramework.pdf>

⁶ Quotation from One Wales: One Planet: Consultation on a new Sustainable Development Scheme for Wales Summary document November 2008 <http://wales.gov.uk/docs/desh/consultation/081119oneplanetsummaryen.pdf>

⁷ Welsh Assembly Government November 2008, One Wales, One Planet: Consultation on a new Sustainable Development Scheme for Wales, <http://wales.gov.uk/consultations/closedconsultations/sustainable/onewalesoneplanet/?lang=en>

- Move towards becoming a zero waste nation. This will build on our stated goal of achieving 70% recycling of municipal waste by 2025;
- Travel less by car, and create a stronger connection with local economies and communities;
- Source more of our food locally and in season; and
- Do all this in ways which make us a fairer society, building on our commitments to tackling child and fuel poverty.

1.15 The Barry Waterfront masterplan has incorporated the principles behind these targets, in order that the development contributes to their achievement.

Vale of Glamorgan Council

1.16 Policy 2 of the Vale of Glamorgan Council (VoGC) Unitary Development Plan (UDP) encourages sustainable practices in all development proposals. This cites the following approaches to development as favourable:

- *“Proposals which contribute to energy conservation or efficiency, waste reduction or recycling; pollution control; biodiversity and the conservation of natural resources;*
- *Proposals which are located to minimise the need to travel, especially by car and help to reduce vehicle movements or which encourage cycling, walking or the use of public transport;*
- *The reclamation of derelict or degraded land for appropriate beneficial use; and*
- *Proposals which improve the quality of the environment through the utilisation of high standards of design.”*

1.17 As amplification to the contents of Policy 2, VoGC has produced Supplementary Planning Guidance (SPG) on Sustainable Development. This seeks to *“encourage a holistic approach to construction and reduce the impact of development during its lifetime”*, placing a requirement on applicants to consider and demonstrate the manner in which sustainability has been incorporated into scheme development.

Recent Updates

1.18 Since the publication of the SD SPG by VoGC, the Welsh Assembly Government has published various guidance and consultation documents. One such consultation relates to the transport hierarchy⁸ which seeks to add the transport hierarchy to Planning Policy Wales:

“The Assembly Government supports a transport hierarchy in relation to new development that establishes priorities in such a way that, wherever possible, they are accessible in the first instance by walking and cycling, then by public transport and then finally by private motor vehicles.” (Proposed new paragraph 8.1.2)

1.19 A further (now ended) consultation document relates to Planning for Sustainable Buildings⁹. This guidance states that:

“Development proposals should mitigate the causes of climate change by minimising carbon and other greenhouse gas emissions, associated with their design, construction, use and eventual demolition. The overall aspiration is to secure zero carbon buildings... while continuing to promote a range of low and zero carbon (LZC) technologies as a means to achieve this.

⁸ Welsh Assembly Government July 2009 *Consultation on proposed Changes to Planning Policy Wales to support the requirement for travel plans for specific types of development* <http://new.wales.gov.uk/consultations/planning/ppwtransportconsultation/?lang=en>

⁹ Welsh Assembly Government May 2009 *Ministerial Interim Planning Policy Statement 01/2009 Planning for Sustainable Buildings* <http://wales.gov.uk/docs/desh/publications/090507mippssustainablebuildingsen.pdf?bcsi-ac-32EB37A25608E379=18FDF98200000002E/IHV3rUTG5l35qLec9eH21ZvastHqAAAgAAACt6lQCEAwAAAAAALtvDAA>

Development proposals should also include features that provide effective adaptation to and resilience against the current and predicted future effects of climate change, for example by incorporating green space to provide shading, sustainable drainage systems to reduce run-off, and are designed to prevent overheating and to avoid the need for artificial cooling of buildings.”

- 1.20 Other Welsh Assembly Government Guidance that has been considered and adhered to as part of the development of this SS is referenced with the sustainability objectives that have been developed for the site and are presented in section 2 and Appendix A of the SS.

Scope of Sustainability Statement

- 1.21 The Statement has been prepared in accordance with the requirements of the VoGC Sustainable Development SPG and aims to demonstrate how the policies of the Welsh Assembly Government will be delivered by this project. The SPG requires that all Statements of Sustainability address the following:
- Site layout and density;
 - Transport and movement;
 - Energy conservation and efficiency;
 - Low/zero carbon energy sources and systems;
 - Low embodied energy material and resource efficiency;
 - Street lighting to minimise pollution;
 - Water conservation and sustainable drainage;
 - Waste management; and
 - Landscape, Trees and Ecology.
- 1.22 The SS comprises a written explanation of the sustainability principles and characteristics of the proposed development. This is supported by a completed Sustainability Checklist in the format required by the VoGC SPG, which is presented as Table 3.2.

2. Approach to preparation of Sustainability Statement

Introduction

2.1 The preparation of the SS has been informed by the following process, which has been developed from the general principles of the established methodology for conducting Sustainability Appraisal¹⁰ (SA), incorporating Strategic Environmental Assessment¹¹ (SEA), of development plans. As outlined below, this approach encompasses the requirements of the SPG, building upon them to create a broader sustainability analysis based on the specific sustainability considerations of the site, as well as wider sustainable development guidance.

2.2 The approach comprises the following sequential stages:

- Development of the Sustainability Appraisal Framework based on:
 - Review of Policies, Plans and Programmes;
 - Identification of Key Issues and Opportunities through Baseline Analysis;
 - Final Sustainability Appraisal Framework.
- Assessment of the Barry Waterfront masterplan against the Sustainability Appraisal Framework (2 stages: First Iteration: Design Stage Appraisal to ensure sustainability is considered from the outset; Second Iteration: Assessment of Final Masterplan to demonstrate compatibility with local sustainability requirements); and
- Development of Sustainability Supporting Statement (this document).

2.3 The principal tasks under each of the stages are outlined in this section.

Development of Sustainability Appraisal Framework

2.1.4 In order to assess the characteristics of the Barry Waterfront masterplan in terms of its potential ability to achieve sustainable development, it was necessary to develop a framework of assessment questions and criteria for use as an appraisal tool. The development of this Sustainability Appraisal Framework involved an examination of the key issues and opportunities of the site, as well as analysis of a wide range of common sustainability themes contained within relevant planning and sustainability plans, policies and guidance. This process is detailed in Appendix A.

Plans, Policies and Guidance Considered

2.4 The need to achieve sustainable development is in accordance with Welsh Assembly Government guidance ('Creating Sustainable Places'), which seeks to embed sustainable development in all regeneration projects. Sustainable development principles have been derived from the analysis of key guidance, alongside the criteria used for EcoHomes 2006 to which the site is registered. The analysis of key guidance included the following documents:

- EcoHomes 2006 Pre-Assessment Estimator v1.2;
- Vale of Glamorgan Supplementary Planning Guidance (SPG) 'Sustainable Development';
- Vale of Glamorgan SPG 'Barry Waterfront: Development Principles';
- Vale of Glamorgan Unitary Development Plan (UDP);

¹⁰ Local Development Plan Manual, Welsh Government Assembly (June 2006) Planning: Delivering for Wales Programme

¹¹ Sustainability Appraisal of Regional Spatial Strategies and Local Development Documents, Guidance for Regional Bodies and Local Planning Authorities, ODPM, November 2005.

- Vale of Glamorgan Local Development Plan (LDP) Initial Sustainability Appraisal Report (ISAR);
- Technical Advice Note (TAN) 12:Design;
- Wales Spatial Plan;
- Wales Spatial Plan Update 2008 including SA/SEA;
- Welsh Assembly Government July 2009 Consultation on proposed Changes to Planning Policy Wales to support the requirement for travel plans for specific types of development;
- Welsh Assembly Government May 2009 Ministerial Interim Planning Policy Statement 01/2009 Planning for Sustainable Buildings
- SA/SEA guidance in the LDP Manual (advisory);
- The Vale of Glamorgan Municipal Waste Management Strategy (2004); and
- Manual for Streets.

2.5 The analysis of the above documents and guidance helped to provide the underlying requirements for the sustainability of the development from a Planning Policy and guidance perspective- the 'generalised requirements'. These requirements are included in a table in Appendix A. Ecohomes and the Code for Sustainable Homes are given more explanation below. Adherence to Ecohomes criteria is especially important for this development, and the achievement of these standards will only be possible if considered as a part of the holistic design process from the outset.

Ecohomes 2006

The development site is registered under Ecohomes 2006. It is targeted that the development achieves Ecohomes 'excellent'. Due to the scoring system required under Ecohomes, it may not be necessary for all of the headline requirements to be targeted. Therefore, a design workshop was undertaken, comprising members of the design team, in order to discuss and refine the criteria to be targeted within these requirements. Based on local conditions and requirements, this tailored approach to the development led to specific targets and levels of achievement under each rating to be aimed towards under Ecohomes criteria, for the development to be assessed against in order that the development achieves an 'excellent' rating.

The Vale of Glamorgan SPG on Sustainable Development states that, in relation to Ecohomes *'Developers are encouraged to make use of such schemes and to consider the environmental issues at an early stage in the design process, in order to maximise the opportunities of achieving a higher rating'*. The process outlined in this report will ensure that the site achieves its maximum potential in terms of achieving sustainable development.

The Code for Sustainable Homes

2.6 In addition to the above review of relevant plans, policies and programmes, the Code for Sustainable Homes: Technical Guide (April 2008) published by Communities and Local Government (CLG) was used as a comparator alongside the EcoHomes criteria. Although not formally used as part of the assessment, the Code allowed more detailed recommendations to be made at the design stage assessment where it was felt improvements could be made to the overall sustainability of the Masterplan. This is only applicable to the first iteration of the assessment, where detailed recommendations were made for the further development of the masterplan.

Baseline Study

In the context of the Barry Waterfront development, achieving integration of this substantial new influx of population into the existing established communities of Barry Island to the south and Barry Town to the north and west is considered critical to achieving the overall development objectives and, moreover, environmental, social and economic sustainability. As such, the methodology included an analysis of the existing baseline conditions in and around the site, comprising consideration of the following:

- Audit of the type and size of existing social and community facilities, including school places within 400m, 600m, 800m, 1000m and 1300m pedsheds from all entry points into the site, presented as a map and schedule;
- Demographic profile of the wards likely to be most directly affected by the development, using published statistical sources, including the Index of Multiple Deprivation 2005;
- Review of all relevant environmental information including the Phase I Habitat Survey of the site (prepared by Soltys Brewster Ecology Ltd. in March 2008); Flood Risk Assessment and associated data (prepared by Arup and the Environment Agency (EA)); LANDMAP; and the findings of Site Investigation works (currently under preparation by Arup).

2.7 The Sustainability Baseline information is provided in more detail in Section A.2 of Appendix A.

Key localised objectives and requirements

- 2.8 The development of the Sustainability Appraisal Framework involved the amalgamation of the requirements of Plans, Policies and Guidance considered, summarised into 'assessment questions'. Appendix A demonstrates which requirements from the guidance were incorporated into the original framework for assessment.
- 2.9 The baseline information provides an indication of the underlying social, environmental and economic issues, opportunities and constraints provided by the site. With this information, alongside initial discussions with the design team and the local authority on the specialist sustainability requirements of the project, more tailored requirements for the development site were established. The assessment will show where potentially feasible requirements have been included or not. This information is presented in Appendix B as the 'local requirements' supported by a brief rationale for each departure from the 'generalised requirements'. Appendix B also shows the latest thinking in terms of sustainability objectives for each of the requirements in cases where the generalised and local requirements are considered to fall short in sustainability terms.
- 2.10 For the second iteration of assessment, the appraisal will demonstrate where subsequent studies and work have revealed where certain elements are not applicable as they have been determined as unfeasible environmentally, socially, or economically.
- 2.11 The requirements of changes in Welsh Assembly Guidance since the first iteration and original development of the Sustainability Appraisal Framework have also been integrated into the most recent version of the Sustainability Appraisal Framework, in order to ensure that the final masterplan reflects the latest sustainability requirements.
- 2.12 This approach reflects the best practice of established SA/SEA process in drawing together common sustainability themes and therefore goes beyond the requirements of the SPG, thus enabling a thorough and integrated analysis and outcome. The methodology has allowed the identification of a range of locally specific recommendations in order to maximise the sustainable development potential of the site, as well as meeting the aspirations of The Consortium in respect of the sustainability credentials sought for the development.
- 2.13 Locally specific sustainability requirements have been grouped in the following way, in accordance with the requirements of the SD SPG, with the addition of further requirements where necessary to broaden the scope of the appraisal:
- Management;
 - Low/Zero Carbon Energy Sources and Systems;
 - Site Layout and Density, Energy Conservation and Efficiency/ Street Lighting to Minimise Pollution;
 - Low Embodied Energy Material and Resource Efficiency;
 - Waste Management;
 - Water conservation and sustainable drainage;

- Landscape, Trees and Ecology;
- Geology;
- Local Character and Urban Design;
- Transport and Movement;
- Pedestrians: convenient routes, which are easy, safe and attractive to use;
- Cyclists: direct, safe and attractive routes;
- Public Transport;
- Private Motor Vehicles;
- Housing Needs;
- Design for Change;
- Design Out Crime;
- Health and Well Being;
- Community Facilities; and
- Retail.

2.14 The final list of sustainability assessment questions incorporated into the Sustainability Appraisal Framework and used for the Barry Waterfront masterplan assessment is shown below in Table 2.1. The table also demonstrates where the relevant elements of the VoGC SPG have been covered.

Table 2.1 – Final Sustainability Assessment Questions

Summary Assessment Questions In accordance with the locally adjusted requirement, does the masterplan...?		Relevant elements of SPG Sustainability Checklist
National Targets/EcoHomes/ BREEAM		
The overall scoring for Ecohomes is a matter for the Ecohomes Assessor employed by the developer. This assessment seeks to ensure that the elements of the Ecohomes assessment have been considered alongside other sustainability principles.		Undertake an EcoHomes, BREEAM, or NHER standards assessment to determine the overall environmental performance of the proposal; An EcoHomes assessment is required for affordable housing funded through Social Housing Grant; and BREEAM assessment is required for WAG procured buildings.
Management		
1	Include provision for a home user guide?	Undertake an EcoHomes, BREEAM, or NHER standards assessment to determine the overall environmental performance of the proposal.
2	Seek that the Considerate Constructors Scheme is signed up to?	Undertake an EcoHomes, BREEAM, or NHER standards assessment to determine the overall environmental performance of the proposal.
Low/Zero Carbon Energy Sources and Systems		
3	Integrate all feasible	Solar Photovoltaics (PVs);

Summary Assessment Questions In accordance with the locally adjusted requirement, does the masterplan...?		Relevant elements of SPG Sustainability Checklist
	methods of renewable and low emission energy sources?	Solar water heating; Small scale wind; Biomass; Combined Heat and Power (CHP); and Geo thermal.
4	Layout and orientation maximise passive solar gain and natural daylighting and ventilation?	Topography and site orientation; Orientation of buildings utilises and benefits from solar gain; Passive solar design; Natural daylighting; and Natural ventilation.
5	Seek to provide energy efficient boilers and white goods?	Reduce energy consumption e.g. installation of A rated appliances, condensing boilers, etc.
6	Require that all lighting is energy efficient and minimises pollution?	Street lighting designed to reduce light pollution and other environmental impacts; and Low energy street and other external lighting.
7	Allow for the provision of internal or external drying space?	Provision of internal drying space or external communal drying area.
Low embodied energy material and resource efficiency		
8	Include the implementation of decisions relating to the use and sourcing of low embodied materials and resources?	Use reclaimed or recycled materials; Materials sourced from sustainable sources e.g. FSC certified timber; Use natural energy efficient materials e.g. timber, stone etc ; and Sustainable construction techniques e.g. straw bale, green roofing etc.
9	Include the characteristics likely to achieve a reduced CO₂ emissions rating?	Undertake an Eco-homes, BREEAM or NHER standards assessment to determine the overall environmental performance of the proposal; Passive solar design; Natural daylighting; Natural ventilation; Reduce energy consumption e.g. installation of A rated appliances, condensing boilers etc; Provision of internal drying space or external communal drying area; Solar Photovoltaics; Solar Water Heating; Small Scale Wind; Biomass; Combined Heat and Power (CHP);

Summary Assessment Questions In accordance with the locally adjusted requirement, does the masterplan...?		Relevant elements of SPG Sustainability Checklist
		Biomass and Fuel From Waste; and Ground Source Heat Pumps.
10	Include characteristic that will result in the HLP being less than or equal to 1/1W/M2K?	Undertake an Ecohomes, BREEAM or NHER standards assessment to determine the overall environmental performance of the proposal.
11	Include insulation with a GWP of less than 5?	Undertake an Ecohomes, BREEAM or NHER standards assessment to determine the overall environmental performance of the proposal.
12	Re-use contaminated land?	Undertake an Ecohomes, BREEAM or NHER standards assessment to determine the overall environmental performance of the proposal...
Waste Management		
13	Propose a waste management strategy, to encourage the movement of waste up the hierarchy?	Internal recycling/separation facilities; Communal external recycling/separation facilities; and Re-use/recycle existing building materials.
14	Demonstrate a commitment and a strategy to monitor, sort and recycle construction waste on site including the reuse of building materials?	Implementation of an on site waste management scheme during construction.
Water conservation and sustainable drainage		
15	Incorporate the use of features which will encourage the conservation of water resources alongside safeguarding water quality?	Installation of dual water supplies e.g. rainwater run-off for toilets and/or grey water reuse; Installation of low/dual flush toilets; Installation of rainwater collectors for landscape maintenance and/or domestic garden use; Installation of water efficient A rated white goods; and Use natural techniques, such as reed bed filtration system to treat waste water.
16	Incorporate the appropriate use of SUDS?	Installation of Sustainable Urban Drainage; Soakaways; Permeable surfacing; Swales and basins; Infiltration trenches and filter drains; Ponds and wetlands; Onsite stormwater detention; and Green roofs.
17	Demonstrate flood risk mitigation techniques?	Topography and site orientation.

Summary Assessment Questions In accordance with the locally adjusted requirement, does the masterplan...?		Relevant elements of SPG Sustainability Checklist
Landscape, Trees and Ecology		
18	Seek to protect and enhance ecology wherever possible?	Landscape/amenity impacts including trees and green spaces; Ecological impacts assessed; EIA of other ecological assessment/surveys conducted; Retention of existing trees as part of the site layout/landscaping scheme; Incorporation of ecological mitigation or compensation measures; Creation of new wildlife habitats; Inclusion of post-development management, monitoring and review; and Plant locally sourced indigenous trees and plants.
19	Achieve an adequate footprint ratio?	Undertake an Ecohomes, BREEAM or NHER standards assessment to determine the overall environmental performance of the proposal.
20	Retain a visual relationship with the waterfront and the town?	Boundary features such as hedges, stone walls and tree lines; and Local building characteristics and important views.
21	Propose a sustainable landscaping strategy?	Landscape/amenity impacts including trees and green spaces; Retention of existing trees as part of the site layout/landscaping scheme; Retention/enhancement of existing landscape features.
22	Include an attractive open space network including space for children's play?	Landscape/amenity impacts including trees and green spaces; Allow for easy and safe access to public open areas
23	Include a network of multipurpose wildlife corridors and pedestrian routes?	Landscape/amenity impacts including trees and green spaces; Maintains or improves the existing pedestrian and cycle network; Allow for easy and safe access to public open areas; Safe movement for children, pedestrians and disabled persons
Geology		
24	Contribute to the protection of any geological or geomorphological sites of significance?	Requirement not included in SPG Sustainability Checklist.
Local Character and Urban Design		

Summary Assessment Questions In accordance with the locally adjusted requirement, does the masterplan...?		Relevant elements of SPG Sustainability Checklist
25	Lead to the enhancement of local character and heritage through design?	Archaeological or historic interests; Boundary features such as hedges, stone walls and tree lines; Local building characteristics and important views
Transport and Movement		
26	Seek to reduce the need to travel through the provision of home offices and mixed use development?	Mix of uses.
See below		
1. Pedestrians Convenient routes, which are easy, safe and attractive to use through		
27	Reflect the manual for streets, and provide safe, convenient, easy and attractive routes for pedestrians?	Accessibility to neighbouring developments, local services and facilities; Connections to existing pedestrian, cycle, rights of way and public transport; Infrastructure layout accords to the transport user hierarchy; Maintains or improves existing pedestrian and cycle network; Safe movement for children, pedestrians and disabled persons; and Maintain the transport user hierarchy.
2. Cyclists: Direct, safe and attractive routes		
28	Reflect the manual for streets, and provide safe, direct and attractive routes for cyclists?	Connections to existing pedestrian, cycle, rights of way and public transport; Infrastructure layout accords to the transport user hierarchy; Maintains or improves existing pedestrian and cycle network; Safe movement for children, pedestrians and disabled persons; Provisions made for cyclists e.g. secure cycle storage; and Maintain the transport user hierarchy.
3. Public Transport		
29	Create good access to public transport?	Connections to existing pedestrian, cycle, rights of way and public transport; Infrastructure layout accords to the transport user hierarchy; Safe movement for children, pedestrians and disabled persons; Encourages public transport use;

Summary Assessment Questions In accordance with the locally adjusted requirement, does the masterplan...?		Relevant elements of SPG Sustainability Checklist
		Maintain the transport user hierarchy
4. Private Motor Vehicles		
30	Road design reflect the transport user hierarchy?	Infrastructure layout accords to the transport user hierarchy; Maintain the transport user hierarchy.
Socio-economic considerations		
31	Seek to meet the housing needs of the local community?	A range of house types including family housing. The level of affordable housing provision will depend on availability of social housing grant and scheme viability.
Design for Change		
32	Layout reflect the potential need for adaptation over time?	There will be flexibility in the use of buildings e.g. potential for change between A3, C3 or B1 uses within specific locations are highlighted in the parameter plan.
Design out Crime		
33	Seek to design out crime?	Minimise the opportunities for crime
Health and well being		
34	Include the provision of adequate daylighting?	See site layout
35	Incorporate adequate sound insulation?	
36	Provide private or semi private space?	Design principles in the Design and Access Statement identify the need for demarcation of private or semi private spaces.
Community facilities		
37	Include the provision of additional facilities for community use?	Accessibility to neighbouring developments, local services and facilities
38	Lead to the establishment of the waterfront as a social and leisure focus for the town?	Mixed use development proposed
39	Lead to the provision of educational facilities for the town?	Mixed use development proposed
Retail		
40	Incorporate the appropriate level of retail provision?	Mixed use development proposed

- 2.15 The final framework for assessment is presented in Table B.1 in Appendix B.

Iterative Assessment

- 2.16 Once established, the key localised objectives and requirements to ensure the sustainable development of the site were used to analyse the masterplan in two iterations. The first assessment iteration involved the analysis of the draft masterplan document against the requirements, and is shown in Appendix C. From this, recommendations to improve the sustainability of the masterplan at the design stage were drawn up. These recommendations were, where appropriate, integrated into the design of the development.
- 2.17 The assessment key is shown in Table 2.1. It can be seen that the scoring methodology differs between the first and second iteration of assessment. The first iteration covered the early design stage of development, ahead of the undertaking of numerous feasibility studies. Recommendations were sought to be ambitious in order that the feasibility studies explored the potential of the site. Following this stage, the final masterplan is intended to include all the potential sustainability features deemed feasible, determined through survey work and other investigative studies undertaken as part of the EIA, Low Carbon Strategy and Ecohomes pre-estimation. Thus, the assessment will only score red or orange (negative effects), where there is potential for the sustainability criteria to be achieved, but the masterplan has not been deemed to incorporate these features.
- 2.18 This SS presents the results of the second iteration of the assessment, undertaken on the final masterplan, to accompany the masterplan for submission. It should be noted that the assessment considers the predicted effects of the final masterplan as shown on the plan, during operational phases, and not the phases up to its completion, including construction- this will be covered as part of the EIA. However, these phases will be considered where specifically required in the SD SPG such as for biodiversity effects.

Table 2.2 – Assessment Key

1. First Iteration Assessment	2. Final Iteration Assessment	Predicted Effect
Requirement not addressed at all where required	Requirement not addressed at all where feasible	Negative
Requirement insufficiently addressed and unlikely to be achieved if not addressed at early stage	Requirement insufficiently addressed where feasible	Negative
Effect unknown/ Level of detail yet to be determined	Effect unknown/level of detail yet to be determined	Neutral
	Achievement of requirement unfeasible	Neutral
Requirements met partially and further detail required	Requirements met partially	Positive
Requirements met in full	Requirements met in full	Positive
Requirements exceeded	Requirements exceeded	Positive

Supporting Documents

2.19 In order to undertake the assessment, the following documents, which comprise the full scope of accompanying documents for the planning application, were used alongside the masterplan itself:

- Planning Statement;
- Design and Access Statement;
- Transport Assessment;
- Retail Impact Assessment;
- Environmental Statement;
- Low Carbon Strategy; and
- Contaminated Land Remediation Methodology.

Low Carbon Strategy

2.20 The Low Carbon Strategy has been undertaken as part of the development of the Sustainability Strategy throughout the development of the masterplan design. The Low Carbon Strategy has followed the best practice of looking to reduce consumption first. This has led to strong consideration of the energy factors in the overall development of the masterplan, taking into account

- Orientation for passive solar gain;
- Orientation for solar hot water or Photovoltaic collection;
- Surface to volume ratio of built form; and
- Compact load centres.

2.21 Following this, a study looked at the available types of low and zero carbon energy sources (LZC) and considered their suitability and application to the development. The study referred to the relevant tier 2 documents supporting building regulations:

- Low or Zero Carbon Energy Sources – Strategic Guide (DCLG); and
- Domestic Heating Guide (DCLG).

2.22 The following technical approaches were considered by the study.

- Ground Source Heat Pump;
- Water Source Heat Pump;
- Air Source Heat Pump;
- Micro Wind – individual properties;
- Small Scale Wind;
- Large Scale Wind;
- Solar Thermal;
- Photovoltaics;
- Community Heating – Thermal only;
- Community Heating – Centralised CHP;
- Nearby Biomass Power Station; and
- Micro CHP.

3. The Contribution of Barry Waterfront to Sustainable Development

Introduction

- 3.1 The masterplan proposals for Barry Waterfront have been assessed against the identified sustainability requirements; and the design process has integrated key considerations arising from the assessment process.
- 3.2 As detailed in section 2, at the design development stage, the Sustainability Appraisal Framework was used to assess initial ideas, leading to the development of a series of recommendations, which were explored during further iterations of the masterplan development. The results of the assessment at the design development stage (first iteration) are outlined in Appendix C.
- 3.3 This chapter summarises the results of the assessment of the final masterplan for submission (second iteration). The full assessment results for the second and final assessment iteration are included in Appendix D, which also includes the results from the first iteration of assessment, demonstrating how the sustainability appraisal process has led to the improvement of sustainability within the masterplan.
- 3.4 Table 3.1 provides a summary of the assessment results of the final masterplan. In accordance with the SD SPG, this section also includes the completion of the Sustainability Checklist (Table 3.2) included in the SPG, which highlights how the development will contribute to the sustainable development priorities of the VoGC and the Welsh Assembly Government, as outlined in section 1. As the process of developing Sustainability assessment questions led to the addition of further requirements for appraisal, this section also includes additional headings over and above those required in the SPG as detailed in section 2. This has enabled a more thorough demonstration of the ability of the masterplan to contribute to sustainable development.

Table 3.1 – Summary of Assessment Results

KEY: Final Iteration Assessment	
Requirement not addressed at all where feasible	
Requirement insufficiently addressed where feasible	
Effect unknown/level of detail yet to be determined	
Achievement of requirement unfeasible	
Requirements met partially	
Requirements met in full	
Requirements exceeded	

No	In accordance with the locally adjusted requirements, does the masterplan...?	Score
Management		
1	Include provision for a home user guide?	Requirements met in full
2	Seek that the Considerate Constructors Scheme is signed up to?	Requirements exceeded
Low/Zero Carbon Energy Sources and Systems		
3	Integrate all feasible methods of renewable and low	Requirements

	emission energy sources?	met in full
Site Layout and Density, Energy Conservation and Efficiency/ Street Lighting to Minimise Pollution		
4	Layout and orientation maximise passive solar gain and natural daylighting and ventilation?	Requirements met in full
5	Seek to provide energy efficient boilers and white goods?	Requirements met partially
6	Require that all lighting is energy efficient and minimises pollution?	Requirements met in full
7	Allow for the provision of internal or external drying space?	Requirements met in full
Low Embodied Energy Material and Resource Efficiency		
8	Include the implementation of decisions relating to the use and sourcing of low embodied materials and resources?	Requirements met partially
9	Include the characteristics likely to achieve a reduced CO ₂ emissions rating?	Requirements met in full
10	Include characteristics that will result in the HLP being less than or equal to 1/1W/M2K?	Requirements met in full
11	Include insulation with a GWP of less than 5?	Requirements met in full
12	Re-use contaminated land?	Requirements exceeded
Waste Management		
13	Propose a waste management strategy, to encourage the movement of waste up the hierarchy?	Requirements met partially
14	Demonstrate a commitment and a strategy to monitor, sort and recycle construction waste on site including the reuse of building materials?	Requirements met partially
Water Conservation and Sustainable Drainage		
15	Incorporate the use of features which will encourage the conservation of water resources alongside safeguarding water quality?	Requirements met in full
16	Incorporate the appropriate use of SUDS?	Achievement of requirement unfeasible
17	Demonstrate flood risk mitigation techniques?	Requirements met in full
Landscape, Trees and Ecology		
18	Seek to protect and enhance ecology wherever possible?	Requirements met partially
19	Achieve an adequate footprint ratio?	Requirements met partially
20	Retain a visual relationship with the waterfront and the town?	Requirements met in full
21	Propose a sustainable landscaping strategy?	Requirements met in full

22	Include an attractive open space network including space for children's play?	Requirements met in full
23	Include a network of multipurpose wildlife corridors and pedestrian routes?	Requirements met in full
Geology		
24	Contribute to the protection of any geological or geomorphological sites of significance?	Requirements met in full
Local Character and Urban Design		
25	Lead to the enhancement of local character and heritage through design?	Requirements exceeded
Transport and Movement		
26	Seek to reduce the need to travel through the provision of home offices and mixed use development?	Requirements met in full
1. Pedestrians: convenient routes, which are easy, safe and attractive to use		
27	Reflect the manual for streets, and provide safe, convenient, easy and attractive routes for pedestrians?	Requirements met in full
2. Cyclists: direct, safe and attractive routes		
28	Reflect the manual for streets, and provide safe, direct and attractive routes for cyclists?	Requirements met partially
3. Public Transport		
29	Create good access to public transport?	Requirements met in full
4. Private Motor Vehicles		
30	Road design reflect the transport user hierarchy?	Requirements met in full
Housing Needs		
31	Seek to meet the housing needs of the local community?	Requirements met partially
Design for Change		
32	Layout reflect the potential need for adaptation over time?	Requirements met in full
Design out Crime		
33	Seek to design out crime?	Requirements met in full
Health and Wellbeing		
34	Include the provision of adequate daylighting?	Requirements met partially
35	Incorporate adequate sound insulation?	Requirements met in full
36	Provide private or semi private space?	Requirements met partially
Community Facilities		
37	Include the provision of additional facilities for community use?	Requirements met partially

38	Lead to the establishment of the waterfront as a social and leisure focus for the town?	Requirements met partially
39	Lead to the provision of educational facilities for the town?	Effect unknown/level of detail yet to be determined
Retail		
40	Incorporate the appropriate level of retail provision?	Requirements met in full

Management

- 3.5 In order to ensure that the intended sustainable development of the site is continued during occupation, a Home User Guide will be provided to all units in accordance with Ecohomes requirements. This will cover a range of information including local public transport links, accessibility to amenities and the efficient operation of the features of the unit/house.
- 3.6 During construction phases, the Considerate Constructors Scheme will be signed up to, which will minimise construction site impacts, ensure the monitoring and reporting of water and energy use, and adopt best practice for water and dust pollution. In addition to this, best practice recommendations for the prevention of contamination will be outlined in the detailed Construction Environment Management Plan (CEMP) and Site Waste Management Plan (SWMP) both of which will be developed and discussed with the Local Authority and Environment Agency, prior to commencing construction.
- 3.7 These measures will ensure that both the effects from construction and through operation will be minimised, taking a proactive approach. Other elements included within this sustainability appraisal, such as increasing a shift to more sustainable modes of transport, will help to ensure that this is the case.

Site Layout and Density

- 3.8 The masterplan has been developed to achieve the optimum efficiency in terms of the use of the available land on site. In turn, this has led to careful design solutions to ensure that energy efficiencies and accessibility is maximised.
- 3.9 As part of the Low Carbon Strategy, efficiencies gained through layout and orientation were explored, resulting in the following key features:
- Orientation for passive solar gain;
 - Orientation for solar hot water or Photovoltaic collection;
 - Terraced housing with low Surface to volume ratio;
 - Gardens available for drying.
- 3.10 The high density of housing not only brings a benefit in terms of party walls reducing thermal losses to the environment, but also in providing a compact load for the potential use of community or district heating. The linear streets provide shorter pipe runs and the denser housing gives a compact load with potentially lower mains losses per dwelling. Reduced mains losses will reduce energy demand on any central plant that may be installed.

Transport and Movement

- 3.11 The transport and movement strategy includes a number of factors including location, design and layout, as well as specific details for provision within units and street furniture.

- 3.12 The development proposes a wide mix of uses, which will reduce the need to travel by car for the existing community in Barry, as well as the new population. The development is likely to provide the following:
- Up to 2,000 dwellings comprising one, two, three and four bedroom houses and residential apartments, including 20-30% affordable units;
 - A 6,525 sqm (gross) foodstore;
 - 2,300 sqm (gross) non-food retail floorspace;
 - 1,820 sqm café/restaurant floorspace contained within 8 buildings;
 - 3,450 sqm Class B1 office floorspace;
 - A 70 bedroom hotel (3,500 sqm); and
 - A 72 sqm petrol filling station.
- 3.13 The location of the development in this urban location will ensure that there is good access for all members of the population to access a wide range of services and facilities, not only on the site, but connecting out to the surrounding areas of Barry Town and Barry Island. The proximity of the three rail station and good bus links (as detailed in the ES), means that is ideally situated to implement that transport hierarchy.
- 3.14 In addition to improved accessibility to local services and facilities, the development is likely to generate approximately 700 additional direct jobs (net) at the following proposed land uses:
- Foodstore;
 - Non-food retail;
 - Class A3 units;
 - Offices;
 - Hotel; and
 - Petrol Filling Station.
- 3.15 The generation of this level of employment is also predicted to generate approximately 102 'spin off' jobs in local services and other firms in the local area, with a further 204 jobs likely to be generated in the South East Wales region.
- 3.16 The achievement of Ecohomes 'Excellent' will contribute further to reducing the need to travel through the targeted provision of a designated home office in each dwelling. This will include additional power and telephone points to allow for home working or studying.
- 1. Pedestrians: convenient routes, which are easy, safe and attractive to use**
- 3.17 The masterplan has been developed specifically to ensure that high priority is afforded to pedestrian permeability. In addition to the main features of the development, as highlighted above, which will reduce the need to travel by private car and subsequently increase the potential for accessibility by foot, the masterplan has designed in features to further encourage this mode and increase accessibility for all users. As listed below, these features will not only increase accessibility within the masterplan area, but increase the integration of the development with the surrounding communities, providing physical and visual links in and out of the area. An important aspect of the pedestrian facilities is the linkage to the external pedestrian facilities around the waterfront area and this has also been accommodated.
- 3.18 Key features of the design of the masterplan include:
- The newly constructed link road will include wide footways to cater for increased demand and frontage activity.

- Dedicated at-grade crossings will be provided at the proposed signalised junctions along the main link road.
- Footways will share space with cyclists and motor vehicles within the housing areas to provide a 'street' feel, as advocated in the Department for Transport's Manual for Streets document.
- Pedestrian shortcuts will be provided between dead end streets, allowing local trips to be faster for pedestrians.
- Uncontrolled crossings will be situated in convenient locations around the development sites, and will have dropped kerbs to cater for disabled users.
- Pedestrian desire lines have also been considered to ensure that safe convenient routes are available to pedestrians wanting to access the retail, school and office facilities.
- Connections will also be made to the existing footways that follow the alignment of Powell Duffryn Way that connects to the roundabout situated at the north eastern corner of West Pond.
- The potential for a direct pedestrian access to Barry Station through the provision of a footway crossing over the disused railway to the north of West Pond will be explored with the Vale of Glamorgan Council. This would connect to the existing underpass that currently provides a link between the waterfront and Broad Street.
- The segregated cycle/footway bordering Ffordd y Mileniwm has been integrated into the masterplan, to ensure seamless connections between existing facilities and the proposed development.
- Seating areas and public cycle parking facilities are provided at a number of locations within the development sites to facilitate walking and cycling within the site and create a vibrant development.
- The existing construction of the Thompson Street footbridge will create a further route from the Waterfront area to the Town centre. This route will be of particular use to potential residents of the Arno Quay and East Quay sites.

2. Cyclists: direct, safe and attractive routes

- 3.19 *"It is envisaged that cycling will be a key mode for trips within the development and to other destinations in Barry. Much of Barry is within an acceptable cycling distance from the development sites."* (ES)
- 3.20 The ES describes the internal and external links within the development for use by cyclists. The provision will ensure continuous routes throughout the development, as well as connecting to areas outside the immediate vicinity.
- 3.21 Internally, the road network has been designed to facilitate a similar level of accessibility as that afforded to pedestrians, as described above. In addition to the internal street design which has been developed to encourage cycle use, there will be a dedicated cycleway, to run along the western edge of the former No. 1 Dock to provide both commuter and leisure cyclists with an attractive alternative route to busy roads. The waterfront setting of this cycle route will provide a genuinely attractive link for cyclists wishing to access the dedicated cycleway along Ffordd y Mileniwm.
- 3.22 The internal cycle infrastructure will be conveniently connected to the dedicated cycleway along Ffordd y Mileniwm allowing cyclists an uninterrupted route through West Pond/South Quay area onto Ffordd y Mileniwm. Cyclists will also benefit from the at-grade crossing of the disused rail line providing a more direct route to Barry Station.
- 3.23 To encourage an increase in cyclists and achieve the vision for the development for cycling to be a key mode of transport, cycle parking provision will be included within the site. This will ensure compliance with Ecohomes criteria, as well as the Outline Travel Plan. The proposed level of

cycle parking is in excess of the CSS Wales Parking standard. It is proposed that houses will be constructed with dedicated secure cycle parking, to be provided in all building units.

3. Public Transport

3.24 As stated above, Barry Waterfront is in an urban location which is well served by public transport at present. The demand for public transport is likely to be split between the two modes available, rail and bus services.

3.25 Bus services already operate frequently, as included in the ES. However, a diverted service through the West Pond area is likely to result from the proposals, further improving accessibility by this mode. Additionally, it is likely that bus service operators will increase the frequency of services as a result of the increased catchment. Further features of the development will increase the potential for bus patronage to be high are outlined in the ES:

“The majority of the development site is within 5 minutes walking distance of a bus stop, with the rest being within 10 minutes. The location of the stops has been determined with consideration for the guidance set out in Manual for Streets.

The bus stops will be of high quality and provide travel information, lighting, shelter and signing to ensure a positive passenger experience. As the link road is being constructed as a single carriageway with dedicated on street parking, there is sufficient width for the installation of bus lay-bys to at each of the bus stops. This will allow buses to pull off the main link road to pick passengers, reducing the delay to vehicles during the pickup/drop off of passenger.” (ES)

3.26 There is considered to be adequate capacity within the current rail services, which will enable accessibility by this mode. Future planning improvement works are likely to increase this potential.

3.27 The potential for pedestrian accessibility to rail stations to be improved beyond the masterplan boundary will be investigated with the Vale of Glamorgan Council. There is an aspiration for a footpath across the existing railway sidings situated south of the Powell Duffryn Way/Hood Road junction. This would allow more direct pedestrian access from the development areas to the rail station via the Powell Duffryn Way underpass, and Broad Street. Improved access to the rail station will make rail travel to and from the development a more attractive way of travel, and help to create a modal shift to more sustainable modes of transport overall.

4. Private Motor Vehicles

3.28 Although the private motor vehicle will be accommodated for through the masterplan, this is the lowest priority in terms of modes of transport and as such, prioritisation for more sustainable modes has been ensured as outlined above. This reflects the Transport User Hierarchy as outlined in the Manual for Streets, and reflects the latest Welsh Assembly Government Guidance on the Transport Hierarchy, as detailed in section 1.

3.29 The Travel Plan will promote the transport vision for Barry Waterfront. An outline version of the Travel Plan is provided in the TA, providing a framework to encourage a modal shift to more sustainable modes of transport. Key features of this will include:

- Car sharing: relieves congestion at peak hours;
- Encouraging walking: encouraging employees to walk to work;
- Encourage cycling: cycling facilities, information and establishing a Bicycle User Group (BUG) within the proposed offices;
- Encourage Public Transport; and
- Resident initiatives: Welcome pack, transport information, personalised travel planning.

3.30 Mitigation measures proposed for consideration in conjunction with the Vale of Glamorgan Council in the ES and TA will enable the alleviation of potential traffic problems through increased users and ensure that the Transport User Hierarchy is implemented throughout the masterplan. These include:

- *“The proposed works to the Merrie Harrier signalised junction... aimed at providing improved facilities for buses, cyclists and pedestrians whilst increasing available capacity through the installation of new signal equipment.*
- *Waycock Cross: The proposed works to the junction involve an enlargement and re-siting of the roundabout to the north. The revised junction will have a significantly larger diameter gyratory with improved capacity on all approach arms. The improvement proposals arise from existing traffic conditions and proposals for the Metrix development at RAF St. Athan to the west of Barry.*
- *It is possible to remodel seven of the existing junctions in order to improve junction capacity and traffic control with the new development. The works involve a range of measures targeted at increasing traffic capacity within available highway land.*
- *For a further four junctions it is anticipated that improvement works would require major upgrading works in order to alter the form of the junctions within the available highway land.*
- *Severance: The presence of the rail line and No 1 Dock cannot be altered however the developer will minimise severance (whilst improving access to rail facilities) by creating a more direct route from the West Pond area to Broad Street and Barry train station.*
- *Safety has been a key consideration in the design of transport infrastructure. It is anticipated that the design will lead to appropriate vehicular speeds both on the main road and within residential areas.*
- *Efforts have been made to accommodate pedestrian desire lines through routes which link origins and destinations.*
- *Detailed design of road junctions will be completed in line with local and national design guidance and safety audits will be undertaken at appropriate stages to ensure the suitability of designs and identify any unforeseen site specific circumstances.” (ES)*
- *“The new link road will be bordered by wide footways, and dedicated crossings will be provided at strategic locations. Internal roads deviating off the main road will be designed according to Manual for Streets to encourage access by walking or cycling with crossing providing safe permeability.” (TA)*

Energy Conservation and Efficiency

Energy Demand

- 3.31 Low energy demand reduces the stress on available resources, be these finite or renewable. The reduction of the inherent energy of a development demand by good design at the outset will minimise the carbon used throughout the life of the buildings. This places demand minimisation at the top of the energy hierarchy.
- 3.32 The development will follow the best practice of the energy hierarchy to minimise the energy demand through good design. Key features are:
- Orientation for passive solar gain;
 - Orientation for solar hot water or Photovoltaic collection;
 - Terraced housing with low Surface to volume ratio;
 - High levels of insulation;
 - Low air leakage;
 - Gas appliances to be A rated condensing type;
 - High penetration of low energy lighting- A minimum of 75% dedicated low energy light fittings (internal and external) will be included;
 - Any built in white goods to be A rated for energy;

- All houses are to be provided with rotary dryers and all flats with tidy-drys. This allows clothes to be dried naturally; and
- Energy efficiency of lantern types and appropriate control will keep the carbon footprint of the street lighting to a minimum.

3.33 The high density of housing not only brings a benefit in terms of party walls reducing thermal losses to the environment, but also in providing a compact load for the potential use of community or district heating. The linear streets provide shorter pipe runs and the denser housing gives a compact load with potentially lower mains losses per dwelling. Reduced mains losses will reduce energy demand on any central plant that may be installed.

Energy Efficiency

3.34 In addition to meeting the minimum energy and carbon emission targets laid down in Part L of the building regulations, the dwellings in the development will meet the carbon emission targets they require to attain the Ecohomes excellent rating. Ecohomes awards credits for attaining particular absolute carbon values and these form a significant part of the overall score.

3.35 To attain the Ecohomes excellent score, the typical dwelling will be targeting a carbon emission of less than 22 kg/m²/yr.

Ecohomes

3.36 The dwellings in the development will attain Ecohomes excellent.

3.37 The commercial buildings in the development will be targeting BREEAM excellent.

Passive Solar Design

3.38 The buildings have been orientated to maximise the opportunity for passive solar design. The grain of the West Pond area, and the dockside facing units on the south key all have a southerly elevation which permits a passive design to maximise the solar gain during the winter and minimise the heating required.

3.39 The same orientation will yield a south facing roof with an ideal pitch for the use of solar collectors for producing domestic hot water, or for the installation of Photovoltaics. The exploitation of this opportunity will follow during the detail design phase of the individual houses.

Natural Daylight

3.40 The layout of the buildings permits all the dwellings to have a clear view of sky with potential for good daylighting to reduce the carbon footprint associated with artificial lighting. The exploitation of this potential will follow with the fenestration design during the detail design phase of the individual houses.

Natural Ventilation

3.41 Design of buildings to be tenable throughout the year in the face of climate change is a key element of preventing increased carbon emissions through the retrofitting of mechanical cooling in the future. Good design and passive natural ventilation can provide an effective control of the internal environment. The dwellings will make use of natural ventilation and good design to limit the temperatures within the buildings during the summertime.

Low/Zero Carbon Energy Sources and Systems

3.42 It should be noted that the yield and costs of renewable energy technologies are continuously changing, and new products are coming to market. The following summary gives the present position in respect of the Barry Waterfront development. This includes the viability of each potential option, including where technologies have been deemed unfeasible at this stage. Over the life of the development the costs of existing technologies will be expected to fall and new technologies come on stream. The effectiveness of these in meeting the carbon targets will be kept under review and appropriate solutions selected as each stage of the development proceeds.

Photovoltaics

- 3.43 As a producer of electricity, PV technology addressed a high carbon fuel – electricity. Although expensive, it is a cost effective proposition in attaining 25% improvement on current building regulations on apartment buildings where it can serve common area power requirements.
- 3.44 On-site production of electricity will be required to meet the higher carbon targets. Photovoltaics will form an intrinsic part of the future solution for performances of 44% better than 2006 building regulations from properties in the development.

Solar Water

- 3.45 Solar thermal has a useful contribution to make towards achieving the 15% renewable contribution at Barry Waterfront. This is particularly so in the West Pond Area with its essentially south facing roofs, and in Arno Quay with the south facing elevation.
- 3.46 In South Quay, the houses lie in an east/west orientation, solar thermal will therefore be less effective in this location. This effect can be compensated for in the size of the collector array in detail design. The escarpment is not expected to significantly impact upon the solar thermal output, as shading occurs at low sun angles which predominate in the winter period when the solar energy is much lower and heat would not normally be recovered.
- 3.47 Solar thermal will form a key part of the strategy to achieve the carbon targets.

Heat Pumps

Ground Source Heat Pumps

- 3.48 The ground connection will make Ground Source Heat Pumps (GSHP) impractical at Barry. The area required for the shallow loop for each building is too large to allow this to work within each plot, with the exception of the school where the playing fields could be used. In the commercial area, such loops could be laid under the car park, but these would cool the surface of the car park, causing it to freeze earlier with consequent hazard.
- 3.49 Boreholes also provide a difficulty. The ground on which the development takes place is reclaimed industrial land, with various levels of contamination (see the ES). This will be capped when the general level of the land is raised for flood purposes. Boreholes would penetrate this layer and it would compromise its effectiveness. Additionally, the density of housing means that there is insufficient space for all houses to have boreholes within their plots without them affecting each other.

Water Source Heat Pumps

- 3.50 With the large surface area of the dock nearby, Water Source Heat Pumps (WSHP) are a viable option for a proportion of the development. As this technique can be used to pump heat both ways, it provides a particularly useful opportunity for the commercial quarter at the head of the docks.
- 3.51 However there is opportunity for some of the housing to also be served.
- 3.52 A particular issue is the prevention of recirculation of water between inlet and outlets positions from the heat exchanger. This can be avoided by allowing the water to be drawn from one side of the mole and returned to the other. The abstraction and return will need the agreement of relevant bodies such as ABP and the Environment Agency (EA).
- 3.53 This technology has been used at Swansea Bay, and the experience is understood to have been mixed.
- 3.54 As with GSHP, the scheme uses electricity very efficiently as a low carbon solution. It could also be expected to generate about 4 to 5 units of heat from each unit of electricity, with a carbon footprint about half that of gas.
- 3.55 The central plant would have to be developed by an Energy Services Company (ESCO).

Air Source Heat Pumps

- 3.56 As it uses electricity as a source fuel, Air Source Heat Pumps (ASHP) would not deliver the carbon reduction benefit required for the higher level carbon targets and is not recommended as a first option for technology.

Small Scale Wind

- 3.57 The distances between buildings and the planting involved in green spaces to create the quality of environment in the Barry Waterfront development does not lend itself to the best deployment of small scale wind power. It is recommended that this is left to the development of the larger commercial buildings and the school, with which buildings it could be associated. This allows them to make the economic and marketing judgement applicable to that development achieving the BREEAM Excellent score.

Domestic Wind

- 3.58 The current economics and poor performance of these micro-wind units do not make these an effective or viable contributor to meeting a carbon target at current costs.

Biomass and Fuel from Waste

- 3.59 The consortium aspires to the development of a community heating system at Barry Waterfront which would be seen as a positive move in terms of sustainability, but acknowledges that substantial hurdles would need to be overcome. The largest obstacle to community heating is the initial cost. Although this would be phased as the development proceeds, there will be a forward weighting as a certain degree of resilience and fundamental infrastructure must be set up and the boiler house constructed (in a means that can be expanded) from the start. It would also require the implementation of an ESCO arrangement to provide for the long term operation.
- 3.60 Community Heating does have the flexibility to adapt to different fuel sources, and allows the development to attain almost any CO² rating required for Ecohomes excellent, or to meet potentially higher carbon targets. This flexibility can be invoked up to a late point in the design process. The fuel solution can be varied between the stages of the development by installing the appropriate boiler type for each stage of housing.
- 3.61 Should a viable solution be available this would be pursued to meet the aspirations. However, it may be that with the continuing re-assessment that takes place throughout the development a smaller system is constructed during the later stages.

Combined Heat and Power

- 3.62 Should a community or district heating network be installed, a centralised CHP component to the Barry Waterfront development is then a viable option with good potential for carbon savings. By use of thermal storage to even out diurnal variations in the summer, a constant thermal base load of 2 MWth can be achieved if every building was connected. This would imply a CHP unit of between 450kWe and 600 kWe. A unit of this size would be the annual electricity consumed by 1000 electrically efficient homes, although there would be periods of overall import and export.
- 3.63 Once the base load has been taken by CHP, the wintertime thermal peaks can be met by supplementary boiler plant, fuelled as required to meet the carbon target. With a large diurnal store provided for the CHP, short cycling of biomass fuelled plant should not be a problem.
- 3.64 One issue to be resolved in the design and economics of a CHP plant will be the gradually ramp up of the available thermal load over ten years. This will constrain the selection of plant, as the economic optimum would be a single plant running at full capacity. It may be that the CHP unit can only be installed once the development reaches a certain size.

Micro CHP

- 3.65 Many of the micro CHP units will have a thermal capacity too high for the most effective operation in a new build, but some models turn down to between 5 and 7.5kW. Only one unit marketed has a heat output of 3.5kW suitable for a new build and this has other disadvantages.

Although with a thermal store these lower outputs do give an option of reducing the carbon footprint of many houses in Barry Waterfront, it is a more complex solution. They are best suited to existing properties and are not a first choice solution for Barry Waterfront.

Low Embodied Energy Material and Resource Efficiency

3.66 In order that the effects of the development seek to contribute to creating sustainable development, reducing the effects on furthering climate change, the design of the masterplan has fully considered the use of low embodied energy materials and resource efficiency through design. As such, the majority of the main building elements are to achieve a grade A from the Green Guide to Housing Specification. Other key ways in which the Barry Waterfront development will achieve resource efficiency include:

- To attain the Ecohomes excellent score, the typical dwelling will be targeting a carbon emission of less than 22 kg/m²/yr. This is significantly less than the minimum emission rating for scoring under Ecohomes, of 40kg/m²/year. In order to achieve this, improved U values over Building regulations levels will be targeted. Doors and windows will achieve 1.5 and roofs 0.14. Air tightness in buildings looks to <5 air changes per hour when tested to a pressure of 50 Pascals, current building regulations suggest a target of 10 air changes per hour.
- The Excellent pre-assessment of the site is based on average HLP of 1.1 W/m²K or less
- All insulation used will have a Global Warming Potential of less than 5.

The Masterplan will combine high density development on brownfield land. In addition to this, the re-use of contaminated land will lead to its remediation which will improve soil quality and have benefits for human and environmental health.

Street Lighting to Minimise Pollution

3.67 There are many influences that drive the need for the external space to be illuminated and the type of light used, all of which could contribute to potential light pollution in the local environment. The selection of lantern and lamp type will be optimised for the location, taking into consideration several factors as outlined below.

Aesthetic appearance

3.68 Light provides both functional illumination and night-time visual sculpture. It is essential to creating a sense of place at night-time, and also as a fundamental piece of street furniture to contributing to the overall aesthetic of an area during the day.

Security

3.69 Research studies show that good street lighting has a major impact on overall security and crime in an area. The lighting design will follow best practice, and by contributing to reduction in anti-social behaviour will make the development a safe place to be and help in maintaining property values contributing to long term economic sustainability.

Light Colour

3.70 Local highway authorities are increasingly favouring lanterns using the Compact Fluorescent type. This produces a white light providing improved road safety, reduction in crime (both actual and perceived) and better colour rendering and recognition.

Light Pollution

3.71 These modern lantern types also give improved light spill characteristics over the more traditional High Pressure Sodium lighting and thereby reduce unwanted light pollution. In sensitive areas close to housing rear light shield can be incorporated into the lantern to further control unwanted light.

3.72 'Night glow' is a direct product of poor lighting design and the contribution from Barry Waterfront shall be minimised by the design and selection of lanterns. Those with flat glass diffusers and no

lantern inclination prevent direct upward light pollution; only the unavoidable component reflecting back from the ground surface remains.

Energy Efficiency and Control

- 3.73 Energy efficiency of lantern types and appropriate control will keep the carbon footprint of the street lighting to a minimum. All street lighting shall be operated by a combination of time-clock and photocells to ensure the minimal run time. The design will also consider the zoning to avoid illumination being lost in key areas should a fault occur.

Water Conservation and Sustainable Drainage

- 3.74 Water conservation and sustainable drainage are considered to be key elements of a sustainable development strategy in a changing climate. The masterplan design will ensure that the use of water is minimised, and that surface water drainage is as efficient as possible, in order to reduce potential pollution to water resources as well as flood risk.
- 3.75 The pre-assessment for Ecohomes calculates that the development will use less than 37m³ of water per bed-space with 4/2l dual flush, aerating taps and showers reduced to 4.5l/min. A- rated white goods will be supplied where appropriate. These measures will reduce internal water use. Water efficiency will also be encouraged through the provision of water butts to houses and apartment blocks.
- 3.76 Pollution risk will be minimised during both the construction and operation of the development through the *“remediation of the made ground and source removal of grossly contaminated material and free product, together with the use of driven piles to mitigate the potential for pathways to be developed.”* (ES)
- 3.77 Due to the contaminated land on site, it is not possible for SUDS to be used in this particular location. As an alternative, *“the new surface water drainage system will pick-up rain water from roads, roofs and hardstandings and transmit flows through the drainage network and discharge into the dock. Trapped gullies and interceptors will be incorporated into the design which will prevent contamination migration from the new drainage network into the dock.”* (ES)
- 3.78 To reduce the risk of flooding, the design level of the development to provide protection for a 0.5% tidal (1 in 200 year) event is 8.868mAOD. Other alterations within the design of the development are included within the ES as follows:
- *“To prevent a possible surge being transmitted into the western area of West Pond; it has been agreed that ground levels immediately to the east of the viaduct structure is raised to 9.34mAOD, to be a general ground level raise rather than to a local bund.*
 - *To allow movement within the site during a flood event, all new roads will also be raised above the 1 in 200 year extreme flood level of 8.868Maod. To allow access/egress to/from the site, the existing access points will need to be used.*
 - *To ensure that the off-site access roads do not flood by more than 0.6 during an extreme event, local lengths of Y Rhodfa and Cory Way roads may need to be raised by up to 0.2m and 0.4m locally to ensure emergency access during an extreme flood event.*
 - *To provide such flood protection across East Quay, West Pond and South Quay, ground levels will need to be revised, typically by 0.5 – 1.0m.”* (ES)

Waste Management

- 3.79 Internal recycling bins will be provided to help maximize the amount of waste recycled; this will help towards the achievement of the council’s recycling targets. The local authority will collect materials for recycling.
- 3.80 A Site Waste Management Plan will be provided as part of statutory requirements. The achievement of Ecohomes Excellent will also require the following:
- Commitment to sorting and recycling construction waste on site.

- Demonstrate a commitment to monitor, sort and recycle construction waste.

Landscape, Trees and Ecology

- 3.81 The ecology on the site is described in the ES, alongside potential impacts predicted. *“As part of the site preparation works in advance of construction, the level of the site would need to be raised to address flood issues and this would effectively remove most of the existing ecological features at the site. Minimisation of the effects of construction will include, however, the retention and protection of the cliff/cliff base on South Quay, retention of grassland at East Quay, avoidance of key periods (e.g. bird nesting season) during clearance works and retention/protection of peripheral scrub habitats.”* (ES)
- 3.82 Mitigation measures proposed in the ES would *“allow for retention and/or provision of habitats, albeit at a smaller scale and this in turn would provide resource for continued use of the site by birds, foraging bats and terrestrial invertebrates.”* The mitigation measures proposed include:
- *“Retention and protection of 2m wide strip at the cliff base and face along the South Quay;*
 - *Retention of 5300m² grassland areas for Skylark to the south of East Quay;*
 - *Design of Public Open Space in East Quay to provide grassland of potential value to Skylark (2200m²);*
 - *Possible retention of 7100m² of ABP land on East Quay to retain grassland habitat in-situ and provide potential resource to Skylark;*
 - *Provision of 1000m² wildflower meadow as part of public open space at East Quay;*
 - *Creation of linear park swale and meadow strip habitat through West Pond;*
 - *Up to 43,100m² of public space including grass, bulb, herbaceous, trees and shrub species selected to be beneficial to biodiversity;*
 - *Street tree network to contribute to foraging corridors for birds, bats;*
 - *Retention and protection of rare plant (Childing Pink) areas off site (East Quay) and translocation of species (Corky Fruited Water Dropwort);*
 - *Provision of brown roofs on the District Centre in West Pond (approximately 2600 m² of habitat).*
 - *Brownfield habitat to be provided – up to 2000m² - as part of green corridor around south-eastern periphery of site. This provision would be at ground level with 7m wide scrub/hedge border adjacent to the development. Substrate of crushed brick/concrete to be seeded with native grasses/wildflowers and maintained as a brownfield meadow.*
 - *Translocation of reptiles from within the application boundary to a suitable offsite area (Cosmeston Country Park)*
 - *Creation of ‘green corridor’ link between off-site railway scrub and the cliff corridor.*
 - *Retention of the cliff top green space managed as wildlife gardens, allotments and open space.*
 - *Up to 1:10 of the approximate 600 houses in South Quay to have bird boxes.*
 - *Up to 600 m² of thicket scrub in East Quay Park.”* (ES)
 - To enhance the ecology on site, locally sourced plants are likely to be used.
- 3.83 As can be interpreted from the above mitigation for ecological reasons, the measures are also likely to have a significant benefit for the overall landscape of the scheme. The potential benefits of the scheme are provided in more detailed in the ES.
- 3.84 More specifically in relation to a sustainable landscaping strategy for the masterplan, designs show how a wide range of green infrastructure features have been included, which will

collectively also contribute to biodiversity. The DAS summarises how *“Trees, shrubs, herbaceous and bulb species are to be chosen to provide good seasonal effect and to collectively contribute to biodiversity... The provision of strategic street planting, within a site wide hierarchy, is a principal landscape design objective.”*

- 3.85 The masterplan will therefore include semi-mature trees (in excess of 800 number) within open spaces (in excess of 6.0 hectares within the application site) and along roadways, which will enhance the overall character of the area. Over time, trees will be visible *“within the roofscape of the development, providing a green structure. The proposed open spaces that are situated throughout the site will provide areas of visual and recreational amenity for both residents and visitors. Street trees along the district centre public realm will contribute to key gateway views.”* (ES)
- 3.86 In addition to the provision of an extensive planting scheme a *“continued development plan for the young developing woodland and scrub material within the site will add a considerable linear landscape character to the slopes at the south of the site.”* (ES) Such linear landscape features are important for nature conservation corridors as identified with the ecology chapter.
- 3.87 With regard to retained trees, Root Protection Areas will be an essential component for protecting against further damage to trees selected for retention. These measures are likely to be included in a written Tree Protection Plan, developed as part of the reserve matters detailed design.
- 3.88 As mentioned above, the masterplan includes the establishment of an open space network, which will comprise formal as well as informal spaces. *“Whilst children’s formal play facilities would be met in full there will be flexibility in the way in which other forms of public open space are provided, including a quality public realm along the waterfront, dual use of any educational facilities including all weather facilities, and the creation of new public green spaces... The Barry Waterfront scheme proposes to provide a minimum of 6.16 ha of public open space and 1.42 ha of public realm of which 0.58 hectares will be children’s play area.”* (PS)
- 3.89 The provision of a network of open spaces will not only provide benefits for ecological and landscape priorities as listed above, but it will also encourage community mixing and an increase in informal and formal physical activity contributing to human health and wellbeing.
- 3.90 The ecological mitigation measures within the ES encompass multifunctional routes and spaces which will be beneficial not only for biodiversity, but will also enhance pedestrian accessibility and recreational opportunities. These include:
- *“Design of Public Open Space in East Quay to provide grassland of potential value to Skylark (2200m²);*
 - *Provision of 1000m² wildflower meadow as part of public open space at East Quay;*
 - *Creation of linear park swale and meadow strip habitat through West Pond;*
 - *Up to 43,100m² of public space including grass, bulb, herbaceous, trees and shrub species selected to be beneficial to biodiversity;*
 - *Brownfield habitat to be provided – up to 2000m² - as part of green corridor around south-eastern periphery of site.*
 - *Creation of ‘green corridor’ link between off-site railway scrub and the cliff corridor.*
 - *Retention of the cliff top green space managed as wildlife gardens, allotments and open space.”*

Geology

- 3.91 Appendix A shows the location of the Geological SSSIs, demonstrating their location as being a considerable distance from the development site. As such, it is considered that they will not be negatively affected by the development, contributing to their continued protection.

Local Character and Urban Design

- 3.92 The masterplan indicates the enhancing of several key views in and out of the development area. These include a key view through South Quay to Barry Island and from Barry Island to Arno Quay and a continuous frontage along the waterfront. The DAS shows how key views have been created through the masterplan process, enhancing the visual relationship between the waterfront and Barry town. Additionally, provision will be made for public art through the public realm strategy although the precise scale and form will be a matter of negotiation with the Council. (PS)
- 3.93 The DAS explains how the masterplan has been divided into seven character areas. Each of these will contribute to the enhancement of local character, with each having their own identified character through design objectives and principles. The seven areas are:
- District Centre: ‘... a vibrant new heart for both the new and existing community’
 - West Pond: ‘... a new neighbourhood based upon traditional values’
 - S Q Parkside: ‘... a distinct residential quarter with a parkside setting’
 - S Q Waterside: ‘... a lively new neighbourhood with a waterside setting’
 - Arno Quay: ‘...a gateway opportunity’
 - East Quay: ‘...a peninsula residential development’
 - The Mole: ‘...a distinct and attractive leisure-led, mixed-use area’
- 3.94 The landscape and visual chapter of the ES confirms that the development will lead to the enhancement of local character through design. The proposed development is likely to have a long term beneficial effect on the landscape of the local area *“transforming a dockland landscape that has been in decline for many years into a vibrant, urban townscape, while still respecting the traditional local urban structure and form that surrounds the site.”* (ES) The chapter also highlights that the two listed buildings that will be most affected by the development, the Dock Office building and the North Hydraulic Pumping House, will be influenced positively.
- 3.95 The archaeology chapter of the ES goes further to protect local heritage, providing mitigation including:
- “Watching briefs and site surveys prior to any excavation or demolition works with relation to potential negative effects on sites of archaeological significance will provide mitigation and ensure that there will be no residual impact on the archaeological resource.”*
- 3.96 The design of the built development will contribute positively to local character in the following ways:
- *“The blocks of housing within West Pond, South Quay Parkside, South Quay Waterside and East Quay, which are predominately two-storeys in height, reflect the traditional street patterns that are typically found within the residential streets surrounding the Docks.*
 - *Houses within West Pond and South Quay Parkside will be finished using materials, which compliment the existing housing styles adjacent to the docks.*
 - *The residential developments at South Quay Waterside respond to the radial geometry of the adjacent cliff and the terraced housing on the peninsula.*
 - *Through the use of contemporary design, the housing will connect with its maritime location and integrate the development blocks into their surroundings, whilst still reflecting the traditional urban vernacular of the area.”* (DAS)

Housing Needs

- 3.97 The ES outlines the need and geographical distribution of affordable housing as included within the Vale of Glamorgan Housing Strategy. This analysis has revealed the particular requirement

for affordable housing in Barry. It also indicates a substantial shortfall in provision in Barry and throughout the Vale of Glamorgan.

3.98 The development at Barry Waterfront will include the provision of approximately 2000 dwellings. This presents considerable scope for the provision of a range of types and tenures of housing, which will address the needs not only for affordable housing, but for a wide range of local housing requirements. The mix of housing types will be approximately:

- a) 450 apartments;
- b) 360 – 630 2 bedroom houses;
- c) 360 – 630 3 bedroom houses; and
- d) 60 – 180 4 bedroom houses.

3.99 *“The current mix will provide between 1,400 and 1,600 private market housing units and potentially 400 to 600 affordable residential units, dependant upon the availability of housing grant and scheme viability. These are to be provided as a mix of social rented and intermediate residential units. This supply of affordable housing is very high in comparison with the level of provision that has been achieved in recent years in the Vale of Glamorgan.”* (ES)

Design for Change

3.100 The masterplan demonstrates the use of block layouts through the provision of apartments. This will allow for potential future changes of use within the buildings, without the need for demolition. The interiors of buildings can be modified to accommodate the new use.

Design out Crime

3.101 Designing out crime through the masterplan has been a key design principle. An increase in the quality of the design of the development may discourage crime, as may the provision of additional space for recreation to encourage a greater sense of community cohesion. Further to this, community cohesion may be promoted through the integration of the development with the surrounding area through pedestrian and cycle routes.

3.102 Alongside the secondary benefits of the development in terms of crime reduction, specific design measures have also been incorporated. These include the inclusion of active frontages along pedestrian routes leading to natural surveillance. All units are to achieve Secured by Design compliance, as well as achieving the minimum windows and doors security standards.

3.103 Upon completion of the development, activity and natural surveillance in the area will completely alter the Waterfront environment. It is considered that the combination of well designed infrastructure (routes, lighting, building design) and activity will create an urban area that has characteristics far less likely to result incidents which give rise to fear and intimidation.

Health and Wellbeing

3.104 The health and wellbeing of the community is likely to be improved through a number of the features of the masterplan already discussed in this section. This may include improved health levels through an increase in accessibility by walking and cycling leading to increased physical activity. This benefit may also arise through the provision of the network of open spaces and green infrastructure throughout the development. Another benefit from this feature, as well as from accessibility to public transport and the mix of uses proposed, is the likely modal shift to more sustainable modes of transport. This is likely to lead to a reduction in potential air and noise pollution which will have direct health benefits.

3.105 In addition to this, wellbeing levels are likely to arise from the designing out of crime in the development, as well as the integration of the community within Barry as well as within the site itself.

3.106 More specifically, building design features that will enable improved levels of health and wellbeing include:

- The maximising of passive solar gain through the orientation of the buildings will ensure that adequate daylighting is provided within dwellings, leading to health benefits.
 - Any residual noise pollution will be reduced through design standards- all party walls and floors are to achieve 5dB improvement over Building Regulations with accredited robust details or sound testing.
 - The DAS demonstrates provision of private spaces for a large proportion of the dwellings provided. Further to this, the masterplan includes the provision of a large amount of public amenity space. Many of the apartments will include the provision of private space where feasible, in the form of balconies.
 - The provision of standard thermal double glazing with an RTRA sound insulation performance of 30 Db (capable of providing an adequate level of protection against noise, for all of the façade assessment locations, providing between 'reasonable' and 'good' internal noise levels during the day and 'good' internal noise levels during the night.)
 - The ES recommends that *“a more detailed assessment of the sound insulation performance requirements for the proposed residential dwellings most affected by noise is undertaken at the detailed design stage.”* (ES) This will help to ensure that the effects of potential noise pollution on human health are mitigated.
- 3.107 A proactive approach to minimise the effects of noise and vibration has been considered in the ES, to minimise the effect from road traffic for the masterplan design in general. Options for consideration at the detailed design stage include:
- For a limited number of dwellings fronting Ffordd y Mileniwm, on Fford Sealand and Rhodfa Sweldon: *“A reduction in the speed limit on this section of road to 20 mph, and ensuring broad compliance with this limit through appropriate traffic management...The practicality of restricting speeds on this route is at this stage unknown, and as such, is presented as an example of how the impact of this predicted increase can be reduced”*
 - For two properties at the junction of Earl Crescent and Clive Road: *“One option may be the construction of localised acoustic barriers, which would be sufficient to reduce the predicted increase in noise at these locations to acceptable levels, providing it is feasible to find a barrier alignment that interrupts the line of sight between the source and receiver. If such an alignment is deemed impractical at the detailed design stage, then another option may be to consider the provision of additional boundary screening and possibly sound insulation for any properties that are predicted to experience increases in noise of more than 5 dB.”* (ES)

Community Facilities

- 3.108 Community facilities and services can include a wide range of features, including public open space, retail and commercial features, as well as directly relating facilities such as leisure facilities and educational provision.
- 3.109 The Principal Strategic Aims for the Public Open Space and Public Realm Design Principles in the DAS include the need to capitalise on recreational potential and public draw of the site’s waterfront location. This will include linking the waterfront with the rest of the development through pedestrian and cycle access primarily. The Masterplan has also considered the future development of the Marina, allowing for flexibility in its strategy.
- 3.110 The incoming community to the Barry Waterfront area is likely to benefit from the wide range of community facilities on offer across Barry, which includes 12 local community centres. The availability of good quality public transport connections will ensure good accessibility to these facilities, and their use will ensure their increased viability as well as encouraging increased community integration across Barry.
- 3.111 *“The Masterplan demonstrates a mixed use area that will provide retail opportunities. The provision of public squares, and a hotel amongst other social and leisure facilities will lead to the provision of a focus for the area from this perspective. The Proposed Development will include provision for a range of cafés and restaurants (1,820sqm).”*

- 3.112 *“It is evident that the impact of the Proposed Development upon primary education requirements will be adverse but negligible in scale. There will be no adverse impact upon secondary education provision.”* (ES) Therefore, the provision of such a facility may not be necessary on site, although this is unclear at present, as forecasts in the Single Education Plan only go to 2011, which will be around the same time as the first communities occupy the site.

Retail

- 3.113 The Retail Assessment proposes to provide *“up to 8,800 sq. m of convenience and comparison floorspace. Specifically, this will comprise a 6,500 sq m gross foodstore (approximately 4,600 sq m net) with approximately a 60:40 split. As such, it is anticipated that 2,800 sq m (net) will be devoted to the sale of convenience goods and 1,800 sq m (net) will be devoted to the sale of comparison goods.*
- 3.114 *There will also be a further 2,300 sq m gross non-food floorspace (approx 1,800 sq m net) provided within separate retail units adjacent to the proposed foodstore. The exact number of units is unknown at this stage of the application process although it is envisaged that there will be 2no units of approximately 1,150 sq m gross (900 sq m net) each. There are no proposed operators for any of the retail floorspace to date.*
- 3.115 *It is intended that the proposed retail floorspace will be located within a new District Centre.”*
- 3.116 *“This offer will be important in improving local shopping facilities for local residents and will help to claw back expenditure from other centres outside the catchment area and out-of-centre stores.”* (ES)

VoGC Sustainability Checklist

- 3.117 The Final Sustainability Appraisal Framework for assessment included within Appendix B, shows which of the assessment questions used to appraise the Waterfront Barry Masterplan, correspond with the requirements of the VoGC Sustainability Checklist. The VoGC SD SPG requires the completion of the Sustainability Checklist. This is provided as Table 3.2.

Table 3.2 - VoGC Sustainability Checklist

Sustainable Measure		Rationale
SITE ASSESSMENT		
Accessibility to neighbouring developments, local services and facilities	✓	The masterplan has been developed with high priority afforded to pedestrian permeability. The additional level of patronage would be important in sustaining activity within the existing community centres. It will also help to encourage increased integration between the new community at Barry Waterfront and the existing community in the surrounding area.
Connections to existing pedestrian, cycle, rights of way and public transport routes	✓	The ES describes the internal and external links within the development for use by cyclists; the provision will ensure continuous routes throughout the development, as well as connecting to areas outside the immediate vicinity.
Existing infrastructure and its capacity	✓	The ES concludes that the Barry Waterfront scheme can be satisfactorily accommodated by the local transportation network, assuming that the various transportation measures discussed in the report are implemented prior to the completion of the development. <i>“A positive drainage system, (installed in the 1990s) exists around the capped landfill facility present on East Quay. Surface water drainage was also installed within Cory Way on East Quay</i>

Sustainable Measure		Rationale
		<p><i>and Y Rhodfa on Arno Quay with spurs leading into the proposed development areas with outfalls discharging into the adjacent dock. The majority of rainwater on Arno Quay, East Quay, West Pond and South Quay currently infiltrates into the made ground.</i></p> <p><i>The Environment Agency has stated in draft planning conditions that no infiltration of surface water into the ground should be permitted, to prevent pollution of controlled waters. Positive drainage will therefore be required to convey flows from roofs, roads and hardstandings for discharge into Barry Docks No.1.</i></p> <p><i>Existing foul gravity and rising main drainage pipes are present within West Pond, Arno Quay and East Quay; these transmit flows from existing development to the foul drainage network. Consultation with DCWW has been ongoing for some time; they have undertaken hydraulic modelling of the foul network and have indicated that capacity is available in the existing foul network providing that an existing storm overflow culvert from Broad Street is diverted away from the existing 450mm foul pipe. They have proposed that a new 1350mm diameter pipe is laid across West Pond that connects the Broad Street overflow to the Barry Island Trunk Sewer located south of the site. Consultation regarding this work is ongoing. Due to existing levels and the length of foul drainage required, gravity sewers will not be able to transmit flows from most of South Quay and all of East Quay, pumping stations will be required at these locations.” (ES)</i></p>
Topography and site orientation	✓	<p>As part of the Low Carbon Strategy, efficiencies gained through layout and orientation were explored. Key features are:</p> <ul style="list-style-type: none"> • Orientation for passive solar gain • Orientation for solar hot water <p>The design level of the development to provide protection for a 0.5% tidal (1 in 200 year) event is 8.868mAOD.</p>
Archaeological or historic assets	✓	<p>The archaeology chapter of the ES goes further to protect local heritage, providing mitigation including:</p> <p><i>“Watching briefs and site surveys prior to any excavation or demolition works with relation to potential negative effects on sites of archaeological significance will provide mitigation and ensure that there will be no residual impact on the archaeological resource.”</i></p> <p>The Landscape and Visual Impact chapter of the ES concludes that: <i>“the two listed buildings that will be most effected by the development will be the Dock Office building and the North Hydraulic Pumping House, both of which have direct views across the proposed development site. Significance of effects on the two listed buildings is likely to be moderate beneficial. There will be no views of the development from the Grade I listed Dovecote, therefore there will be no adverse of beneficial effects from this structure.”</i></p>
Boundary features such as hedges, stone walls and tree lines	✓	<p>There are no specific features of this nature on the development site at present. The sustainable landscaping scheme will enable the improvement of boundary features, through the inclusion of tree planting schemes including street trees.</p>
Local building characteristics and important views	✓	<p>The Landscape and Visual Impact chapter of the ES concludes that: <i>“The development is considered appropriate in terms of its location, design, scale, materials used and its relationship with the surrounding townscape. The proposed developments will have longer term beneficial effects on the local area, transforming a dockland landscape that has been in decline for</i></p>

Sustainable Measure		Rationale
		<i>many years into a vibrant, urban townscape, while still respecting the traditional local urban structure and form that surrounds the site.”</i>
Ecological impacts assessed	✓	The ecological impacts of the development were assessed as part of the EIA, details of which can be found in the ES. The assessment methodology included an extended Phase 1 Habitat Survey as well as Phase 2 Surveys.
Landscape/ Amenity impacts including trees and green spaces	✓	<p><i>The established masterplan will include trees within the open spaces and along roadways providing a more mature structure to the streetscape that will assist in enhancing the overall character of the area.</i></p> <p>The mitigation included within the ecology chapter of the ES includes wildlife corridors, as well as multipurpose routes and spaces for wildlife and pedestrians such as:</p> <ul style="list-style-type: none"> • <i>“Design of Public Open Space in East Quay to provide grassland of potential value to Skylark (2200m²);</i> • <i>Provision of 1000m² wildflower meadow as part of public open space at East Quay;</i> • <i>Creation of linear park swale and meadow strip habitat through West Pond;</i> • <i>Up to 43,100m² of public space including grass, bulb, herbaceous, trees and shrub species selected to be beneficial to biodiversity;</i> • <i>Street tree network to contribute to foraging corridors for birds, bats;</i> • <i>Brownfield habitat to be provided – up to 2000m² - as part of green corridor around south-eastern periphery of site.</i> • <i>Creation of ‘green corridor’ link between off-site railway scrub and the cliff corridor.</i> • <i>Retention of the cliff top green space managed as wildlife gardens, allotments and open space.”</i>
SITE LAYOUT		
Orientation of buildings utilises the benefits of solar gain	✓	<p>The development will follow the best practice of the energy hierarchy to minimise the energy demand through good design. Key features are:</p> <ul style="list-style-type: none"> • Orientation for passive solar gain • Orientation for solar hot water or Photovoltaic collection • Terraced housing with low Surface to volume ratio • High levels of insulation • Low air leakage • Gas appliances to be A rated condensing type • High penetration of low energy lighting • Any built in white goods to be A rated for energy • Gardens available for drying <p>The high density of housing not only brings a benefit in terms of party walls reducing thermal losses to the environment, but also in providing a compact load for the potential use of community or district heating. The linear streets provide shorter pipe runs and the denser housing gives a compact load with potentially lower mains losses per dwelling. Reduced mains losses will reduce</p>

Sustainable Measure		Rationale
		demand on any central plant that may be installed.
Infrastructure layout accords to the transport user hierarchy	✓	<p>The location of the development will intensify development in this urban location, increasing development densities, where there is good access to services and facilities accessible by foot. The location of three rail stations and good bus links means that it is ideally situated to implement that transport hierarchy.</p> <p>The layout of infrastructure has been carefully designed to give priority to pedestrian and cyclists within the development as well as providing external links. The majority of the development site is within 5 minutes walking distance of a bus stop, with the rest being within 10 minutes. The location of the stops has been determined with consideration for the guidance set out in Manual for Streets. Internal roads deviating off the main road will be designed according to Manual for Streets to encourage access by walking or cycling with crossing providing safe permeability.</p>
Maintains or improves existing pedestrian and cycle network	✓	<ul style="list-style-type: none"> • The newly constructed link road will include wide footways to cater for increased demand and frontage activity. Dedicated at-grade crossings will be provided at the proposed signalised junctions along the main link road. • Pedestrian desire lines have been considered to ensure that safe convenient routes are available to pedestrians wanting to access the retail, school and office facilities. • The segregated cycle/footway bordering Ffordd y Mileniwm has been integrated into the masterplan, to ensure seamless connections between existing facilities and the proposed development. • Connections will also be made to the existing footways that follow the alignment of Powell Duffryn Way that connects to the roundabout situated at the north eastern corner of West Pond. Potential to create direct pedestrian access to Barry Station will be investigated with the Council through the provision of a footway crossing over the disused railway to the north of West Pond. This connects to the existing underpass that currently provides a link between the waterfront and Broad Street.
Allow for easy and safe access to public open spaces	✓	A comprehensive open space network has been established throughout the waterfront development, and is demonstrated on the masterplan. The mitigation included within the ecology chapter of the ES includes wildlife corridors, as well as multipurpose routes and spaces for wildlife and pedestrians.
Street lighting designed to reduce light pollution and other environmental impacts	✓	<p>A minimum of 75% dedicated low energy light fittings (internal and external) will be included.</p> <p>Energy efficiency of lantern types and appropriate control will keep the carbon footprint of the street lighting to a minimum.</p>
TRANSPORT AND MOVEMENT		
Safe movement for children, pedestrians and disabled persons	✓	<p><i>“The masterplan has been developed with high priority afforded to pedestrian permeability. The newly constructed link road will include wide footways to cater for increased demand and frontage activity. Dedicated at-grade crossings will be provided at the proposed signalised junctions along the main link road. Footways will share space with cyclists and motor vehicles within</i></p>

Sustainable Measure		Rationale
		<p><i>the housing areas to provide a 'street' feel, as advocated in the Department for Transport's Manual for Streets document. Pedestrian shortcuts will be provided between dead end streets, allowing local trips to be faster for pedestrians.</i></p> <p><i>Uncontrolled crossings will be situated in convenient locations around the development sites, and will have dropped kerbs to cater for disabled users. Pedestrian desire lines have also been considered to ensure that safe convenient routes are available to pedestrians wanting to access the retail, school and office facilities." (ES)</i></p>
Provisions made for cyclists e.g. secure cycle storage	✓	<p><i>"The proposed level of cycle parking is in excess of the CSS Wales Parking standard, it is proposed that houses will be constructed with dedicated secure cycle parking." (ES)</i></p> <p>Cycle storage will be provided in all building units.</p>
Encourages public transport use	✓	<p><i>"Pedestrian links with Barry and Barry Island rail stations will be improved. A footpath will be provided across the existing railway sidings situated south of the Powell Duffryn Way/Hood Road junction. This will allow more direct pedestrian access from the development areas to the rail station via the Powell Duffryn Way underpass, and Broad Street. Improved access to the rail station will make rail travel to and from the development a more attractive way of travel, and help provide a genuine competitor to the private car.</i></p> <p><i>The majority of the development site is within 5 minutes walking distance of a bus stop, with the rest being within 10 minutes. The location of the stops has been determined with consideration for the guidance set out in Manual for Streets.</i></p> <p><i>The bus stops will be of high quality and provide travel information, lighting, shelter and signing to ensure a positive passenger experience. As the link road is being constructed as a single carriageway with dedicated on street parking, there is sufficient width for the installation of bus lay-bys to at each of the bus stops. This will allow buses to pull off the main link road to pick passengers, reducing the delay to vehicles during the pickup/drop off of passenger." (ES)</i></p>
Maintain the transport user hierarchy	✓	<p>The location of the development will intensify development in this urban location, increasing development densities, where there is good access to services and facilities accessible by foot. The location of three rail stations and good bus links means that it is ideally situated to implement that transport hierarchy.</p> <p>The layout of infrastructure has been carefully designed to give priority to pedestrian and cyclists within the development as well as providing external links. The majority of the development site is within 5 minutes walking distance of a bus stop, with the rest being within 10 minutes. The location of the stops has been determined with consideration for the guidance set out in Manual for Streets. Internal roads deviating off the main road will be designed according to Manual for Streets to encourage access by walking or cycling with crossing providing safe permeability.</p>
SUSTAINABLE ENERGY USE		
Undertake an Eco-homes, BREEAM or NHER standards assessment to	✓	<p>The dwellings in the development will attain Ecohomes excellent</p> <p>The commercial buildings in the development will be targeting BREEAM excellent</p> <p>The national home energy rating is based upon a scale of 0-20. It has been extended upwards from 10 to take account of future improvements in new dwellings. The scale takes into account</p>

Sustainable Measure		Rationale
determine the overall environmental performance of the proposal		<p>running costs and consequently 20 is a net zero cost building where the price of any fuel imported and used is offset by the sale of export energy generated on-site such as electricity from PVs. On the current figures, this will have gone beyond the point of carbon neutrality.</p> <p>The scale hence has a looser connection to carbon emissions than the SAP calculation used in Building Regulations. NHER have conducted a comparison which indicates that a conventional gas heated property complying with current regulations would score around 10, and a dwelling which is carbon neutral in regulated energy score around 14.</p> <p>In accordance with the ambitions to tackle climate change, the development is seeking to meet the carbon based metrics, and is not targeting a specific NHER.</p>
An Eco-homes Assessment is required for affordable housing funded through Social Housing Grant	✓	Any affordable housing provided through Social Housing Grant will be subject to the relevant Ecohomes standards.
BREEAM Assessment is required for Welsh Assembly Government procured buildings	X	Neither the development nor buildings on it are procured by the Welsh Assembly Government.
Passive solar design	✓	<p>The buildings have been orientated to maximise the opportunity for passive solar design. The grain of the key West Pond area and the dockside facing units on the south key all have a southerly elevation which permits a passive design to maximise the solar gain during the winter and minimise the heating required.</p> <p>The same orientation will yield a south facing roof with an ideal pitch for the use of solar collectors for producing domestic hot water, or for the installation of Photovoltaics. The exploitation of this opportunity will follow during the detail design phase of the individual houses.</p>
Natural daylighting	✓	The layout of the buildings permits all the dwellings to have a clear view of sky with potential for good daylighting to reduce the carbon footprint associated with artificial lighting. The exploitation of this potential will follow with the fenestration design during the detail design phase of the individual houses.
Natural ventilation	✓	Design of buildings to be tenable throughout the year in the face of climate change is fundamental to preventing increased carbon emissions through the retrofitting of mechanical cooling in the future. Good design and passive natural ventilation can provide an effective control of the internal environment. The dwellings will make use of natural ventilation and good design to limit the temperatures within the buildings during the summertime.
Reduce energy consumption e.g. installation of A rated appliances, condensing boilers etc.	✓	<p>In addition to meeting the minimum energy and carbon emission targets laid down in Part L of the building regulations, the dwellings in the development will meet the carbon emission targets they require to attain the Ecohomes excellent rating. Ecohomes awards credits for attaining particular absolute carbon values and these for a significant part of the overall score.</p> <p>To attain the Ecohomes excellent score, the typical dwelling will be targeting a carbon emission of less than 22 kg/m²/yr</p>

Sustainable Measure		Rationale
Provision of internal drying space or external communal drying area	✓	All houses are to be provided with rotary dryers and all flats with tidy-drys. This allows clothes to be dried naturally.
RENEWABLE ENERGY SOURCES		
Solar Photovoltaics	✓	On-site production of electricity will be required to meet the higher carbon targets. Photovoltaics will form an intrinsic part of the future solution for performances of 44% better than 2006 building regulations from properties in the development.
Solar Water Heating	✓	<p>Solar thermal has a useful contribution to make towards achieving the 15% renewable contribution at Barry Waterfront. This is particularly so in the West Pond Area with its essentially south facing roofs, and in Arno Quay with the south facing elevation.</p> <p>In South Quay, the houses lie in an east/west orientation, solar thermal will therefore be less effective in this location. This effect can be compensated for in the size of the collector array in detail design. The escarpment is not expected to significantly impact upon the solar thermal output, as shading occurs at low sun angles which predominate in the winter period when the solar energy is much lower and heat would not normally be recovered.</p> <p>Solar thermal will form a key part of the strategy to achieve the carbon targets</p>
Small Scale Wind	X	<p>The distances between buildings and the planting involved in green spaces to create the quality of environment in the Barry Waterfront development does not lend itself to the best deployment of small scale wind power. It is recommended that this is left to the development of the larger commercial buildings and the school, with which buildings it could be associated. This allows them to make the economic and marketing judgement applicable to that development achieving the BREEAM Excellent score.</p> <p>Domestic Wind</p> <p>The current economics and poor performance of these micro-wind units do not make these an effective or viable contributor to meeting a carbon target at current costs.</p>
Biomass and Combined Heat and Power (CHP)	✓	<p>Should a community or district heating network be installed, a centralised CHP component to the Barry Waterfront development is then a viable option with good potential for carbon savings. By use of thermal storage to even out diurnal variations in the summer, a constant thermal base load of 2 MWth can be achieved if every building was connected. This would imply a CHP unit of between 450kWe and 600 kWe. A unit of this size would be the annual electricity consumed by 1000 electrically efficient homes, although there would be periods of overall import and export.</p> <p>Once the base load has been taken by CHP, the wintertime thermal peaks can be met by supplementary boiler plant, fuelled as required to meet the carbon target. With a large diurnal store provided for the CHP, short cycling of biomass fuelled plant should not be a problem.</p> <p>One issue to be resolved in the design and economics of a CHP plant will be the gradually ramp up of the available thermal load over ten years. This will constrain the selection of plant, as the</p>

Sustainable Measure		Rationale
		<p>economic optimum would be a single plant running at full capacity. It may be that the CHP unit can only be installed once the development reaches a certain size.</p> <p>Micro CHP</p> <p>Many of the micro CHP units will have a thermal capacity too high for the most effective operation in a new build, but some models turn down to between 5 and 7.5kW. Only one unit marketed has a heat output of 3.5kW suitable for a new build and this has other disadvantages. Although with a thermal store these lower outputs do give an option of reducing the carbon footprint of many houses in Barry Waterfront, it is a more complex solution. They are best suited to existing properties and are not a first choice solution for Barry Waterfront.</p>
Biomass and Fuel From Waste	✓	<p>The consortium aspires to the development of a community heating system at Barry Waterfront which would be seen as a positive move in terms of sustainability, but acknowledges that substantial hurdles would need to be overcome. The largest obstacle to community heating is the initial cost. Although this would be phased as the development proceeds, there will be a forward weighting as a certain degree of resilience and fundamental infrastructure must be set up and the boiler house constructed (in a means that can be expanded) from the start. It would also require the implementation of an ESCO arrangement to provide for the long term operation.</p> <p>Community Heating does have the flexibility to adapt the fuel source and allows the development to attain almost any CO2 rating required for Ecohomes excellent, or to meet potentially higher carbon targets. This flexibility can be invoked up to a late point in the design process. The fuel solution can be varied between the stages of the development by installing the appropriate boiler type for each stage of housing.</p> <p>Should a viable solution be available this would be pursued to meet the aspirations. However, it may be that with the continuing re-assessment that takes place throughout the development a smaller system is constructed during the later stages.</p>
Ground Source Heat Pumps	✓	<p>The ground connection will make GSHP impractical at Barry. The area required for the shallow loop for each building is too large to allow this to work within each plot, with the exception of the school where the playing fields could be used. In the commercial area, such loops could be laid under the car park, but these would cool the surface of the car park, causing it to freeze earlier with consequent hazard.</p> <p>Boreholes also provide a difficulty. The ground on which the development takes place is reclaimed industrial land, with various contamination. This will be capped when the general level of the land is raised for flood purposes. Boreholes would penetrate this layer and it would compromise its effectiveness. Additionally, the density of housing means that there is insufficient space for all houses to have boreholes within their plots without them affecting each other.</p> <p>Water Source Heat Pumps</p> <p>With the large surface area of the dock nearby, WSHP is a viable option for a proportion of the development. As this technique can be used to pump heat both ways, it provides a particularly useful opportunity for the commercial quarter at the head of the docks. However there is opportunity for some of the housing to also be</p>

Sustainable Measure		Rationale
		<p>served.</p> <p>A particular issue is the prevention of recirculation of water between inlet and outlets positions from the heat exchanger. This can be avoided by allowing the water to be drawn from on side of the mole and returned to the other. The abstraction and return will need the agreement of relevant bodies such as ABP and the Environment Agency (EA).</p> <p>The experience at Swansea is understood to have been mixed.</p> <p>As with GSHP, the scheme uses electricity very efficiently as a low carbon solution. It could also be expected to generate about 4 to 5 units of heat from each unit of electricity, with a carbon footprint about half that of gas.</p> <p>The central plant would have to be developed by an Energy Services Company (ESCO).</p> <p>Air Source Heat Pumps</p> <p>As it uses electricity as a source fuel, ASHP would not deliver the carbon reduction benefit required for the higher level carbon targets and is not recommended as a first option for technology.</p>
ENERGY EFFICIENCY AND MATERIAL CHOICE		
Use reclaimed or recycled materials	X	All materials will be 'A' grade, according to the green guide to specification. <i>"The environmental rankings are based on Life Cycle Assessments (LCA), using BRE's Environmental Profiles Methodology 2008.</i>
Materials sourced from sustainable resources e.g. FSC certified timber	✓	<i>Materials and components are arranged on an elemental basis so that designers and specifiers can compare and select from comparable systems or materials as they compile their specification. The elements covered are:</i>
Use natural energy efficient materials e.g. timber, stone etc.	✓	<p><i>External walls</i></p> <p><i>Internal walls and partitions</i></p> <p><i>Roofs</i></p> <p><i>Ground floors</i></p> <p><i>Upper floors</i></p> <p><i>Windows</i></p> <p><i>Insulation</i></p> <p><i>Landscaping</i></p> <p><i>Floor finishes</i></p> <p><i>Across these building element categories the Guide provides an extensive, but not complete catalogue of building specifications covering most common building materials.</i></p> <p><i>This data is set out as an A+ to E ranking system, where A+ represents the best environmental performance / least environmental impact, and E the worst environmental performance / most environmental impact. BRE has provided a summary environmental rating - The Green Guide rating, which is a measure of overall environmental impacts covering the following issues:</i></p> <p><i>Climate change</i></p> <p><i>Water extraction</i></p>

¹² BRE Global, Introduction to The Green Guide to Specification <http://www.thegreenguide.org.uk/page.jsp?id=2>

Sustainable Measure		Rationale
		<p><i>Mineral resource extraction</i></p> <p><i>Stratospheric ozone depletion</i></p> <p><i>Human toxicity</i></p> <p><i>Ecotoxicity to Freshwater</i></p> <p><i>Nuclear waste (higher level)</i></p> <p><i>Ecotoxicity to land</i></p> <p><i>Waste disposal</i></p> <p><i>Fossil fuel depletion</i></p> <p><i>Eutrophication</i></p> <p><i>Photochemical ozone creation</i></p> <p><i>Acidification</i></p> <p><i>By evaluating the performance of materials and building systems against these specific environmental impacts, which have also been ranked on an A+ to E basis, it is possible for the specifier to select specifications on the basis of personal or organisational preferences or priorities, or take decisions based on the performance of a material against a particular environmental impact.¹²</i></p>
<p>Sustainable construction techniques e.g. straw bale, green roofing etc.</p>	<p>✓</p>	<p>The use of high density housing in a terraced design as well as the design of apartment blocks represents a sustainable construction technique, as it presents an efficient use of materials.</p> <p>Brown roofs will be used as part of the ecological mitigation, detailed in the ES.</p>
STREET LIGHTING		
<p>Low energy street and other external lighting</p>	<p>✓</p>	<p>The selection of lantern and lamp type will be optimised for the location, taking into consideration several factors.</p> <p>Aesthetic appearance</p> <p>Light provides both functional illumination and night-time visual sculpture. It is essential to creating a sense of place at night-time, and also as a fundamental piece of street furniture to contributing to the overall aesthetic of an area during the day.</p> <p>Security</p> <p>Research studies show that good street lighting has a major impact on overall security and crime in an area. The lighting design will follow best practice, and by contributing to reduction in anti-social behaviour will make the development a safe place to be and help in maintaining property values contributing to long term economic sustainability.</p> <p>Light Colour</p> <p>Local highway authorities are increasingly favouring lanterns using the Compact Fluorescent type. This produces a white light providing improved road safety, reduction in crime (both actual and perceived) and better colour rendering and recognition.</p> <p>Light Pollution</p> <p>These modern lantern types also give improved light spill characteristics over the more traditional High Pressure Sodium lighting and thereby reduce unwanted light pollution. In sensitive areas close to housing rear light shield can be incorporated into the lantern to further control unwanted light.</p> <p>'Night glow' is a direct product of poor lighting design and the contribution from Barry Waterfront shall be minimised by the</p>

Sustainable Measure		Rationale
		<p>design and selection of lanterns. Those with flat glass diffusers and no lantern inclination prevent direct upward light pollution; only the unavoidable component reflecting back from the ground surface remains.</p> <p>Energy Efficiency and Control</p> <p>Energy efficiency of lantern types and appropriate control will keep the carbon footprint of the street lighting to a minimum. All street lighting shall be operated by a combination of time-clock and photocells to ensure the minimal run time. The design will also consider the zoning to avoid illumination being lost in key areas should a fault occur.</p>
WATER CONSERVATION		
Installation of dual water supplies e.g. rainwater run-off for toilets and/or grey water use	✓	The pre-assessment for Ecohomes calculates that the development will use less than 37m ³ of water per bed-space with 4/2l dual flush, aerating taps and showers reduced to 4.5l/min. A rated white goods will be supplied where appropriate. These measures will reduce internal water use.
Installation of low/dual flush toilets	✓	
Installation of rain water collectors for landscape maintenance and/or domestic garden use	✓	Water butts will be provided to houses and apartment blocks.
Installation of water efficient A rated goods	✓	A rated white goods will be supplied where appropriate. This measures will reduce internal water use
Use natural techniques, such as reed bed filtration system to treat waste water	X	As the land at Barry Waterfront is contaminated, the EA have determined that natural drainage techniques are inappropriate.
SUSTAINABLE DRAINAGE		
Installation of Sustainable Urban Drainage	X	The Environment Agency has stated in draft planning conditions that no infiltration of surface water into the ground should be permitted, to prevent pollution of controlled waters. Positive drainage will therefore be required to convey flows from roofs, roads and hardstandings for discharge into Barry Docks No.1.
Soakaways	X	
Permeable surfacing	X	
Swales and Basins	X	
Infiltration Trenches and Filter Drains	X	
Pond and Wetlands	X	
Onsite Stormwater	X	This will not be possible on the site due to it's proximity to the

Sustainable Measure		Rationale
Detention		docks and the size and nature of the development.
Green Roofs	✓	Brown roofs are proposed as part of ecological mitigation.
WASTE MANAGEMENT		
Internal recycling/ separation facilities	✓	Internal recycling bins will be provided to help maximize the amount of waste recycled; this will help towards the achievement of the council's recycling targets. The local authority will collect materials for recycling.
Communal external recycling/ separation facilities	X	The provision of recycling facilities for use within units will enable the collection of waste for collection by the Local Authority. However, the provision of a centralised facility may be subject to negotiation with the Council.
Re-use/recycle existing building materials	✓	A Site Waste Management Plan will be provided as part of statutory requirements. The achievement of Ecohomes Excellent will also require the following:
Implementation of an on site waste management scheme during construction	✓	<ul style="list-style-type: none"> - Commitment to sorting and recycling construction waste on site. - Demonstrate a commitment to monitor, sort and recycle construction waste.
LANDSCAPE, TREES AND ECOLOGY		
EIA or other ecological assessment/ surveys conducted	✓	Full details of the range of assessments and surveys undertaken as part of the EIA process are detailed in the ES.
Retention of existing trees as part of the site layout/ landscaping scheme	✓	<p><i>"With regard to retained trees, the protection of RPAs (as illustrated on figure M3), using suitable protective fencing conforming to BS 5837:2005, will be an essential component for protecting against further damage to trees selected for retention. These measures should be included in a written Tree Protection Plan, developed as part of the reserve matters detailed design.</i></p> <p><i>The Development landscape design proposes the planting of advanced and semi-mature tree stock (in excess of 800 number), complemented with areas of green open space (in excess of 4.5 hectares within the application site). This, along with the establishment of the existing landscape as referred to above, should mitigate any short term loss and result in a longer term, beneficial effect for the area in terms of landscape amenity and quality."</i> (ES)</p>
Incorporation of ecological mitigation or compensation measures	✓	<p>A number of ecological mitigation measures will be included within the development, namely:</p> <ul style="list-style-type: none"> • <i>"Retention and protection of 2m wide strip at the cliff base and face along the South Quay;</i> • <i>Retention of 5300m² grassland areas for Skylark to the south of East Quay;</i>
Creation of new wildlife habitats	✓	<ul style="list-style-type: none"> • <i>Design of Public Open Space in East Quay to provide grassland of potential value to Skylark (2200m²);</i> • <i>Possible retention of 7100m² of ABP land on East Quay to retain grassland habitat in-situ and provide potential resource to Skylark;</i> • <i>Provision of 1000m² wildflower meadow as part of public open</i>

Sustainable Measure		Rationale
		<p>space at East Quay;</p> <ul style="list-style-type: none"> • Creation of linear park swale and meadow strip habitat through West Pond; • Up to 43,100m² of public space including grass, bulb, herbaceous, trees and shrub species selected to be beneficial to biodiversity; • Street tree network to contribute to foraging corridors for birds, bats; • Retention and protection of rare plant (<i>Childing Pink</i>) areas off site (East Quay) and translocation of species (<i>Corky Fruited Water Dropwort</i>); • Provision of brown roofs on the District Centre in West Pond (approximately 2600 m² of habitat). • Brownfield habitat to be provided – up to 2000m² - as part of green corridor around south-eastern periphery of site. This provision would be at ground level with 7m wide scrub/hedge border adjacent to the development. Substrate of crushed brick/concrete to be seeded with native grasses/wildflowers and maintained as a brownfield meadow. • Translocation of reptiles from within the application boundary to a suitable offsite area (Cosmeston Country Park) • Creation of 'green corridor' link between off-site railway scrub and the cliff corridor. • Retention of the cliff top green space managed as wildlife gardens, allotments and open space. • Up to 1:10 of the approximate 600 houses in South Quay to have bird boxes. • Up to 600 m² of thicket scrub in East Quay Park. <p>The mitigation measures proposed would allow for retention and/or provision of habitats, albeit at a smaller scale and this in turn would provide resource for continued use of the site by birds, foraging bats and terrestrial invertebrates. For these groups, the significance of any adverse impacts is likely to reduce over the long term as planting natures etc although an overall loss of biodiversity (largely due to the scale of area lost to development) at the site level is likely to arise as a result of development.”</p>
Inclusion of post-development management, monitoring and review	X	This is a matter for more detailed consideration at a later stage of the development process.
Retention and enhancement of existing landscaping features	✓	The development is considered appropriate in terms of its location, design, scale, materials used and its relationship with the surrounding townscape. The proposed developments will have longer term beneficial effects on the local area, transforming a dockland landscape that has been in decline for many years into a vibrant, urban townscape, while still respecting the traditional local urban structure and form that surrounds the site.
Plant locally sourced indigenous trees	✓	To enhance the ecology on site, locally sourced plants are likely to be used.

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and plants		
Minimise the opportunities of crime	✓	<p>Through designing the development to ensure active frontages along pedestrian routes, natural surveillance should discourage crime.</p> <p>All units are to achieve Secured By Design compliance, as well as achieving the minimum windows and doors security standards.</p> <p>Upon completion of the development, activity and natural surveillance in the area will completely alter the Waterfront environment. It is considered that the combination of well designed infrastructure (routes, lighting, building design) and activity will create an urban area that has characteristics far less likely to result incidents which give rise to fear and intimidation.</p>
Mixed use development proposed	✓	<p>In summary, the scheme is to provide:</p> <ol style="list-style-type: none"> 1. Up to 2,000 dwellings comprising one, two three and four bedroom houses and residential apartments, including 20-30% affordable units; 2. A 6,525 sqm (gross) foodstore; 3. 2,300 sqm (gross) non-food retail floorspace; 4. 1,820 sqm café/restaurant floorspace contained within 8 buildings; 5. 3,450 sqm Class B1 office floorspace; 6. A 70 bedroom hotel (3,500 sqm); and 7. A 72 sqm petrol filling station.

4. Conclusions

- 4.1 The Sustainability Appraisal undertaken to inform the preparation of the Barry Waterfront masterplan has determined that the masterplan as submitted is likely to contribute to the achievement of sustainable development. Detail of how this will be achieved is outlined in section 3, which includes the Sustainability Checklist, as required by VoGC.
- 4.2 A wide range of positive sustainability effects are expected to arise from the development- the list below provides a brief summary of the detail provided in section 3. Where these are directly applicable to the Sustainability Checklist, 'SC' has been included in brackets.
- The management of the sustainability of the occupation of the site to ensure continuation and implementation of the masterplan features;
 - Improved energy efficiency through the design of development (SC);
 - The generation of a proportion of energy from low or zero carbon sources (SC);
 - A reduction in natural resource use and environmental impact through the sustainable sourcing of materials for construction (SC);
 - The implementation of the waste management hierarchy through the provision of recycling facilities (SC);
 - The minimisation of light pollution through design (SC);
 - A reduction in surface water runoff and water pollution through design and management of construction site impacts (SC);
 - A reduction in flood risk through design (SC);
 - The enhancement of long term ecology through mitigation (SC);
 - An improvement to landscape and local views within and externally to the development (SC);
 - The creation and enhancement of local character and urban design (SC);
 - The protection of local archaeological features (SC);
 - Improved accessibility and design to reduce the need to travel and encourage a modal shift to more sustainable modes of transport (SC);
 - Improved accessibility to services, facilities, retail opportunities and employment (SC);
 - The integration of the development site with the surrounding community (SC);
 - The provision of a range of employment opportunities (SC);
 - The provision of housing to meet local needs (SC);
 - The design of buildings for future adaptation;
 - A reduction of crime and the fear of crime through design (SC);
 - An improvement in the overall health and wellbeing of the population through physical and visual features and services; and
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