Carmarthenshire County Council Llanelli Wellness and Life Science Village

Environmental Impact Assessment Scoping Report

Draft 1 | 27 July 2017

This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

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Ove Arup & Partners Ltd 4 Pierhead Street Capital Waterside Cardiff CF10 4QP United Kingdom www.arup.com



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			Prepared by	Checked by	Approved by	
		Name	Rowena Ekermawi	Damian Barry	Damian Barry	
		Signature	R.C. Ekemani	(Barry	MBarry	
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Ecology Baseline Report, 2016

Appendix B

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HUDU Rapid Assessment Matrix

Carmarthenshire County Council

1 Introduction

1.1 Background

Carmarthenshire County Council (CCC) is preparing to submit an outline planning application for a Wellness and Life Science Village in Llanelli which would include:

- Wellness Hub: (Visitor Centre, Corporate, Leisure and Sporting Facilities) with a footprint of up to 10,000 sqm (Use Class D2 Assembly and Leisure);
- **Health Hub:** (Neuro Rehab Centre and Clinical Facilities, Life Science Institute with Education Facilities and Associated Accommodation, Research and Development Office Space, Housing for Professionals) with a footprint of up to 7,500 sqm (Use Classes; C2 Residential Institution, D1 Non-Residential Institution, B1 (b) Business and C3(a) Residential);
- Assisted Living: (Care Home, Extra Care Housing, Domiciliary Care Housing) of up to 575 beds/units (Use Classes; C2 Residential Institution, C3(a) and C3(b) Residential)
- Ancillary Development: Recreation, leisure and therapy spaces; landscaping and public realm works; energy and utilities infrastructure works; access and parking spaces on land at Delta Lakes, Llanelli.

The planning application site boundary is shown on Figure 1. For the purposes of this Scoping Report, the elements of the Wellness and Life Science Village are referred to as 'the proposed development'.

The proposed development is considered to be Environmental Impact Assessment (EIA) development as defined by the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017, hereafter referred to as the EIA Regulations. As such the planning application will require an accompanying Environmental Statement (ES) to be prepared in accordance with the EIA Regulations.

In preparation for undertaking an EIA, CCC submits this report as a request to CCC Planning for an EIA scoping opinion under Part 4 of the EIA Regulations. The report sets out information to assist CCC to reach a scoping opinion.

1.2 Report Structure

This Scoping Report is structured as follows:

• Chapter 2: Project description – a brief description of the proposed development, including an overview of the site, its history and the purpose of the development;

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- Chapter 3: The EIA process the purpose and process of EIA;
- **Chapter 4**: **The scoping process** a description of the scoping process that has been followed;
- **Chapter 5: Scoping results** the results of the scoping exercise set out by environmental topic. This includes a description of the currently known baseline, identified key issues, assessment methods proposed, consultation that will be carried out and potential mitigation measures that could be considered.



2 **Project description**

2.1 Proposed development

The proposed site for the Llanelli Wellness and Life Science Village (LWLV) covers a total area of approximately 23 ha and includes the following:

Proposed development component	Use class	Area (sqm)	Description
Wellness Hub	Class D2 Assembly and Leisure	10,000	The wellness hub would include a visitor's centre along with corporate, leisure and sporting facilities.
Health Hub	C2 Residential Institution, D1 Non- Residential Institution, B1 (b) Business C3(a) Residential	7,500	The health hub would include a neuro rehab centre and clinical facilities contained within a prestigious building that would be a focus of the proposed development on the site. It would be linked to the wellness hub via a covered street that would facilitate easy access between the two buildings. A life science institute would be housed within the Health Hub which would include educational facilities ¹ and associated accommodation (possible onsite accommodation requirements for medical practitioners/researchers/ academics and students. Research and development office space would be provided within Building 5 (L shaped blocks to the west of the Health Hub) XXX
Assisted living	C2 Residential Institution, C3(a) & C3(b) Residential		Assisted living includes the provision of a care home, extra care housing ² and domiciliary care housing ³ .
Ancillary development	N/A		Associated recreation, leisure and therapy spaces would be provided across the application site. The details of this are yet to be defined.

¹ Educational facilities for project ARCH, a regional collaboration for health, based out of Swansea University:

(http://www.swansea.ac.uk/medicine/enterpriseandinnovation/aregionalcollaborationforhealtharch/)

 $^{^{2}}$ Extra care housing is housing designed with the needs of frailer older people in mind and with varying levels of care and support available on site. It differs from a care home as people are living independently and have a legal right to occupy the property.

³ Domiciliary care describes care services that support and enable people to live at home and in their local community, i.e. a care worker visits the home to help with a range of jobs and services.

Landscaping a public realm works across the entire site would be required.
Engineering and infrastructure works would be provided as needed across the site (i.e. energy, water, wastewater).
Access and parking provision would be provided at various locations across the site.

2.2 The site

The application site is approximately 23 hectares and is located to the south of Llanelli, centred at approximately National Grid Reference (NGR) SS509985, and on the edge of an urban setting. The site is located along the coast, north of the Loughor estuary. The New Dafen River, a standing water body, is located in the centre of the site. The Afon Dafen is culverted at the eastern boundary of the site and feeds the New Dafen River which flows into the Afon Lliedi. The Afon Lliedi in turn flows into the Loughor Estuary.

The site is bordered to the east by the B4304 (the Avenue), to the north by Northumberland Road and to the south by the B4304. North and south of the New Dafen River the site is open derelict land consisting of rough grass/scrub with a thin capping layer of limestone gravel.

The area of the site north of the Afon Dafen is unmanaged brownfield land that is currently grassed and was once the site of the New Dock (also called the Great Western Dock).

2.3 The surrounding area

The area surrounding the application site is a mixture of urban residential, industrial and managed rural areas. Relatively new residential properties exist to the south west of the site whilst residential areas of Morfa, Llanelli are to the east of the Avenue. The south east corner of the site is adjacent to Delta Lakes Enterprise Centre which houses a number of small industrial units. To the south of the southern B4304 is the Machynys Golf Academy and Driving Range.

Llanelli railway station is approximately 500m from the northern edge of the application site, with the land between being predominantly the site of the former copper works.

2.4 Rational and alternatives

The concept of a Wellness and Life Science Village is a response to a number of societal, health and market factors which include, amongst others:

- A need for a diverse range of resilient and flexible employment and commercial opportunities;
- A need for regeneration and redevelopment of the application site;

- An ageing population and a high degree of rurality across Carmarthenshire with consequential issues of accessibility to services;
- High levels of social deprivation in parts of Health Board areas with allied widening inequalities in health;
- An unprecedented demand being faced by conventional health and social care services and increasing pressures on primary and secondary care provision;
- The need for service efficiency and health and wellbeing innovation and new models for delivery;
- The benefit of partnerships in delivering service efficiency; and
- The need for new ways to manage patients with multiple chronic conditions.

Schedule 4 of the EIA Regulations require consideration of the main alternatives that have been studied and the basis of the final selection made, taking into account environmental effects. The consideration of alternative forms of development for the site will be addressed within the ES accordingly, including consideration of alternative densities, layout and mitigation measures.

3 Approach to EIA

3.1 The Purpose and Process of EIA

EIA is an important procedure for ensuring that the likely effects of developments on the environment are understood and taken into account in the planning process. It is a systematic process that examines the environmental consequences of a development, to ensure that they are understood and taken into account in the planning process.

The EIA will identify the likely significant environmental impacts (both positive and negative) of the proposed development and report these within in the ES. The EIA will be undertaken following the requirements of the EIA Regulations and the ES will provide the following relevant information:

- A description of the development, including the physical characteristics of the whole development and the land use requirements during the construction and operational phases;
- An outline of the main alternatives studied by the applicant with an indication of the main reasons for the choice, taking into account the environmental effects;
- A description of the aspects of the environment likely to be significantly affected by the proposed development;
- A description of measures designed to prevent, reduce and where possible offset any significant adverse effects on the environment along with a description of measures designed to enhance beneficial effects;
- A non-technical summary; and
- A description of any difficulties encountered by the applicant.

3.2 General EIA Methodology

The EIA will be undertaken in accordance with best practice including:

- IEMA Quality Mark this is run by the Institute of Environmental Management and Assessment (IEMA) and is based around a set of EIA Commitments, which organisations registered to the scheme agree to comply with. Arup are registered with the Quality Mark. The IEMA EIA Quality Mark provides registrants with a benchmark for their EIA activities and allows them to demonstrate their commitment to effective practice; and
- National Planning Practice Guidance which draws together previous EIA guidance including the DCLG/DETR guidance documents on EIA such as 'EIA: A guide to good practice and procedures' (DCLG, 2006) and DETR Circular 02/99 Environmental Impact Assessment (1999).

One of the purposes of the scoping exercise is to seek agreement with the planning authority and statutory agencies on the approach to be taken for the EIA. As a general rule, standard methods for survey and assessment will be used where

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available and modified where appropriate to the scale, location and nature of the development.

The key issues to be addressed have been identified as those upon which the proposed development will have potentially significant environmental effects during both the construction and operational stages of the development.

Key environmental issues for the EIA to consider are likely to be around:

- the landscape and visual amenity of the area;
- surrounding habitats and wildlife including European and nationally designated sites and protected species;
- socioeconomics, education, research, health and tourism;
- the increased levels of traffic likely to travel to the site;
- ground conditions including the potential for contamination from previous land use;
- the water environment including water flow, groundwater, storage and impact on water bodies, and flood risk to the surrounding area;
- noise and air quality 'nuisance' effects, particularly resulting from the construction phase.

Although all the information required to comply with Schedule 4 of the EIA Regulations will be covered, the ES will focus on the key environmental effects, having scoped out unnecessary detail on those issues of less relevance.

3.2.1 Environmental Liaison Groups

Environmental Liaison Groups (ELGs) will be created to facilitate greater levels of communication and cooperation between consultees that have different, but often interrelated topics and issues of interest. ELG meetings will be organised by the EIA project team at regular intervals in the project programme.

Initially, the first ELG is likely to involve all CCC consultees and representatives from NRW, along with the EIA topic specialists. This will provide an opportunity to give an overview of the project, stated objectives and programme and will provide an open forum for cross sectoral discussions. This will prove valuable when formulating mitigation that has the potential to affect several topics, e.g. ecology, water and ground conditions.

Following the initial ELG, periodic ELGs will be arranged as the assessment and design progress. Feedback from these meetings will be recorded and used as evidence of how the proposals have adapted and improved to meet environmental requirements.

3.3 Definitions and Methodology

The following general definitions and methodology will apply to all assessments undertaken unless otherwise specified by the individual topic specialists:

3.3.1 Spatial and temporal scope

Spatially, the area over which effects could occur is wider than the site. The appropriate study area will be determined for each environmental topic. Specific study areas will be defined in each subject section, and will allow for assessment of indirect as well as direct effects, together with off-site factors, such as traffic routes.

In considering the environmental effects of the proposed development, it is necessary to identify both adverse and beneficial effects, direct and indirect, during construction and operation of the development. Specific temporal periods will be defined for the assessment of baseline conditions and the impacts of the proposals. It is recognised that some environmental design measures will take time to become established and effective.

As there is no intention to decommission or restore the land at the end of this period, the proposed Life Science and Wellness Village will be treated by the EIA as a permanent feature.

Should planning permission be granted, construction of the proposed development would start in 2018. With this in mind the EIA will need to consider how the baseline environmental conditions that are identified in 2017 may change up to that time, when predicted effects are likely to commence.

The EIA will also consider cumulative effects which are considered to be those that arise as a result of additive impacts from more than one project (under construction or reasonably foreseeable projects), combining together to have an effect on a receptor that may be larger than if the effect were considered separately. Broadly, reasonably foreseeable projects are those that are known to the planning system or are already consented (but not yet built).

3.3.2 Identification of potential receptors

Receptors are defined as the physical resource or user group that would experience an effect. The environmental effect would depend on the spatial relationship between the source and the receptor. Some receptors will be more sensitive to certain environmental effects than others. The baseline studies, including risk assessments, will identify the potential environmental receptors.

3.3.3 Prediction of Environmental Effects

Much of the predictive exercise will be undertaken on the basis of the expert judgement of the assessment team. Whatever the predictive approach, the objective will be one of presenting a clear justification for the strategy adopted, and stating all relevant assumptions to allow independent review.

3.3.4 Significance of Effect

The significance of effect is assessed against a defined scale set out in **Table 1**. These are specific to each subject area and will be included in the relevant sections. Broadly, significance of effect is a function of:

- The value of the resource (international, national, regional and local level importance);
- The magnitude of the effect, be it adverse or beneficial;
- The timescale involved, temporary or permanent; and
- The sensitivity of the receptor and numbers affected.

To judge the importance of environmental effects and to ensure consistency between topics, significance criteria will be defined by the appropriate EIA specialists, following the generic framework shown in **Table 1**. Definition of terms follows good practice guidelines. The generic criteria identified here will be used to guide the evaluation unless otherwise stated in the topic areas.

 Table 1 Significance Criteria for use within the EIA

Significance	Criteria Definition
Major	These effects are likely to be key factors or important considerations at a regional or district scale but, if adverse, are potential concerns to the project, depending upon the relative importance attached to the issue during the decision making process. They are generally, but not exclusively associated with sites and features of national importance and resources/features which are unique and which, if lost, cannot be replaced or relocated.
Moderate	These effects, if adverse, while important at a local scale, are not likely to be key decision making issues. Nevertheless, the cumulative effect of such issues may lead to an increase in the overall effects on a particular area or on a particular resource.
Minor	These effects may be raised as local issues but are unlikely to be of importance in the decision making process. Nevertheless, they are of relevance in the detailed design of the project.
Negligible	Effects which are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

3.3.5 Mitigation measures

Where adverse effects can be reduced to acceptable levels through incorporation of practical and cost-effective design or management measures, these will be identified.

3.3.6 Residual effects

Residual effects are the effects that remain following the implementation of proposed mitigation measures.

3.3.7 Monitoring

Where appropriate, monitoring procedures will be identified that will measure the effectiveness of the mitigation proposed.

Limitations and Assumptions 3.3.8

In accordance with Schedule 4 of the EIA Regulations, difficulties encountered during assessment work and limitations and assumptions used for individual assessment areas will be set out in the ES.



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4 Scoping

4.1 The purpose of scoping

An EIA must contain the information specified in Schedule 4 of the EIA Regulations which is set out in Appendix A of this report.

The scoping process aims to identify what the likely effects of a proposed development are and to determine those that are likely to be significant and therefore included within the scope of the EIA.

4.2 **Requesting a scoping opinion**

The scoping opinion of a planning authority represents its opinion as to what information needs to be included with the ES and what assessments should be carried out in order to determine what effects the proposed development is likely to have on the environment. When considering this, the scale and nature of the proposed development, along with the site specific and local environmental baseline conditions should be taken into account. The aim of the process is therefore to 'scope in' only those issues considered to have potential to give rise to likely significant effects.

A comprehensive and focused scoping process that identifies the likely significant effects and any EIA methodologies that CCC wishes to see employed will enable the production of the ES that provides a proportionate, concise and objective analysis that deals with all the significant areas of impact and highlights the key issues relevant to the decision making process.

A scoping opinion is therefore being sought from CCC in order to reach agreement on the topics and issues that should be addressed as part of the EIA and reported in the ES. As required in the EIA Regulations (Part 4, Regulation 14), this scoping request includes the following information:

- A plan sufficient to identify the land;
- A brief description of the nature and purpose of the development including its location and technical capacity;
- its likely significant effects on the environment; and
- Such other information or representations as the person making the request may wish to provide or make.

The environmental topics that have been considered within this scoping report are:

- Socioeconomics;
- Noise and vibration;
- Traffic and transport;
- Air quality;
- Hydrology and flooding;

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- Ground conditions;
- Biodiversity;
- Archaeology and Cultural Heritage
- Landscape and visual;
- Health and wellbeing;
- Climate.

For each topic, the likelihood of significant effects arising will be considered in terms of:

- Direct and indirect effects during construction;
- Direct and indirect effects during operation;
- Cumulative effects arising from the proposed development with other development that has extant planning permission or is under construction.

4.3 Assessment process

This request for a Scoping Opinion and the preliminary assessment is made in accordance with the following:

- European Council Directive 2014/52/EU on the assessment of the effects of certain public and private projects on the environment; and
- Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017.

This request for a Scoping Opinion and the preliminary assessment has had regard to the following:

- IEMA Quality Mark;
- National Planning Practice Guidance (refer to section 3.2)
- Policies and guidance relevant to the environmental topics being assessed.

As part of the EIA process, and in accordance with Part 1 of Schedule 4 information of the EIA Regulations, difficulties encountered during assessment work, limitations and assumptions used for individual assessment areas will be set out.

Preliminary consultation with statutory bodies has already taken place and is reflected in Section 7 (Likely significant environmental effects). Consultation will continue through the baseline data gathering and assessment phases.

The impact assessment will include an assessment of cumulative effects between construction and operation of the proposed development and other committed (or reasonably foreseeable) developments which, due to their geographical location and programme of construction my result in significant effects when combined with Llanelli WSV.

5 Scoping results

5.1 Introduction

In this section a review has been made on a topic by topic basis of potential environmental effects of the proposed Llanelli Wellness and Life Science Village. Where potential for significant effects has been identified, the scope for undertaking an environmental assessment is described.

5.2 Socioeconomics

5.2.1 Introduction

The potential effects of the proposed development on socioeconomic receptors have been considered at varying geographical levels, as appropriate. The proposed development is located in the Glanymor ward in the south of Llanelli. Potential local effects of the scheme have been considered for a south Llanelli study area comprising Glanymor and the neighbouring wards of Bigyn and Tyisha. In other cases, the potential for effects has been considered across the wider Carmarthenshire local authority area.

5.2.2 Known baseline

Population and demographics

Carmarthenshire has a total population of approximately 184,000, of whom 20.8% are aged 65 and over, and 2.8% are aged 85 and over. By comparison, 18.4% of the total population of Wales is aged 65 and over, and 2.4% aged 85 and over. The proportion of older people living in the south Llanelli wards is lower than the Welsh average, and there are higher than average proportions of children aged under 16, particularly in Glanymor.

Outside of Llanelli and the towns of Carmarthen, Ammanford and Burry Port, the county is predominantly rural, with a population density of 0.8 persons per hectare. In the south Llanelli wards, population density varies between 14.0 persons per hectare in Glanymor, and 64.1 in Tyisha.

Housing and household composition

Across Carmarthenshire, there are 78,800 households of which over 70% are owner-occupied. The proportion of households that are social rented is slightly below the average for Wales, at 14.8%. In the south Llanelli wards, the rate of owner-occupation is considerably lower, and there are higher proportions of households in social rented accommodation. In Glanymor, 29.8% of all households and 34.1% of households where the reference person is aged 65 and over are in social rented housing.

The proportion of households where all members are aged 65 and over is 25.0% in Carmarthenshire, above the average for Wales. This includes 14.8% of households which are one person households aged 65 and over. The figures are

| Draft 1 | 27 July 2017 \scioballeuropeicardiffjobs\248000/248032-0014 INTERNAL PROJECT DATA\4-50 REPORTS\STAGE 3 OUTLINE APPLICATIONENVIRONMENTAL SCOPING\SCOPING REPORT - DRAFT 02.DOCX lower in the south Llanelli wards, reflecting the smaller proportions of residents in older age groups.

Employment and economic activity

Carmarthenshire is part of the Swansea Bay City Region. The Economic Regeneration Strategy for the City Region identifies that the region is underperforming economically, recording lower than average economic growth and experiencing a 'productivity gap' relative to Wales and the UK. In 2010, productivity was 94% of the Welsh level and 77% of the UK level. This is attributed largely to the loss, since 1990, of manufacturing employment, and the growth of employment in relatively low-value sectors and occupations⁴.

Employment levels across the City Region have fallen considerably since 2010, and economic activity is lower than the average for Wales and the UK. Within Carmarthenshire, the rate of economic activity is also slightly lower than the average for Wales. However, unemployment is below average, at 3.7% compared with 4.3% across Wales. The south Llanelli wards record considerably higher levels of unemployment. In Glanymor, the unemployment rate is 6.9%, and in Tyisha it is $7.5\%^{5}$.

Skills and education

The Economic Regeneration Strategy for the Swansea Bay City Region identifies a major skill deficit across the City Region, with lower than average proportions of working age residents with higher level qualifications, and higher than average proportions of residents with no qualifications. This pattern is reflected in Carmarthenshire, where 23.9% of working age residents have degree level qualifications and 26.8% have no formal qualifications. Of the wards which make up the south Llanelli study area, 30.3% of working age residents of Bigyn and 34.1% of working age residents of both Glanymor and Tyisha have no qualifications.

However, the Strategy for the City Region identifies opportunities around innovation and the knowledge economy, linked to the region's universities (Swansea University and the Unversity of Wales Trinity St David, which has campuses at Carmarthen and Lampeter in Ceredigion). The City Deal for the region includes a skills and talent initiative led by Carmarthenshire County Council which will support skills development across all 11 City Deal projects (including the Llanelli Wellness and Life Science Village).

Deprivation

Deprivation is measured by Lower Super Output Area (LSOA) rather than by ward. The area to the south of Llanelli town centre records relatively high levels of multiple deprivation, with several LSOAs falling within the 10% most deprived in Wales. LSOAs in the area also fall, variously, within the 10% most deprived in

⁴ Swansea Bay City Region (2015) Economic Regeneration Strategy, 2013 – 2030. Available online at: <u>http://www.swansea.gov.uk/article/8061/Swansea-Bay-City-Region-Economic-Regeneration-Strategy</u>

⁵ Carmarthenshire County Council (2017), Tyisha Ward: Electoral Division Profile. Available online at: <u>http://www.carmarthenshire.gov.wales/media/1750027/Tyisha_Ward.pdf</u>

terms of income, employment, health, education, community safety, and physical environment deprivation.

The proposed development is located within the LSOA of Glanymor 1, which is the sixth most deprived in Carmarthenshire and among the 20% most deprived in Wales. In terms of the physical environment, it is the most deprived LSOA in Carmarthenshire and the 44th most deprived in Wales. The physical environment domain of deprivation measures air concentration, air emissions, flood risk, and proximity to waste disposal and industrial sites. Glanymor 1 scores particularly highly in terms of flood risk and proximity to waste / industrial sites.

Leisure and recreation

Existing leisure and recreation provision in the south Llanelli area includes the Millennium Coastal Park, which covers 22 kilometres of coastline and includes Llanelli beach and the Discovery Centre, located in Glanymor. Also in Glanymor are Ysgol Maes Y Morfa Juniors, Dolau Fawr Play Area, Crown Park, Havenlock Park, Bwlch Rangers Playing Field, Morfa Park, South Llanelli Cricket Club, the Millenium Park Centre, Machynys Peninsula Golf Club, and Ropewalk Road Allotments⁶. Pen-Y-Fan Park, Coronation Road Allotments, and Clos yr Ysgol and Nightingale Court play areas are located in Bigyn ward⁷.

5.2.3 Key issues

Construction

The following potential significant effects have been identified during the construction of the proposed development:

- Employment: the construction of the proposed development will create employment opportunities, which could result in beneficial effects for socioeconomic receptors in the local study area and across Carmarthenshire.
- Training: the construction of the proposed development may create apprenticeships and other opportunities for training and up-skilling, which could result in beneficial effects for socioeconomic receptors in the local study area and across Carmarthenshire.
- Amenity effects for residents and businesses: the construction of the proposed development could result in environmental effects such as noise, air quality, and construction traffic effects which could, in combination, give rise to amenity effects for residents and businesses in the local study area.

Operation

The following potential significant effects have been identified once the proposed development is in operation:

• Housing: the proposed development will provide assisted living accommodation including a care home, extra care housing, and domiciliary

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⁶ Carmarthenshire County Council (2017), Glanymor Ward: Electoral Division Profile. Available online at: <u>http://www.carmarthenshire.gov.wales/media/1749913/Glanymor_Ward.pdf</u>

⁷ Carmarthenshire Council (2017), Bigyn Ward: Electoral Division Profile. Available online at: <u>http://www.carmarthenshire.gov.wales/media/1749868/Bigyn_Ward.pdf</u>

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care housing, which could result in beneficial effects for socioeconomic receptors in the local study area and across Carmarthenshire.

- Employment: the proposed development will create employment opportunities in the Wellness Hub, Health Hub, and assisted living facilities, which could result in beneficial effects for socioeconomic receptors in the local study area and across Carmarthenshire.
- Education and research: the proposed development will provide a life science institute incorporating educational facilities, and research and development office space. This could result in beneficial effects for socioeconomic receptors in the local study area and across Carmarthenshire.
- Access to leisure and recreation facilities: the proposed development will provide leisure and sporting facilities within the Wellness Hub and associated recreation and leisure facilities across the wider site, which could result in beneficial effects for socioeconomic receptors in the local study area and across Carmarthenshire.

5.2.4 Assessment methodology

A full socioeconomic baseline will be developed, drawing on published data sources including ONS Census 2011, the Annual Population Survey, and the Welsh Index of Multiple Deprivation, as well as relevant documents published by Carmarthenshire County Council and the Swansea Bay City Region. The baseline will inform the identification and assessment of socioeconomic effects.

Where employment numbers are not yet available, the assessment of employment effects will, as far as possible, use industry accepted best practice to provide estimates of the number of jobs likely to be generated during construction and operation. Where this is not possible, a qualitative assessment of employment effects will be provided.

The assessment of amenity effects will draw on the findings of other ES topics, including Air Quality, Noise and Vibration, Traffic and Transport, and Landscape and Visual. The socioeconomic assessment will consider the potential for an amenity effect on a specific receptor where two or more significant environmental effects are identified.

A framework will be developed for assessing the significance of potential socioeconomic effects, taking into account the sensitivity of the receptor and the magnitude of the effect. Appropriate significance criteria will be defined, based on industry accepted best practice.

5.2.5 Consultation

Consultation will be undertaken with Carmarthenshire County Council officers representing Business Support, Leisure, and Strategic Development in order to understand the range of potential effects of the proposed development, and to inform the assessment. Where appropriate, consultation will be undertaken by telephone or by email.

5.2.6 Potential mitigation measures

Where potential adverse socioeconomic effects are identified, the assessment will recommend mitigation measures to avoid or reduce these effects. The assessment will also identify measures, where appropriate, to support the delivery of the benefits of the proposed development for socioeconomic receptors.

5.3 Traffic and Transport

5.3.1 Introduction

This section sets out the proposed approach to the assessment of potential effects and their likely significance on land-based traffic and transport as a result of the proposed LWLV. The assessment will be support by a separate Transport Assessment, the scope of which will be agreed separately with CCC as the Local Highways Authority.

Effects arising from the construction and operational phases will be assessed. Both stages are expected to have some effect on local receptors, arising from the increase in vehicular movements.

The study area for the Traffic and Transport assessment is proposed to broadly encompass all highways, walking and cycling routes that surround the site. This will include:

- The B4304 Coastal Road, directly west and south of the site
- The B4304 The Avenue
- Copperhouse Road
- Northumberland Road

5.3.2 Known Baseline

Local Highway Network

The site is located adjacent to the B4304 Coastal Road which defines a southern edge to Llanelli and acts as a peripheral distributor connecting to the A484 to the east and west of Llanelli. The Avenue routes along the eastern boundary of the site and alongside New Dock Road, provides a direct route to Llanelli railway station. The continuation of this route, Station Road, provides access to the town centre.

Walking and Cycling

The site is bounded to the South and west by the B4304 Coastal Road. On the south side of this road there is an existing shared footway/cycleway which runs parallel to the road to the north. East of the site, the shared footway/cycleway is located north of the B4304 Coastal Road. At the roundabouts located on the southern and western boundary of the site there are uncontrolled crossings for pedestrians.

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On the east side of The Avenue there is a footway that runs parallel to the road and continues adjacent to New Dock Road. There is currently no existing infrastructure for pedestrians on Northumberland Road or Copperhouse Road to the north of the site.

The footway/cycleway adjacent to the Coastal Road and the footway adjacent to The Avenue connects into the wider pedestrian network. Pedestrians in Llanelli are generally well provided for by both footways adjacent to roads and footpaths.

The site is located within walking distance of a range of local amenities, including a Lidl food store, Maes Y Morfa Community Primary School, Machynys Bar and Brasserie and Llanelli railway station, as well as services located on Station Road, north of the site.

In addition to the shared footway/cycleway adjacent to the Coastal Road, there are a number of facilities for cycles in the vicinity of the site. Route 4 of the National Cycle Network (NCN) follows the coast to the west and south of the site. Northwest of the site, Route 4 provides an off-road route to Burry Port and Pembrey. This section of the Route 4 is also referred to as the Millennium Coastal Path and has become a destination for leisure cyclists.

There is a local on-road cycle route that runs between Route 4 and Llanelli Railway Station. Route 47 of the NCN runs north from Route 4, approximately 2km north-west of the site.

Public Transport

The closest bus stops to the site are located on Embankment Road, 475m and 650m from the centre of the site. There is a shelter on the bus stop located on the south side of Embankment Road, however it is in poor condition.

The bus stops are served by the L1 service which has a circular route which originates and terminates at Llanelli Bus Station via the Trostre Retail Park. The route operates in both a clockwise and anticlockwise rotation, combining to provide an hourly service to Llanelli Bus Station where interchange to other local and regional services is possible.

Llanelli railway station is located some 1.2km north of the development site. The railway station is located on the West Wales and the Heart of Wales Lines. The station building, located adjacent to the eastbound platform is staffed during weekdays (06:10-12:40) and Saturdays (0700-1330) and has facilities which include a waiting room/seating area, accessible ticket machine, toilets, cycle storage, car parking and a taxi rank.

Train services are operated by Arriva Train Wales. There are two train services every hour to Carmarthen, Swansea and Cardiff.

5.3.3 Key Issues

The key issues to be considered within the Transport Chapter of the EIA for this site are as follows:

- The management of impacts on drivers, pedestrians and cycles during construction and the methods for reducing these impacts;
- Changes to routes and flows of traffic during the construction and operational phases and associated impacts on the capacity of junctions;
- Delivering longer term benefits to pedestrians and cycles once the development is completed; and
- Effects on accessibility to public transport terminals.

5.3.4 Assessment Methodology

A Transport Assessment (TA) will be prepared in accordance with national and local policy. The scope of the TA will be agreed with the local highway authority through the submission of a scoping note and subsequent combined meetings. The TA will consider the transport implication of the proposed development on the surroundings and present the potential mitigation that would be required. A travel plan will also be submitted that will include measures to encourage travel by sustainable modes and aim to reduce the overall level of vehicular movement being generated by the site.

The assessment methodology for the Traffic and Transport chapter of the EIA is set out below.

5.3.4.1 Legislation and Guidance

The Traffic and Transport assessment will be undertaken with due regards to the following legislation and Policy.

Legislation

- Institute of Environmental Assessment (now IEMA) Guidance Note 1: Guidelines for the Environmental Assessment of Road Traffic: 1993;
- IEMA The State of Environmental Impact Assessment Practice in the UK: 2011 (Ref. 9.22); and
- DfT The Design Manual for Roads and Bridges (DMRB): 1993 (Ref. 9.21). The DMRB sets out the relevant standards, advice notes and guidance relating to the design, environmental assessment and operation of the Highways Agency's (now Highways England) network (motorways and trunk roads).

Policy

- Welsh Government (WG) Planning Policy Wales (PPW): Edition 9 (November 2016). PPW sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs);
- WG TAN 8: Transport. This Technical Advice Note elaborates on the relationship between land use planning and transport infrastructure by outlining a range of key principles that should be adopted in new development;

- CCC Local Development Plan (LDP) 2014. The development plan for the area is the CCC LDP, adopted in 2014 for the period 2006-2021; and
- CCC South Llanelli Planning and Development Brief 2014. This Supplementary Planning Guidance includes further guidance and elaborates on the proposals and policies of the CCC LDP to provide additional clarity to assist developers understanding the core requirements for the area.

5.3.4.2 Methodology for Establishing Baseline Conditions

To establish a baseline position, traffic data has been collected at key locations within the agreed study area. The locations of the traffic surveys were identified through discussions with CCC Highways during the scoping discussions for the Transport Assessment.

Traffic data was collected in July 2017 outside of school holidays, as per agreement with CCC Highways.

5.3.4.3 Assessment of effects

The IEMA guidelines recommend that the impacts set out in Table 2 may be considered important when considering traffic from an individual development:

- Severance;
- Pedestrian delay;
- Pedestrian amenity;
- Fear and intimidation;
- Driver delay; and
- Accidents and safety.

There are other potential effects that could arise from the traffic impacts of the proposed development including noise, vibration, visual impact, heritage and conservation, ecological effects and air quality. These will be assessed within other chapters of the EIA relating to the specific discipline.

Significance Criteria

Table 2 below outlines the criteria by which potential effects are proposed to be assessed. The IEMA guidelines have been used as a basis for developing the assessment criteria.

Impact	Assessment Criteria			
	Negligible	Minor	Moderate	Major
Severance	Change in traffic flow of up to 30%	Change in traffic flow of 30% to 60%	Change in traffic flow of 60% to 90%	Change in traffic flow of over 90%

Table 2: Assessment criteria

Pedestrian delay	To be assessed on a case by case basis, with consideration given to the sensitivity and vulnerability of the receptor.
Pedestrian amenity	To be assessed on case by case basis using professional judgement with consideration given to changes to traffic flow.
Fear and intimidation	To be assessed on case by case basis using professional judgement with consideration given to the increase in HGV
Driver delay	To be assessed on case by case basis using professional judgement and the results of the junction modelling assessments.
Accidents and Safety	To be assessed on case by case basis using professional judgement with consideration given to accident assessment included within the TA and the forecast increase in traffic flows resulting from the development

The assessment criteria set out in Table 2 indicates the key evidence needed to understand the assessment is an increase in traffic or HGV flows.

The following assessment criteria is set for raising the significance of effect on any link:

- An increase in total traffic flows of 30% from 0-30%, 30-60% and 60-90% and greater than 90% to represent the effect of the development from negligible to major; or
- An increase in HGV traffic of 10%.

This assessment criteria allows for a simultaneous assessments to be conducted on any link whereby total traffic has increased as a result of the development proposals.

The sensitivity of a receptor can be defined by the degree by which it responds to change in its environment. The proposed assessment will predominately relate to the effect in an increase in traffic flow.

Paragraph 2.5 of the IEMA guidance indicates the following groups are susceptible to changes in traffic conditions. These groups are set out below alongside local examples that are proposed to be considered:

- People at home such as the neighbouring Machynys residential developments;
- People in work places including the Delta Lakes Enterprise Centre;
- Sensitive groups including children, elderly and disabled;
- Sensitive locations, e.g. Ty Elli Group Practice located on The Avenue;
- People walking on surrounding footways around and through the site;
- People cycling on neighbouring roads, footway/cycleways and the Millennium Coastal Path;
- Open spaces, recreational sites and shopping areas, including the eco-park;
- Sites of ecological/nature conservation value; and
- Sites of tourist/visitor attraction including Llanelli Beach and the Millennium Coastal Path.

Table 3 below presents the receptor sensitivity based on paragraph 2.5 of the IMEA guidelines and adapted using professional judgements.

Receptor Sensitivity	Receptor Type
Major	Receptors of greatest sensitivity to traffic flow including roads without footways, schools/colleges/playgrounds, historic accident hotspots and retirement homes.
Moderate	Receptors sensitive to traffic flow including roads with limited/narrow footway or unsegregated cycleways, congested junctions, GPs/Hospitals/Shopping areas with roadside frontages, parks and recreational facilities.
Minor	Receptors with some sensitivity to traffic flow including residential streets with suitable footway provision, places with ecological/nature/heritage value and tourist/visitor attractions
Negligible	Receptors with low sensitivity to traffic flow and those located sufficiently away from affected roads and junctions.

Table 3: Receptor Sensitivity

The assessment criteria and the receptor sensitivity have been combined to determine overall significance in Table 4.

Sensitivity of	Magnitude of Impact					
Receptor	Negligible	Minor	Moderate	Major		
Negligible	Negligible	Negligible	Negligible	Minor		
Minor	Negligible	Negligible	Minor	Moderate		
Moderate	Negligible	Minor	Moderate	Major		
Major	Minor	Moderate	Major	Major		

Table 4: Significance of Effects

Potential effects are therefore categorised as either Major, Moderate, Minor or Negligible significance. Major and moderate significance represents effects considered to be significant in IEMA guidelines.

5.3.5 **Consultation**

There will be ongoing consultation with CCC Highways to discuss the assessment methodology, forecast traffic impacts and potential mitigation strategy. The South Wales Trunk Roads Agent will be consulted regarding the potential impact on the M4 and the A483.

5.3.6 **Potential Mitigation**

Mitigation will be considered for the construction and operational phases of the project and will be presented within the Transport Assessment and outline

Construction Traffic Management Plan (CTMP). The CTMP will be developed to minimise the impact of construction traffic arising from the project.

Mitigation measures may include the following:

- Temporary traffic management which may include Traffic Marshalls and signage, HGV driver information packs and temporary speed limits;
- Providing sufficient off road parking for construction vehicles and workers, avoiding footpaths and grass verges;
- Travel planning for site personnel could be considered within the CTMP;
- Junction mitigation schemes to provide capacity improvements;
- Improvements to pedestrian facilities including the provision of new or improved crossings;
- Improving the accessibility to and around the site for cycles; and
- Proving improvements to existing public transport infrastructure, services and routes to the terminals.

5.4 Noise and Vibration

5.4.1 Introduction

A noise and vibration assessment will be undertaken as part of the Environmental Impact Assessment for the proposed development. The proposed development has the potential to impact upon ambient sound and environmental noise during both the construction and operational phases and therefore both phases will be assessed in the ES. Ground borne vibration will be induced during the early stages of construction. During operation of the development, there are no vibration sources that are likely to impact on buildings within and outside the development boundary. The scope of the noise and vibration assessment is outlined in this chapter and it proposed to discuss and agree the scope of background noise surveys, noise and vibration limits and significance criteria with Carmarthenshire County Council.

5.4.2 Known Baseline

It is proposed that a baseline noise survey is carried out to establish the character and levels of the existing environment within the locality. Up to four measurement locations will be chosen (subject to consultation with the County Council), at representative closest sensitive receptors around the site of the proposed development The survey will be designed to capture data for the daytime, evening and night time periods using a combination of attended and logged measurements. The nearest sensitive receivers are residential properties fronting onto the B4304, off Pentre Nicklaus Avenue to the southwest, along New Dock Street to the north and Embankment Road and Dafen Road to the east. The survey locations would be chosen to be representative of these sensitive receivers.

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There are no apparent sources of existing significant ground borne vibration which may impact on the development and since any potential effects from the construction of the development to existing sensitive receptors will be assessed to absolute limits recommended by standards, a baseline vibration survey will not be conducted.

5.4.3 Key issues

During construction the use of powered mechanical equipment on site can give rise to high noise emissions at source and these will often vary in level and duration throughout the works programme. In general, it is normally expected that noise from the powerful equipment needed for site clearance, ground works and foundation construction will be noisier than the later stages of building construction and fitting out when smaller scale equipment will be used for lifting, assembly and fitting out. All stages of construction will induce road traffic on the local highways for the transport of materials from and to the site. The possible use of compacting equipment for earthworks and sub-base layers to roads and paved areas and percussive and vibratory piling has the potential to induce vibration which may be felt by nearby receptors. Therefore, both construction noise and vibration assessment are scoped in for the assessment.

After construction, during occupation of the development, road traffic will also be induced on the local highway network and may increase existing levels of noise at nearby sensitive receptors. The development itself provides residential as well as other noise sensitive accommodation and outdoor amenity and therefore the effects of the future conditions, such as road traffic noise and any other prevailing or planned noise emitting sources will be considered in the noise assessment.

There will also be potentially noisy installations within the development which include utilities and building services (air supply and air conditioning equipment etc.), and car parking. The effects of these to existing and planned noise sensitive receptors will be assessed and where they may be significantly adverse, planning and engineering control measures will be recommended. The type of development proposed is not anticipated to be vibration generating and therefore assessment of such is scoped out of the assessment.

5.4.4 Assessment methodology

The following current policy and guidance will be used to inform the assessment:

Control of Pollution Act 1974 - gives local authorities powers to control noise or vibration pollution from construction sites

British Standard BS5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1 Noise - provides practical guidance on the control of construction site noise.

Technical Advice Note (TAN) 11: Noise (1997), last updated 31 May 2017 – provides guidance on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development. It provides advice on the consideration of noise during the development plan and control (management) processes as well as noise exposure categories for different types of activity which should be taken into account during the consideration of proposals for residential development.

For new residential development, potentially affected by transport related noise sources, Noise Exposure Categories (NECs) have been derived to assist local planning authorities in their consideration of planning applications for residential development near transport related noise sources. The NECs are described as following.

- NEC A Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as desirable.
- NEC B Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection.
- NEC C Planning permission should not normally be granted. Where it is considered that permission should be given, for example, because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
- NEC D Planning permission should normally be refused.

For noise generating development, including industrial and commercial sources, local planning authorities must ensure this does not cause an unacceptable degree of disturbance. It will also be relevant to bear in mind that if subsequent intensification or change of use results in greater intrusion, consideration should be given to the use of appropriate conditions.

Noise characteristics and levels can vary substantially according to their source and the type of activity involved. The character of the noise should therefore be taken into account as well as its level. Sudden impulses, irregular noise or noise which contains a distinguishable continuous tone will require special consideration. It is highlighted that disturbance which can be caused by traffic and associated car parking should not be underestimated.

The likelihood of complaints about such noise sources can be assessed, where the Standard is appropriate, using guidance in BS 4142: 1990 [updated 2014]. Tonal or impulsive characteristics of the noise are likely to increase the scope for complaints and this is taken into account by the 'rating level' defined in BS 4142. This 'rating level' should be used when stipulating the level of noise that can be permitted. The likelihood of complaints is indicated by the difference between the

noise from the new development (expressed in terms of the rating level) and the existing background noise. The Standard states that, 'A difference of around 10 dB or higher indicates that complaints are likely. A difference of around 5 dB is of marginal significance'. Since background noise levels vary throughout a 24 hour period it will usually be necessary to assess the acceptability of noise levels for separate periods (e.g. day and night) chosen to suit the hours of operation of the proposed development. Similar considerations apply to developments that will emit significant noise at the weekend as well as during the week. In addition, general guidance on acceptable noise levels within buildings can be found in BS 8233: 2014 (see below).

British Standard BS 8233:2014 Guidance on sound insulation and noise reduction for buildings provides guidance on noise control in and around buildings on an objective and quantifiable basis as far as is currently possible. For many common situations, this guide suggests criteria, such as suitable sleeping/resting conditions, and proposes noise levels that normally satisfy these criteria for most people. Technically it is applicable to new build developments or building refurbishments, but it also serves as useful guidance in determining acceptable levels of noise.

Design Manual for Roads and Bridges – Vol 11 Section 3 Part 7:HD213/11 revision 1(2011) - An approach to assessing noise and vibration effects from roads is described in Design Manual for Roads and Bridges (DMRB) relating to environmental assessment.

World Health Organization (WHO) Guidelines for Community Noise 1999 provides guidance on acceptable levels of noise in a variety of scenarios and arising from sources such as road, rail and air traffic, industries, construction and public work, and the neighbourhood.

Night Noise Guidelines for Europe – these guidelines recommend that the population should not be exposed to night noise levels greater than 40dB of $L_{night,outside}$, with an interim target of 55dB, during the part of the night when most people are in bed.

As identified above, the proposed development has the potential to give rise to noise during both construction and operation. The assessment will therefore consider the likely noise and vibration generated by the proposed development and the effects it may have on surrounding receptors, as well as sensitive building and amenity areas within the development itself. It will include:

- Construction noise and vibration;
- Operational noise associated with fixed sources such utilities and building services, as well as car parking and wind turbines and any other significant noise emitting installations; and,
- Operational noise from road traffic movements.

The assessments will be undertaken in accordance with objective criteria from local policy and, where considered useful, guidance from standards and national guidance documents.

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In the case of the noise assessment of site preparation and construction work, the potential effects would be temporary, whereas operational noise could potentially cause permanent noise issues.

Construction noise and vibration levels will be assessed to examine the noisiest processes within each phase of the works and the duration of any resulting noise or vibration effects. The guidance in BS 5228: 2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites' Part 1: Noise and Part 2 will be referred to. If required, noise mitigation measures will be recommended in order to adequately manage the noise impacts of the construction onto the nearest sensitive receptors.

Should any significant vibration generating operations be required (such as ground compaction and piling) an impact assessment using appropriate standards and guidance (for example BS 6472:2008 'Guide to evaluation of human exposure to vibration in buildings') will be conducted on vibration sensitive receptors. Mitigation measures will be recommended as necessary.

For the operation of utilities, buildings services plant, car park and wind turbines and any other noisy installations within the proposed development, these potentially may give rise to noise emission which could potentially cause disturbance. To ensure that noise from these does not have an unacceptable effect on the surrounding area and sensitive buildings within the development itself, appropriate noise limits would be specified based on the existing noise climate to avoid disturbance and adverse health effects.

Reference will be made to appropriate standards and guidance, including BS 4142: 2014 'Methods for rating and assessing industrial and commercial sound'. As necessary, consideration will be given to possible tonality, and /or impulsiveness or intermittency of the new noise.

In addition to the above, reference will also be made to BS 8233 'Sound insulation and noise reduction for buildings – Code of practice' for the protection of the internal noise environment.

For the purpose of this study, changes in road traffic noise resulting from the proposed development will be forecast using the CRTN methodology. Operational road traffic noise will be assessed based on the approach for noise impacts set out in The Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 7 HD213/11. Additionally, the noise exposure arising from new or altered roads associated with the proposed development will also be calculated using the Calculation of Road Traffic Noise (CRTN).

The cumulative impacts of other developments in the area will be considered using information readily available from local planning records. In the absence of such information, but where considered potentially material, reasonable assumptions on development in planning will be taken to estimate changes to the ambient noise environment and possible concurrent impacts.

5.4.5 Significance criteria

BS 5228-1:2009+A1:2014, is the recommended guidance relevant to construction noise. It provides a number of example methodologies for the assessment of significant effects from construction noise. Annex E describes the 'ABC' method of assessment, which is proposed to establish the threshold of potential significant effect at residential receptors.

Under this approach, the adverse impact threshold is determined at an existing residential dwelling using the existing ambient noise level, rounded to the nearest 5dB and evaluated in relation to the thresholds set out in **Table 1** below.

A potential significant effect is indicated where the construction site noise (L_{Aeq}) level exceeds the threshold level for the category appropriate to the ambient noise level. If the ambient noise level exceeds the highest threshold values given in Table 6 (i.e. the ambient noise level is higher than the Category C values), then a potential significant effect is deemed to occur if the construction site noise (L_{Aeq}) level for the period is greater than the ambient noise level.

Assessment category and threshold value period	Threshold values in decibels (dB), $L_{Aeq,T}$			
	Category A	Category B	Category C	
Weekday Daytime (07:00-19:00) Saturdays (07:00-13:00)	65	70	75	
Night-time (23:00-07:00)	45	50	55	
Weekday Evenings (19:00-23:00) Saturdays (13:00-23:00) Sundays (07:00-23:00)	55	60	65	
Category A: threshold value to use when ambient noise levels (rounded to the nearest 5dB) are less than these values				
Category B: threshold value to use when ambient noise levels (rounded to the nearest 5dB) are the same as Category A values				
Category C: threshold value to use when ambient noise levels (rounded to the nearest $5dB$) are higher than the Category A values				

Table 5 Potential significant effects at dwellings from on-site noise sources (from BS5228-1:2009+A1:2014)

For this assessment, the category C values are considered to represent a significant observed adverse effect level (SOAEL), above which significant adverse effects on health and life quality may occur. Below this level it could be considered that "*noise can be heard and causes small changes in behaviour and/or attitude*". The action would be to mitigate and reduce to a minimum consistent with the concepts of Best Practicable Means. Above a SOAEL level, "*noise is noticeable and disruptive*" and the action would be to avoid.

Depending on the availability of detail on construction programme and methodology, the construction noise assessment may necessarily be high level only in nature, examining the noisiest likely processes within each phase of the works. Noise effects from the operation of utilities, building services, car parking and wind turbines and other similar stationary_sources and activities will be assessed in accordance with the assessment methods in BS4142:2014 and include consideration of the following factors:

- The difference between the 'background noise level' the 'rating level' of the new noise at the receiver location;
- The absolute level of noise; and,
- The character of the new noise compared to the character of the existing residual or ambient noise; and
- The sensitivity of the receptor.

For the determination of significant effects, it is noted that this is context dependent and the references to be taken and final criteria will be established in consultation with the Council.

For operational road traffic noise, an approach to assessing significance criteria has been developed by reference to Volume 11, Section 3, Part 7: HD 213/11 revision 1 (2011) of the Design Manual for Roads and Bridges (DMRB). The DMRB approach to assessing the noise impact is to compare the noise levels for the 'do something' (with the development) scenario against noise levels for the 'do minimum' (without the development) scenario. This procedure will be used in the assessment by examining the changes in levels of road traffic noise that would result from the implementation of the proposed development.

The scale or severity of any road traffic noise change, beneficial or adverse, requires description to indicate the degree of impact where possible. Significance criteria are then applied to categories of change. DMRB Guidance on Noise and Vibration Assessment states that a long term change in traffic noise of less than 3 dB(A) is not generally noticeable and therefore would be considered imperceptible. A change threshold of 3 dB(A) in the long term has commonly been used in traffic noise assessments in the UK to approximate the threshold of significance. The magnitude criteria in Table 6 have been developed based upon DMRB, to assess noise effects arising from the operation of the proposed development.

Change in noise level, dB(A)	Impact category	Initial indicator of significance
>+10	Major adverse	
+5 to +10	Moderate adverse	Potentially significant increase
+3 to +5	Minor adverse	
0 to +3	Negligible	Unlibele to be significant
-3 to 0	Negligible	Uninkery to be significant
-3 to -5	Minor beneficial	

Table 6 **Summary table of noise impact evaluation criteria for changes in traffic noise in the long term**

-5 to -10	Moderate beneficial	Potentially significant
<-10	Major beneficial	decrease

The change in noise exposure arising from forecast changes in traffic flow on existing roads will be calculated using the CRTN Basic Noise Level (BNL) at locations 10m from the kerb. This enables a direct comparison to be made of the change in noise level associated with particular sections of road.

For this assessment, $L_{A10 (18-hr)} 68dB$ at an affected residential dwelling is considered to represent a SOAEL.

5.4.6 Consultation

The Council will be consulted on the survey methodology and locations chosen to take measurements, and for information about local policy relating to operational plant noise criteria and limits for road traffic noise affecting development during the preparation of the EIA technical assessment. The significance criteria for noise level change and health effects will also be proposed for agreement, as outlined above. Information on any planned noise sensitive and noise generating development will also be sought, including planning conditions and noise impact assessments submitted with such applications.

5.4.7 **Potential mitigation measures**

The various potential noise effects associated with the development will be assessed as part of the EIA to demonstrate that these issues have been properly considered. Construction noise, and in particular, noisy activities such as piling and earthworks can give rise to noise impacts. These can be minimised through the implementation of a Construction Environmental Management Plan (CEMP), which includes careful site planning and local noise control measures within it, so that it will be possible to ensure that noisy construction activities are locally controlled and screened to minimise adverse effects.

Construction noise as well as vibration impacts can also be controlled through a suitably worded planning condition and/or existing noise control legislation such as the Section 61 agreements (Control of Pollution Act [HMSO, 1974]) process.

Operational utilities and building services noise also has the potential to give rise to noise impacts. Through detailed design it is entirely practicable to ensure that utility and building services noise levels are controlled at source, such as by use of silencers, enclosure etc. such that they do not give rise to significant adverse noise impacts at surrounding sensitive receivers and those planned on the development site. Noise from car parks can be significant at peak times and control of noise from open areas is normally achieved by arrangement of the site such that car parks are located more distantly from existing and planned sensitive receivers. Where suitable, air conditioned non-residential buildings can be located to provide noise screening to sensitive receivers.

Induced road traffic on the local highways could increase noise levels to the surrounding sensitive receivers, particularly if access and vehicle routing is not directed onto the B4304. Road traffic noise from these roads would also affect

planned sensitive on the development site and if the effects are significant, mitigation measures to be considered include adequate set back buffer, noise barrier or landscaped bunds and self-protecting building layout and design.

Should there be any significant effects identified, appropriate mitigation measures will be proposed to show that residual effects will be eliminated or minimised.

5.5 Air Quality

5.5.1 Introduction

This section assesses existing baseline conditions for air quality in the area surrounding the proposed development in Llanelli and sets out the methodology proposed for assessing air quality impacts as a result of the proposed development.

During construction, dust and vehicle emissions may be a concern due to earthworks and construction activity, this would need to be mitigated appropriately.

During operation the proposed development has the potential to impact existing air quality as a result of road traffic exhaust emissions, such as NO₂, PM₁₀ and PM_{2.5}, associated with vehicles travelling to and from the site, and emissions arising from any proposed combustion plant that may be required.

5.5.2 Known Baseline

Passive monitoring of nitrogen dioxide (NO₂) is undertaken by CCC as part of the Local Air Quality Management (LAQM) process, however, no monitoring is undertaken within 1km of the proposed development.

Monitoring in the area of the proposed development focusses on the main access routes for Llanelli town centre (A484 and A476) and has identified exceedances of the annual mean NO₂ objective $(40\mu g/m^3)$ at two locations on the A476. The latest information available on the CCC website⁸ suggests that CCC is in the process of declaring an Air Quality Management Area (AQMA) for those areas where exceedances have been identified. At the current time, no information is available on either the CCC or Defra websites on the extent of the proposed AQMA. It is anticipated that the AQMA would be limited to the A476 Felinfoel Road access to the town centre which is approximately 1.7km north of the proposed development. Traffic travelling to and from the proposed AQMA.

Defra publishes background pollutant mapping⁹ for every 1km x 1km grid square across the UK. Background pollutant mapping has been reviewed for those grid squares in which the proposed development lies and is presented in **Table 7**. In the absence of monitoring data near the proposed development, it can be seen

⁸ Carmarthenshire County Council, 2015 Updating and Screening Assessment, June 2015

⁹ Defra, Background Pollutant Mapping, http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html
from Defra background concentrations that pollutant concentrations at the proposed development are well below the annual mean NO₂, PM_{10} and $PM_{2.5}$ objectives ($40\mu g/m^3$ and $25\mu g/m^3$ respectively).

OS Grid Square		2016 Concentrations (µg/m ³)			
X	Y	NO ₂	NOx	PM10	PM2.5
250500	198500	7.1	9.4	11.9	8.2
251500	198500	7.8	10.3	11.9	8.2

 Table 7: Defra Estimated Background Pollutant Concentrations

The assessment will assess predicted concentrations in areas where the air quality objectives apply both on and off-site. The long-term annual mean objectives apply at locations where sensitive receptors are located which will include residential properties, hospitals and schools. The short-term objectives apply at locations where members of the public may spend an extended period of time either, more than an hour or more than 24 hours at a single location¹⁰. There are residential properties within 30m of the site boundary and the proposed development will also include sensitive land uses such as clinical facilities and a care home.

The air quality impacts at designated ecological sites will also be assessed at Sites of Special Scientific Interest (SSSI), Special Areas of Conservation (SAC) and Special Protection Areas (SPA) identified within 100m of the site boundary.

5.5.3 Key issues

Pollutant concentrations at the proposed development are currently well below the relevant air quality objectives. Primarily air quality impacts will arise from road traffic travelling to and from the proposed development site and the operation of any combustion plant on-site.

Elevated pollutant concentrations have been identified on the main access routes to Llanelli town centre. The impact on any proposed AQMA as a result of the proposed development will need to be assessed should further work identify these roads as preferred access routes to the proposed development.

Impacts on designated ecological sites, in particular those of international designation, will be assessed and discussed with the scheme ecologists to inform any Habitat Regulations Assessment required as part of the proposed development.

5.5.4 Assessment methodology

An assessment of local air quality will be undertaken following all relevant guidance produced by the Defra and the devolved administrations, IAQM and EPUK. This will include:

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¹⁰ Defra, Local Air Quality Management Technical Guidance, April 2016

- A review of relevant legislation and policy at national, regional and local levels;
- A review of the existing air quality conditions in the area and the main sources of pollutants;
- A qualitative assessment of dust emissions during construction following the IAQM guidance¹¹;
- An assessment of the effects of traffic emissions on air quality, during the construction and operational phases, using dispersion modelling where required
- An assessment of effects from on-site combustion plant during the operational phase;
- An assessment of the significance of these effects following the EPUK/IAQM land-use planning guidance¹²; and
- Formulation of construction and operational measures, where necessary, to mitigate the effects of the proposed development on local air quality.

5.5.4.1 Construction

Construction dust

The construction dust assessment will be undertaken following the risk-based approach outlined in the IAQM guidance for the assessment of dust from demolition and construction. Effects during the construction phase will be temporary and will be assessed within 350m of the site boundary where receptors are present and within 20m of routes used by construction vehicles up to 500m from the proposed development site access, as well as any ecological receptors within 50m of the site boundary.

The IAQM guidance considers the potential for dust emissions from the following activities:

- Demolition;
- Earthworks i.e. soil stripping, ground levelling, excavation and land;
- Construction; and
- Trackout i.e. incidental movement of dust and dirt from the construction or demolition site onto the public road network.

For each of the above activities, the guidance considers three separate dust effects:

• Annoyance due to dust soiling;

¹¹ Institute of Air Quality Management, Guidance on the assessment of dust from demolition and construction v1.1, January 2016

 $^{^{12}}$ Moorcroft and Barrowcliffe. et al., Land-use Planning & Development Control: Planning for Air

Quality. v1.2., January 2017

- Harm to ecological receptors; and
- The risk of health effects due to a significant increase in PM_{10} exposure.

The methodology takes into account the scale on which the above effects are likely to be generated (classed as small, medium or large). The distance of the closest receptors and background PM_{10} concentrations are also taken into account in order to determine the sensitivity of the surrounding area. This is then taken into consideration to derive an overall site risk and identify suitable mitigation measures. Receptors can be either human or ecological and are chosen based on their sensitivity to dust soiling and PM_{10} exposure.

Construction Traffic

It is not anticipated that the construction phase of the proposed development would generate more than 100 Heavy Duty Vehicle (HDV) movements per day or 500 Light Duty Vehicle (LDV) movements per day, therefore an assessment of the emissions associated with construction traffic will be scoped out as any air quality effects would be negligible¹².

If during the assessment stage it is discovered that these criteria would be exceeded, dispersion modelling would be undertaken following the methodology set out for assessing operational road traffic effects, as outlined in section 5.5.4.2.

5.5.4.2 Operation

Road Traffic

The operational traffic assessment will consider sensitive receptors (human and ecological) within 200m of the local road network where changes in traffic and changes to the highway network meet the following criteria as a result of the proposed development:

- A change of LDV flows of more than 500 Annual Average Daily Traffic (AADT);
- A change of HDV flows of more than 100 AADT;
- A realignment of roads where the road layout changes by 5m or more; or
- Introduce a new junction or remove an existing junction near to relevant receptors.

Given the extent of the proposed development it is anticipated a detailed assessment of operational road traffic effects on air quality will be required. Where operational traffic is shown to potentially affect the proposed AQMA in Llanelli town centre, more stringent criteria for AQMAs as set out in the EPUK/IAQM land-use planning guidance¹² will be used to determine if a detailed assessment is required for this location.

The assessment will be undertaken using ADMS-Roads (version 4.1) atmospheric dispersion model from Cambridge Environmental Research Consultants (CERC). Traffic data will be obtained from transport planners for the proposed development in 24 hour Annual Average Daily Traffic (AADT) format with the

calculated percentage of HDVs and average speed data (kph). Using this data the latest vehicle emission factors released by Defra will be used to calculate road-traffic emissions.

The assessment will focus on concentrations of NOx, NO₂, PM_{10} and $PM_{2.5}$ for which air quality objectives and EU limit values are set in legislation. An assessment of nitrogen deposition at designated ecological sites will also be undertaken for assessment against site-specific critical loads.

The assessment of air quality effects from road traffic will include a baseline and opening year scenario both with and without the proposed development in operation. It is anticipated that the traffic data obtained for the opening year scenario both with and without the proposed development will include traffic associated with any committed development in the area.

Where design proposals are sufficiently progressed and car parking proposals for the site are known at the time of assessment, emissions from vehicle use in the car parks will also be included in the dispersion modelling.

A comparison of the results from the opening year with and without proposed development scenarios allows the magnitude of change in pollutant concentrations arising as a result of the proposed development to be determined.

Combustion Plant

Given the scale of the proposed development and the likely land uses, it is anticipated that combustion plant such as communal gas-fired boilers, Combined Heat and Power systems (CHP) or biomass boilers will be required to provide heat and power to the proposed development. At the time of writing no information is available as to the capacity or type of combustion plant to be installed at the proposed development.

Should design proposals progress to include combustion plant with a single or combined emission rate of 5mg/s an assessment of impacts at on and off-site receptors, including designated ecological sites, would be undertaken by including this source in the dispersion model (ADMS-Roads).

Significance of effects

The significance of local air quality effects as a result of construction dust will be determined using the IAQM guidance for the assessment of construction dust. This guidance states that where appropriate mitigation is implemented effectively no significant residual effects would be anticipated.

For the operational phase, and assessment of construction traffic if required, the EPUK/IAQM land-use planning guidance provides an approach to determining the air quality impacts resulting from a proposed development and the overall significance of local air quality effects arising from a proposed development.

5.5.5 Consultation

Consultation will be undertaken with the environmental health officer at CCC to understand their current position for the proposed AQMA and to obtain their latest air quality monitoring information. Discussions will also be held to agree the sensitive receptors to be assessed and the emission factors, background pollutant concentrations and meteorological data to be used in the assessment.

Consultation will also be undertaken with Natural Resources Wales to identify the appropriate site-specific critical loads to be used in the assessment of impacts at designated sites.

5.5.6 **Potential mitigation measures**

Following the assessment of construction and operational air quality effects, mitigation measures will be recommended where required. It is likely that mitigation will be required for the construction phase to minimise the effect of construction dust on nearby properties. Dust suppressant measures outlined in the IAQM guidance for the assessment of dust from demolition and construction will be recommended as required.

5.6 Water Resources

5.6.1 Introduction

This section outlines the approach that will be adopted for the assessment of the impacts on water resources, which may arise as a result of the construction and operation of the proposed development. This includes consideration of flooding, hydrogeology, potable water, foul drainage and storm drainage.

5.6.2 Baseline Conditions

Information will be gathered from the sources identified in Table 8 to determine baseline conditions.

Торіс	Source		
Flooding	Welsh Government – TAN15 Development Advice Maps		
8	Natural Resources Wales – Flood Maps		
Hydrogeology	Natural Resources Wales – Groundwater and Aquifer Maps		
Potable Water	Dwr Cymru Welsh Water – Potable water plant records		
Foul Drainage	Dwr Cymru Welsh Water – Sewer plant records		
Four Drainage	Sewer plant records from previous adjacent development		
	Dwr Cymru Welsh Water – Sewer plant records		
	Sewer plant records from previous adjacent development		
Storm Drainage	Natural Resources Wales – Groundwater, aquifer maps		
	surface water flood maps		
	British Geological Society – Geological maps		

 Table 8
 Information Sources for Water Resources EIA Technical Assessment

A preliminary review of the current Technical Advice Note 15 (TAN15) Development Advice Map (DAM) of the study area shows that the site is within a mixture of Zones A, B and C1. The majority of the site is located within Zone A which is considered to be at little or no risk of fluvial or tidal/coastal flooding. For the areas within the site, considered to have flooding risk, the primary mechanism of flooding is tidal inundation. The tidal inundation would result from rising tide levels in the Loughor Estuary and a breach or overtopping of tidal defences located along the coastline in the site vicinity.

Initial research suggests that there are no groundwater protection zones within the site; however it is anticipated that protection measures will be required to safeguard the groundwater especially if infiltration was considered as a method to dispose surface water drainage.

The proposed development will introduce an increase in the area of impermeable surfaces which is expected to increase the surface water runoff from the site.

The baseline study will confirm the existing site hydrology and hydrogeology in consultation with Natural Resources Wales (NRW) and Carmarthenshire County Council Drainage Department (CCCDD).

Based on prior experience working within the local area and prior discussions with DCWW it is known that there is limited capacity within DCWW's local foul system. It is expected that the limited capacity will result in the need for storage and flow restriction within the site prior to discharge.

All storm-water from site is proposed to discharge to new and existing outfalls into the New Dafen River. Subject to consultation with NRW and CCCDD it is assumed that no attenuation will be required prior to discharge. If attenuation is required space will be required within the site.

5.6.3 Assessment methodology

The assessment will include the following:

- 1. A review of the relevant legislation;
 - Environmental Protection Act 1990 and Environment Act 1995
 - European Union (EU) Water Framework Directive (WFD) 2000/60/EC (as amended in 2008)
 - The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003
 - Contaminated Land Regulations 2006
 - Water Resources Act 1991
 - Flood and Water Management Act 2010
 - Technical Advice Note 15 (TAN15) Development and Flood Risk
 - Planning Policy Wales
- 2. A desk study to identify existing information and to establish the baseline;
- 3. The predictions of likely effects during construction and operation on:

- Hydrogeology;
- Hydrology;
- Potable water resources; and
- Drainage networks

To assess the likely effects of the proposed development the following tasks will be undertaken:

- A review of the relevant legislation;
- Consultation with statutory consultees;
- A desk study to identify existing information;
- Site visits/surveys to identify baseline conditions;
- Assessment of the likely impact on hydrology and drainage during construction and operation;
- Assessment of the likely significance of those impacts and the identification of mitigation measures; and
- Assessment of any residual impact

5.6.4 Consultation

The following parties will be consulted during the preparation of the assessment:

- 1. Natural Resources Wales (NRW);
- 2. Dwr Cymru Welsh Water (DCWW); and
- 3. Carmarthenshire County Council.

The cumulative effect of the development on the Water Resources will be considered as part of the assessment and consultation with the relevant authorities.

5.6.5 **Potential Mitigation Measures**

Mitigation measures will be identified where necessary to avoid, reduce or offset any significant adverse effects on identified receptors. Where appropriate, strategies will be proposed to ensure that post development conditions have no significant adverse impacts.

The assessment will detail any proposals for sustainable drainage solutions, such as infiltration, swales, attenuation, green roofs or rainwater harvesting that could be implemented to mitigate any identified adverse effects.

Drainage proposals will be developed for the site and will be co-ordinated with NRW, DCWW and Carmarthenshire County Council.

A summary table will be included to inform overall conclusions on the significance and scale of effects, necessary mitigation measures and predicted residual effects.

5.7 Ground Conditions

The Ground Conditions chapter will address the potential effects related to geology, hydrogeology and contamination that will need to be considered in light of the proposed development.

5.7.1 Known Baseline

To inform the masterplan for the Llanelli Wellness and Life Science Village (LWLV), a Geotechnical and Geo-environmental Desk Study was produced and submitted to the Council as part of the Stage 2 submission in December 2016.

The report includes a description of the site and a review of the former uses of the site has been undertaken based on historical maps. The British Geological Survey (BGS) geological map and memoir have been consulted to provide a description of the expected geology and ground conditions underlying the site. A mining risk assessment of the site has been undertaken including consultation with The Coal Authority and a preliminary unexploded ordnance (UXO) risk assessment has been undertaken. The desk study also reviews available information from previous geotechnical and geo-environmental assessment is provided, including risks to human health and the environment. The baseline information is summarised below.

5.7.1.1 Site Description

The application site is approximately 23 hectares and is located to the south of Llanelli, centred at approximately National Grid Reference (NGR) SS509985. The site is located along the coast, north of the Loughor estuary. The New Dafen River, a standing water body, is located in the centre of the site.

The site area is generally open derelict land consisting of rough grass/scrub locally with areas of hardstanding and gravel capping layers. A detailed description of the application site is presented in Section 2.2.

5.7.1.2 Site History

Historical maps of the area dating back to 1889 have been reviewed. The area has historically been used for heavy industry, including the South Wales Iron and Tin Works and associated access roads and railway infrastructure. The Great Western Dock and a scouring basin were located at the eastern end of the New Dafen River watercourse which have now been infilled, as have several historic reservoirs.

The industrial landscape of the area changed during the 20th century, and by the 1970s much of the previous industry had been demolished or relocated. A major regeneration of the area was undertaken 1994, which included reprofiling of the New Dafen River, site development, new access roads within and around the site and coastal protection of the nearby Loughor Estuary.

5.7.1.3 Geology, Hydrogeology and Hydrology

The geological maps and previous ground investigations shows the site to be underlain by superficial deposits Estuarine Alluvium and Glacial Deposits. The natural superficial deposits are overlain by varying thicknesses of made ground materials.

The solid geology comprises the Hughes Beds of the Upper Coal Measures. The geological plan indicates that the Hughes Beds are predominantly sandstone beneath the eastern part of the site and undivided mudstone, siltstone and sandstone beneath the western part of the site. The general dip of the beds is around 15° to the north.

The Swansea 2ft coal seam and other thin coal seams are shown to be within the Hughes Beds, and there are various coal mining features shown on the geological map.

The Environment Agency aquifer maps (now Natural Resource Wales) shows the Estuarine Alluvium underlying the site to be designated as 'Secondary Undifferentiated' strata. The Glacial Deposits are designated as a 'Secondary A' aquifer. The underlying Hughes Beds of the Upper Coal Measures bedrock is designated as a 'Secondary A' aquifer.

The impounded New Dafen River watercourse forms an integral feature of the proposed development. The water level of the New Dafen River is controlled by a sluice gate to the east, which connects immediately to the River Lliedi and beyond to the Loughor Estuary. To the south east of the New Dafen River, there is a watercourse that historically was part of a scouring basin and is now heavily vegetated as observed during the site walkover.

5.7.1.4 Mining

As discussed above, the site is underlain by the Hughes Beds of the Upper Coal Measures. The town of Llanelli is known to have been mined for coal in the past, and the geological map shows several mining related features.

The geological map generally shows there are no coal seam outcrops or mine shafts beneath the site, with the exception of the coal seam outcrop shown to the south of the New Dafen River with a note that states 'coal proved in foundations'. There are 4 adits recorded by The Coal Authority in the north west of the site. The depth of superficial deposits beneath the site is expected to be significant.

5.7.1.5 Unexploded Ordnance (UXO)

A detailed UXO risk assessment has been undertaken by specialist Dynasafe BACTEC. The report concluded that Dynasafe BACTEC consider the site to be low risk from UXO. Details of the basis of this recommendation is provided in their assessment.

5.7.1.6 **Previous ground investigations**

There is previous ground investigation information available for the site, sourced from the British Geological Survey (BGS) archives and factual reports of ground investigation undertaken previously for Carmarthenshire County Council. The investigations comprise a mixture of trial pits and boreholes with associated geotechnical land chemical testing. The findings of previous investigations are discussed further in the 2016 Geotechnical and Geo-Environmental Desk Study.

5.7.1.7 Preliminary contamination risk assessment

Based on the conceptual site model for each area of the site, preliminary risk assessments were undertaken. These assessments are presented in the 2016 Geotechnical and Geo-Environmental Desk Study. These assessments will be reviewed and updated as necessary based on current development proposals as part of the environmental impact assessment.

5.7.2 Key issues

The ES will assess the impact of the proposed development on potential receptors associated with the ground conditions. This will include, but will not be limited to, the impact of construction works on soils and groundwater regime, and potentially contaminated ground on human health and controlled waters.

The construction of the piled foundations has a potential to result in localised vertical displacement of made ground materials potentially impacted by contamination or creation of preferential flow path for migration of contamination and ground gas. These may have an impact on controlled waters and human health.

In addition, during construction, construction workers and site neighbours may be directly exposed to any potential subsurface contamination.

The potential effects will be considered during the assessment.

5.7.3 Assessment methodology

A desk-based assessment of ground conditions will be undertaken to determine the baseline conditions within the site. This will consider the following:

- Published geological maps and memoirs;
- Topographic maps and information;
- Current and historical land use information; and
- Review of available ground investigations information.

The above information will be used to develop conceptual site models (CSMs) for the sites. These shall be developed in accordance with the risk management framework provided in CLR11, Model Procedures for the Management of Land Contamination. The need for further focused assessment will be considered where existing or suspected contaminated land may have an effect as a result of construction and operation, i.e. by creating or altering pollutant linkages between sources of potential contaminants and sensitive receptors such as humans, ecological receptors, surface water and groundwater bodies.

The conceptual site models will be used to establish the risks posed by each location and the need or otherwise for further assessment.

The assessment of effects follow the approach outlined in Section 3.3.4.

Potential interrelationships have been identified between the ES chapters concerned with drainage and water environment, air quality (dust), ecology, landscape and cultural heritage. The assessment of effects will take into account these interrelationships. However, the principal effects specific to these topic areas will be assessed within the relevant chapters, even where the effects are on or from geology, hydrogeology and land contamination.

5.7.4 Consultation

It is proposed that the following consultees will be consulted with for the purpose of the Ground Conditions assessment.

- Carmarthenshire County Council, Environmental Health Department, Contaminated land Officer;
- Natural Resources Wales.

5.7.5 **Potential mitigation measures**

Based on the assessments undertaken as part of the 2016 Geotechnical and Geo-Environmental Desk Study, additional ground investigations are required to confirm ground conditions for geotechnical design and to allow further assessment of contamination. Investigation proposals will include further characterisation of groundwater and associated contamination. Mitigation measures detailed in the Environmental Statement will include ground investigation recommendations.

The data obtained from the additional ground investigations will be used to undertake contamination risk assessments in line with current best practice (CLR 11). Based on the findings of the contamination assessments a remediation strategy will be developed.

5.8 **Biodiversity**

5.8.1 Introduction

This section outlines the approach that will be adopted for the assessment of the impacts on ecological receptors, which may arise as a result of the construction and operation of the proposed LWLV.

5.8.2 Known baseline

A number of ecological surveys have already been undertaken to inform proposals at the site including:

- Extended Phase 1 Habitat Survey;
- Reptile surveys;
- Otter surveys;
- Water vole surveys; and
- Badger surveys.

A desk study of previous species records and designated sites has also been undertaken. The full Ecological Baseline Study that was issued in November 2016 is included in Appendix A and the results are summarised below. At the time, the study looked at additional areas around the proposed LWLV site which are now part of separate planning applications. The ecological baseline remains valid for this site.

Designated Sites

No statutory designated sites occur within the site boundary. The following designated sites occur within 4km of the site, and are indicated on Figure 2:

- Burry Inlet Special Protection Area (SPA) and Ramsar site, located approximately 300m west of the site. This site is designated for regularly supporting, in winter, over 20,000 waterfowl and for supporting internationally important wintering populations of the following four species of migratory waterfowl: pintail (Anas acuta), oystercatcher (Haematopus ostralegus), knot (Calidris canutus) and redshank (Tringa totanus). Additional species cited under the SPA designation are internationally or nationally important wintering populations of the following species of migratory wildfowl: shelduck (Tadorna tadorna), teal (Anas crecca), wigeon (Anas penelope), shoveler (Anas clypeata), grey plover (Pluvialis squatarola), dunlin (Calidris alpina), curlew (Numenius arquata) and turnstone (Arenaria interpres).
- Carmarthen Bay and Estuaries Special Area of Conservation (SAC) is located approximately located approximately 100m west of the site. This SAC is designated for its habitats (estuaries, mudflats and sandflats not covered by seawater at low tide, Atlantic salt meadows, Salicornia and other annuals colonising mud and sand, large shallow inlets and bays and sandbanks which are slightly covered by sea water all the time) supporting allis shad (Alosa alosa), twaite shad (Alosa fallax), river lamprey (Lampetra fluviatilis), sea lamprey (Petromyzon marinus) and otter (Lutra lutra).
- Burry Inlet and Loughor Estuary Site of Special Scientific Interest (SSSI) located approximately 300m west of the site. This site is the largest estuarine complex within the old West Glamorgan county and Borough of Llanelli. Comprising extensive areas of grazed saltmarsh, sand and mud flats, the area





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is internationally significant for its wader and wildfowl populations with overwintering totals averaging in excess of 46,000 birds.

- Pyllau Machynys SSSI is located approximately 300m south-west of the site. This site has two special features: standing water and swamp; and a dragonfly assemblage. As well as these features this site has other habitats that contribute to the special wildlife interest. These include areas of wet willow woodland and scrub, and flower-rich grassland. This diversity of habitats similarly supports a wide range of species and these too are a key component of the special interest of the site.
- Pwll Lagoon SSSI is located approximately 3.8km north-west of the site. This site has two special features: swamp; and fen woodland. The Pwll Lagoon is of special interest due to the presence of contrasting fen and woodland communities, with both calciphile (lime-loving) and calcifuge (lime-hating) species growing in close proximity to each other. Further interest is also provided by the presence of scarce wetland plants and the anthropogenic soils which result from the degradation of pulverised fuel ash.
- There is one Local Nature Reserve (LNR) within the 4km search area, North Dock Dunes LNR which lies along the coast approximately 500m east of the site.

<u>Habitats</u>

The majority of the site comprises disturbed and sparsely vegetated ground, with large areas of semi-improved neutral grassland particularly to the north of the site near the lake. Tall herbs are present within the grassland, in patches and along the southern boundary of the site. Shrubs and European gorse (Ilex europaeus) are present around the site boundary, with some small areas of bramble (Rubus fruticosus agg) scrub. A small area of the invasive species Japanese knotweed (Fallopia japonica) has also been recorded alongside the lake.

There are also small areas of broad-leaved woodland and mixed woodland plantations around the edges of the site and on the northern side of the lake.

Reptiles and Amphibians

A number of reptile records within 2km were returned by West Wales Biodiversity Information Centre (WWBIC), and are summarised below.

- One record of slow-worm (Anguis fragilis) and one record of common lizard (Zootoca vivipara) (193m south-west of the Machynys area);
- Two records of slow worm and two records of common lizard within the Avenue East area;
- One historic record¹³ of grass snake (Natrix natrix) and one historic record of common lizard 84m east of the Machynys area.

¹³ Historic records are records before 2000.

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Both slow worms (*Anguis fragilis*) and common lizard (*Zootoca vivipara*) were recorded during the surveys undertaken in 2016. A maximum of 12 common lizard were seen on any survey visits.

In addition, three species of amphibian were recorded during the surveys; common toad (*Bufo bufo*), common frog (*Rana temporaria*) and palmate newt (*Lissotriton helveticus*).

Great crested newts are assumed not to be present at the site due to the lack of previous records and lack of suitable habitat for this species.

<u>Otter</u>

No evidence of otters was found during the course of the surveys. The New Dafen lake habitat within the site is potentially suitable for this species however the lake is heavily disturbed by human activity which reduces the likelihood that otters would occupy this area on a regular basis.

Water vole

The data returned from WWBIC included a number of water vole (Arvicola amphibius) records:

- One historic record of water vole within the New Dafen Lake;
- One historic record of water vole within a large ditch 100m south-east of the New Dafen Lake;
- Five historic records 920m east of the study area near Trostre;
- Numerous historic records 1.4-1.8km east/north-east of the study area around Trostre Industrial Park.

Five water bodies were initially identified as being potentially suitable for water voles; however, following the survey only three of these proved to be suitable. Of these three water bodies, evidence of water vole was only found in one water body (New Dafen River).

<u>Bats</u>

Bats recorded within the area include:

- An unspecified species roost 232m north-east at Hafan y Morfa, an unspecified roost 517m east and a suspected unspecified roost 1.4km north-east;
- Unspecified activity 615m north, common pipistrelle (Pipistrellus pipistrellus) recorded foraging 650m north-west, common and soprano pipistrelle (Pipistrellus pygmaeus) recorded 670m north-west and common pipistrelle activity 1.4-1.6km north.

During the survey, one building at the north-east corner of the New Dafen Lake was considered to have moderate bat roost potential (TN8). The building contains features suitable for bat roosts including gaps underneath roof tiles, gaps behind fascia's and soffit boxes. No signs of bats were observed externally. No trees within the site were identified as having potential for roosting bats, due to their relatively small size and lack of potential roost features. Bats may however use the woodland and waterbodies as foraging areas.

Emergence surveys of the building at the north east corner of the lake will be undertaken in 2017.

Ground nesting birds

Ground nesting birds recorded within the area include:

- Numerous records of skylark (Alauda arvensis), the nearest recorded 98m west of the New Dafen River;
- Numerous records of lapwing (Vanellus vanellus) (including breeding pairs and nests), the nearest record 537m south at Machynys Golf Club;
- Curlew (Numenius arquata) recorded 248m south at Machynys Golf Club, and within the Loughor Estuary;
- Snipe (Gallinago gallinago) recorded 183m west of the New Dafen River and 1.3km east at the National Wetlands Centre.

Invertebrates

Section 7 Species (Environment (Wales) Act) identified within the vicinity of the site include:

- Moths including green brindled crescent (Allophyes oxyacanthae) and rosy rustic (Hydraecia micacea) within the Machynys area;
- Butterflies including small heath (Coenonympha pamphilus), grayling (Hipparchia semele) and wall (Lasiommata megera) within the Machynys area. An historic record of a small blue butterfly (Cupido minimus) was made in the North Dock area in 1989; and
- Bees including moss carder bee (Bombus (Thoracobombus) muscorum) south of Machynys.

Badgers

No badgers were identified during the survey. There is suitable commuting and foraging habitat present within the site, particularly within areas of dense scrub and broadleaved/mixed woodland however, no signs were found during the course of the surveys.

Dormice

There are no records of dormice within the search area. Potentially suitable habitat for this species exists within the woodland to the north of Machynys Golf Course however this habitat is unconnected to other suitable habitat and is too small to support a viable dormouse population.

5.8.3 Key issues

The close proximity of the site to European Sites and the potential for it to be used by mobile species which are features of the European Sites will be a key issue in the assessment, alongside the potential presence of legally protected species. The potential effects on the European Sites will be considered in the EIA process and under the requirements of the Habitats Regulations, with information provided alongside the Environmental Statement to inform the Competent Authorities Assessment.

5.8.4 Assessment methodology

5.8.4.1 Scope of Proposed Assessment

The assessment of effects will follow a methodology primarily taking account of the Guidelines for Ecological Impact Assessment in the UK Chartered Institute of Ecology and Environmental Management (CIEEM).

The Guidelines for Ecological Impact Assessment in the UK (2016) are the current industry standard for ecological assessment and are therefore considered to be current good practice. The assessment of impacts on ecological receptors will therefore be undertaken in line with the CIEEM guidance in terms of the assessment of the significance of effects.

5.8.4.2 Assessment of Potential Effects

The assessment of the effects of the development will include those arising from:

- the permanent land take required for the development;
- construction activities; and
- operation.

The potential effects of the permanent land take for the development would primarily arise from habitat loss which, as well as resulting in the loss of habitat of intrinsic value in its own right, would reduce the area available for foraging and nesting animals. Reducing the area can reduce viability of the habitat and lead to a reduction in the diversity of plant and animal communities present. The integrity of the habitat could therefore be altered, and the conservation status of species affected.

The likelihood of greater human presence and interference within the site has the potential to cause disturbance to any species using the areas of the lake surface and surrounding habitats. In particular the potential for disturbance of bird species which are features of the nearby European Sites will need to be assessed both within the EIA process and in terms of the Habitats Regulations.

5.8.5 Significance criteria

In accordance with the CIEEM guidelines, a significant impact, in ecological terms, is defined as 'an impact (whether negative or positive) on the integrity of a

defined site or ecosystem and/or the conservation status of habitats or species within a given geographical area, including cumulative and in-combination impacts'. It is important to note however that in accordance with the CIEEM guidelines, the actual determination of whether an impact is ecologically significant is made irrespective of the value of the receptor in question. In this respect the CIEEM methodology differs from some other approaches to EIA.

The value of a feature that will be significantly affected is used to determine the geographical scale at which the impact is significant, e.g. an ecologically significant impact on a feature of county importance will be considered to represent a significant impact at a county level. This in turn is used to determine the implications in terms of legislation, policy and /or development management.

Any significant impacts remaining after mitigation (the residual impacts), together with an assessment of the likelihood of success of the mitigation, are the factors to be considered against legislation, policy and development management in determining the development.

5.8.6 Consultation

An initial meeting has been held with Natural Resources Wales and the Carmarthenshire County Ecologist to introduce the scheme and identify any initial concerns. Further meetings will be held during the EIA process.

5.8.7 Potential Mitigation and Enhancement measures

As referred to above, the Carmarthenshire Council has particular responsibilities with respect to the conservation and enhancement of SSSIs, under Section 28 of the Wildlife and Countryside Act 1981, and the conservation of biodiversity, under the Environment (Wales) Act 2016. The Environmental Statement will include both mitigation and enhancement measures for the Scheme to address these obligations.

Mitigation and enhancement opportunities are likely to be required for the presence of legally protected species such as water voles and the potential presence of bird species which are features of the nearby European sites.

Mitigation and enhancement measures will be discussed with the attendees of the Environmental Liaison Group.

5.9 Archaeology and Cultural Heritage

5.9.1 Introduction

This section outlines the approach that will be adopted for the assessment of the impacts on archaeology and cultural heritage, which may arise as a result of the construction and operation of the proposed development.

5.9.2 Known baseline

An initial review of available online resources, for a study area comprising the footprint and a 1km radius surrounding the proposed development has identified:

- 13 non-designated heritage assets within the footprint of the proposed development; and
- four designated heritage assets (one Grade II* and three Grade II listed buildings) and 96 non-designated heritage assets within 1km of the proposed development.

The Register of Landscapes of Outstanding Historic Interest in Wales and Register of Landscapes of Special Historic Interest in Wales¹⁴ was consulted to identify the presence or absence of Cadw Historic Landscape Areas. No such areas are present within the 1km study area.

5.9.3 Key issues

Three areas of post-medieval maritime history are contained within the proposed development, although no longer extant:

- New Dock; Great Western Dock, Llanelli New Dock was constructed by the Llanelly Railway and Dock Company as an outlet for coal from the pits of the Llangennech Coal Co with which the dock company had close relations. It was opened in 1834 as the first public floating dock in Wales. The dock fell into disuse after the war and has now been filled in¹⁵.
- Richard Thomas' Wharf, New Dafen River, Llanelli the South Wales Iron, Steel and Tinplate Works was established in 1872 and purchased by Richard Thomas and Co in 1899. The works were served by Richard Thomas' wharf to the north on the New Dafen River¹⁶.

¹⁴ The Registered Landscapes of Outstanding and of Special Interest in Wales GIS Polygon Dataset (accessed 10.07.17),

http://lle.gov.wales/catalogue/item/RegisteredLandscapesOfOutstandingHistoricInterestInWales/?lang=en

¹⁵ New Dock; Great Western Dock, Llanelli,

http://www.coflein.gov.uk/en/site/309224/details/new-dockgreat-western-dock-llanelli (accessed 10.07.17)

¹⁶ Richard Thomas' Wharf, New Dafen River, Llanelli,

http://www.coflein.gov.uk/en/site/34222/details/richard-thomas-wharf-new-dafen-river-llanelli (accessed 10.07.17)

• New Dock Scouring Basin; Great Western Railway Dock Scouring Basin, Llanelli - a scouring basin for the New or Great Western Dock to the north, built in 1860. On 01 October 1970, traces of masonry on north side of the basin were noted, beneath which lay a culverted drain serving as outlet for the New Dafen River¹⁷.

The proposed development is located within an area of post-medieval industrial activity that, whilst containing very few upstanding remains, encompasses important elements of the historical origins of Llanelli.

5.9.4 Assessment methodology

5.9.4.1 Legislation and guidance

An archaeology and cultural heritage assessment will be undertaken with reference to the following standards and guidance:

Legislation:

- Historic Environment (Wales) Act 2016;
- Planning (Wales) Act 2015;
- Planning (Listed Buildings & Conservation Areas) Act 1990; and
- Ancient Monuments & Archaeological Areas Act 1979.

Guidance documents:

- Planning Policy Wales (Edition 9, November 2016), Chapter 5 Conserving and Improving Natural Heritage and the Coast;
- Planning Policy Wales (Edition 9, November 2016), Chapter 6 The Historic Environment;
- Technical Advice Note (TAN) 24, The Historic Environment (2017);
- Conservation Principles of the Sustainable Management of the Historic Environment in Wales (2011);
- Historic Environment Records in Wales, Compilation and Use (May 2017);
- Setting of Historic Assets in Wales (May 2017);
- Heritage Impact Assessment in Wales (May 2017);
- Managing Historic Character in Wales (May 2017); and
- Chartered Institute for Archaeologists (CIfA) Standard and guidance for historic environment desk-based assessment (Jan 2017).

¹⁷ New Dock Scouring Basin; Great Western Railway Dock Scouring Basin, Llanelli, <u>http://www.coflein.gov.uk/en/site/34198/details/new-dock-scouring-basingreat-western-railway-dock-scouring-basin-llanelli</u> (accessed 10.07.17)

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5.9.4.2 Scope of baseline studies

The baseline study will include a combination of desk-based assessment and fieldbased survey. The initial part of the desk-based assessment will be the further acquisition and examination of all appropriate data for the study area held by the Dyfed Archaeological Trust (DAT), including the regional Historic Environment Record (HER), and the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW), including the National Monuments Record of Wales.

The desk-based work will be backed up by a programme of field survey that will be undertaken in stages, which will also include a detailed walk-through of the study area, along with visits where appropriate to locations outside the study area. The proposed non-intrusive and intrusive fieldwork programmes are described below in more detail.

- A desk-based assessment will be undertaken in line with current guidance and best practice (CIfA, 2017);
- If ground conditions allow, and permission is given by the landowner, geophysical survey will be undertaken within areas that may be affected by construction activities. The extent of this survey and methodology to be employed will be agreed with the DAT Planning Archaeologist; and
- If following the results of the geophysical survey, Cadw and/or the DAT Planning Archaeologist require further intrusive investigations, trial trenching may be undertaken. The extent of the trial trenching would be agreed with Cadw and/or the DAT Planning Archaeologist, and would be undertaken only in areas where impacts on other constraints, such as ecological receptors, would be avoided and where suitable access can be agreed.

No protected landscapes are present within the study area and therefore an Assessment of the Significance of Impacts of Development on Historic Landscape (ASIDOHL) will not be undertaken as part of the assessment.

5.9.4.3 Assessment of effects

Following the Scoping exercise, the presence of heritage assets that may experience impacts requires detailed assessment to be undertaken. The assessment will consider impacts upon all heritage assets within the study area. The assessment will comprise:

- Evaluation of heritage assets to establish the value of each assets on a five point scale ranging from 'negligible' to 'very high';
- Determination of the magnitude of impact on each asset, using five point scale, ranging from 'no change' to major'; and
- Assessment of the significance of effect on each asset, using a five point scale ranging from 'neutral' to 'very large'.

The method for assessing the likely cultural heritage effects of the proposed development will be based upon the guidance described in Design Manual for

Roads and Bridges Volume 11, Section 3, Part 2 'Cultural Heritage' (DMRB Vol 11 Sec 3 Part 2)¹⁸, and supplemented by professional judgement. The guidance provides a three stage approach to determining the importance of the heritage asset, the level of impact and the significance of effect. This is widely used by heritage professionals for undertaking EIA and is accepted as the basis for a best practice approach.

The significance of potential impacts, whether for construction or operational phases, will be based on consideration of the magnitude of the impact and the importance, condition and reliability of the individual interests to be affected, both on and off site. Potential effects of the proposed development include direct impact upon buried non-designated heritage assets as a result of excavation for foundations and remodelling of the existing ground surface, and indirect impacts on the significance of non-designated and designated heritage assets as a result of changes to their settings.

5.9.5 Consultation

Consultation will be undertaken with Carmarthenshire Planning Authority, DAT and Cadw throughout the archaeological assessment process. This will include discussion regarding the known and potential archaeology, the settings of heritage assets and the effect of the proposed development.

5.9.6 Potential mitigation measures

Mitigation will consider the predicted impacts of the proposed development and aim to avoid adverse effects on archaeology and heritage assets within the study area. Wherever possible, mitigation will be designed to deliver benefits, such as enhancing the visual setting of historic assets. In the case of any archaeological remains, the mitigation will aim to avoid undisturbed archaeological remains and preserve them in situ. Where this is not possible, preservation by record will be proposed as mitigation.

5.10 Landscape and visual assessment

5.10.1 Consultation

Consultation regarding the scope of the landscape and visual assessments will be carried out with the relevant officers at Carmarthenshire County Council. Visualisations will be produced from a selection of viewpoints which will be agreed with the same consultees.

¹⁸ Highways Agency, Transport Scotland, Welsh Assembly Government, the Department for Regional Development Northern Ireland (2007) Design Manual for Roads and Bridges, Volume 11, Section 3, Part 2: HA 208/07. Cultural Heritage.

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5.10.2 Extent of Visibility

Due to the location of the Scheme at the urban fringe of Llanelli, existing built form and vegetation will provide a moderate level of screening. The topography of the site and surrounding area is generally flat and falls towards the lake at the centre of the site and very gently towards the sea to the west and south west. The land begins to rise gently approximately 2.5km to the north. The Core Study Area (CSA) for the landscape and visual assessment is defined by a 3km radius from the location of the proposed Scheme. Due to the presence of a good level of built form and tree cover surrounding the site, it is not considered that there is potential for landscape and visual effects beyond this distance. However, for completeness, initial desk study and subsequent field work will extend beyond this 3km CSA for up to 5km to take account of any particularly sensitive receptors, which might experience effects. Sensitive viewpoints within the 5km radius will be visited and screened for inclusion in the assessment

In combination with a desktop study and field work, a computer generated Zone of Theoretical Visibility (ZTV) will be used to analyse the visibility of the Scheme within the surrounding landscape. This will be used to identify potentially affected areas of landscape and a selection of viewpoints to represent visual receptors.

5.10.3 **Potential Sources of Effects**

Potential effects arising from the proposed Scheme will mainly derive from:

- The proximity of the proposed scheme to existing urban areas and public open space;
- The scale and likely visibility of the proposed built form;
- The introduction of soft landscape including tree plantings and other new vegetation;
- The installation of additional lighting; and
- Construction activities.
- Period of time needed for mitigation measures to establish.

The above might have an effect on the landscape character and/or on sensitive visual receptors such as residents, pedestrians, cyclists and road users.

5.10.4 Proposed Scope of Assessment

A desktop study of the site and its surroundings will be undertaken including baseline data compilation and site visits, it is anticipated up to around eight representative viewpoints will be included and presented as photographs. The viewpoints will be selected from a desk study and field survey and a number of receptors at different angles and distance will be selected. A full EIA compliant Landscape and Visual Assessment would be produced in accordance with the Landscape Institute's Guidelines for Landscape and Visual Impact Assessment (3rd edition, 2013).

The following detailed baseline studies would be carried out in order to inform the LVIA:

- Desk study, photographic study and visual analysis;
- Field work to familiarise with the landscape and its character and to agree and finalise a selection of representative viewpoints; and
- Photography undertaken in line with best practice and current guidance (GLVIA3, 2013), (SNH 2017).

The report would include a suite of graphics as follows:

- Site Location, Visibility and Viewpoints Plan;
- Local landscape Designations (including access and heritage);
- Landscape Character Map (LANDMAP); and
- Photosheets.

Data Collection and Guidance

The assessment will follow guidance set out in the following documents:

- 'Guidelines for Landscape and Visual Impact Assessment', Third Edition (Landscape Institute and the Institute of Environmental Assessment, 2013);
- Photography and Photomontage in Landscape and Visual Impact Assessment, Landscape Institute Advice Note 01/11;
- Visual representation of wind farms: good practice guidance, Scottish Natural Heritage, Version 2.2 (2017).

The landscape and visual impact assessment will be undertaken principally in accordance with the Landscape Institute's Guidelines for Landscape and Visual Impact Assessment (GLVIA3). To ensure a proportionate and considered assessment, relevant to the proposed Scheme, the assessors would also apply professional judgement as provided for GLVIA3.

The baseline study will be informed by the following guidance and policy documents:

- Planning Policy Wales (Edition 9, Nov 2016);
- Carmarthenshire Local Development Plan (adopted December 2014)

Existing background information for the study will be sourced from:

- Ordnance Survey 1:50,000 and 1:25,000 scale maps;
- Google Earth and Street View;
- Bing maps;
- LANDMAP;
- GIS designation data sets;
- Field work undertaken by chartered and experienced Landscape Architects.

Landscape Receptors

The study will identify the receptors within the landscape which may be affected by the proposed LWLV. Landscape receptors considered in the assessment will include:

- landscape *elements* including topographic features such as rivers, landforms and boundaries, vegetation, transport routes and recreation routes, such as footpaths and cycle routes;
- aesthetic and perceptual *characteristics* of the landscape such as scale, texture and complexity, openness, tranquillity and remoteness; historic and cultural aspects and darkness at night;
- the overall *character* and settings of the landscape and settlements made up of the components and characteristics above; and
- The character and settings of any *designated* landscapes.

The landscape assessment will cover any direct effects on the constituent elements of the landscape within the application sites and its boundaries.

It will also assess the potential for direct and indirect effects on the perceptual characteristics and the overall character of the landscape of the following character areas and designated sites within the study area.

Landscape elements

Landscape elements include physical features such as trees and hedgerows, topography, water courses and structures. Impacts to these elements may arise where valued features are lost, gained or substantially modified as a result of the development. The loss or depletion of important landscape features can adversely affect the character of the landscape. Conversely, the addition of significant beneficial features can constitute an improvement in landscape character. The Assessment will identify and quantify the scope and level of these effects.

Landscape Character

The LANDMAP system has been developed specifically for the assessment of character in the landscape of Wales. The system has been promoted by the Countryside Council for Wales (CCW)¹⁹ and implemented in partnership with Local Planning Authorities throughout Wales. Much of the methodology is underpinned by earlier work carried out by the Countryside Agency ('CA') -

"...single unique areas which are discrete geographical areas of a particular landscape type."

LANDMAP methodology for landscape characterisation notes that landscape character areas are to be defined using the Visual & Sensory Aspect Area as a starting point, then refined by examining the data from other Aspects. We will be

¹⁹ As of 1st April 2013, CCW merged with Environment Agency Wales and Forestry Commission Wales to form Natural Resources Wales (NRW)

including and assessing the Cultural Landscape, Geological Landscape, Historical Landscape and Landscape Habitat Aspect Areas of which the site is situated.

Impacts on the landscape may arise where the landscape character of the area is modified by the development. It is important to place the application site in its landscape context.

The proposed LWLV sits in a semi-urban landscape which is dominated by major highway infrastructure.

Landscape Designations

There are several landscape and historic designations in the surrounding landscape, including the Gower AONB, Heritage Coast and Historic Landscape Area. The potential effects on these and sites and the wider, more rural and potentially sensitive landscape will be assessed.

The Gower Area of Outstanding Natural Beauty (AONB), approximately 1km to the south and west in the Llanrhidian Sands of the River Loughor.

The Historic Landscape Character Area follows a similar boundary to the AONB HLCA001 Llanrhidian Sands and the Lougher Estuary.

The Gower Heritage Coast follows the coast between Crofty and Llanrhidian, just beyond 3km to the south of the site

There are two registered Parks and Gardens of Special Historic Interest in Llanelli as identified on Cadw Register:

- Parc Howard which is listed as Grade II and is accessible to the public is located about 2.3km to the north-west of the proposal site;
- Stradey Castle is also listed Grade II, however, it is not open to the public and is located about 3.5km to the north-west of the proposed development.

The significance and settings of the designations above and associated assets will be covered in the heritage assessment, however the LVIA will take the historic aspect of the character of the landscape into account and will assess potential visual effects on receptors enjoying views to and from these areas.

The Burry Inlet Ramsar site extends as far as the coastline immediately to the west of the Scheme.

The long-distance Wales Coast Path passes directly past the Scheme at the mouth of the New Dafen River.

The Carmarthen Bay and Estuaries Special Landscape Area site just within the northwest extents of the 3km Care Study Area.

There are no other known local, national or international landscape designations on or immediately adjacent to the application sites.

Visual Receptors

Visual receptors are those locations from which it is possible to obtain views of the application site. These views may be partial or full, glimpsed or direct.

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Impacts on the visual amenity from a particular location may arise where features intrude into or obstruct views, or where there is some other qualitative change to the view.

Views from such receptors will be illustrated by photographs taken from key representative viewpoints. The planning authority will be consulted on the scope of this visual assessment following this scoping exercise. Receptors will include private viewpoints, such as views from domestic residences, as well as public viewpoints like highways, footpaths and other places parks and recreational or cultural assets with public access.

Designated historic assets will be considered, including Registered Parks and Gardens, Historic Landscapes, Scheduled Monuments and Listed Buildings. The LVIA will assess effects on visual amenity of people enjoying views to or from the assets. For this the asset needs to be publicly accessible with views to or from it being an important contributing factor in its enjoyment.

Potential visual receptors include the following:

Recreational receptors

- The PRoWs crossing the application site;
- The long-distance Wales Coast Path adjacent to the application site;
- NCN Route 4 along the coast
- Visitors enjoying views from the Discovery visitor centre, dunes and beach at North Dock
- Other locations on the local footpath network from which views of the proposed development may give rise to significant effects;
- The sports' fields of Seaside AFC; and
- Machynys Peninsula Golf & Country Club.

Transport receptors

• Users of the B4304 between The Avenue and Marine Street, New Dock Road, The Avenue, and Dafen Row.

Residential receptors

People in their homes at Penrhyn Gwyn, Bwlchygwymt, New Dock Street and Pentre Nicklaus Village.

Heritage receptors

The assessment will include the visual amenity of people enjoying views from publicly accessible heritage assets from which it will be possible to see the site. At this scoping stage only two heritage receptors with the potential for views have been found; the Old Castle Tinplate Works, south of the A484, and Siloah Independent Chapel on Heol Copperworks. If during further work any additional heritage assets with views are found, they will be discussed with the author of the heritage assessment and where appropriate included as visual receptors.

Limitations to Survey Methods

The character of the landscape and nature of views will be assessed from field work and visiting publicly accessible viewpoints. Visual impact assessment protocol normally requires views from a private property to be considered. For this assessment access to private property will not be sought, but all private receptors likely to receive effects will be included in the assessment and where possible represented from a similar nearby viewpoint for which access is possible. All survey work will be undertaken at ground level and on foot.

The photographic survey work and site visit should be ideally undertaken at a time when the deciduous trees are not in leaf, therefore representing the worst case scenario since the screening effect of this vegetation is less effective at this time of the year. If this is not possible due to the project programme, summer photography will be used, but consideration given in the assessment of visual effects as to how visual receptors would be affected in winter when vegetation is out of leaf and views are more open.

Photography and Imaging

The photographic surveys will be carried out by qualified Landscape Architects who are well versed with the methods and best practice required to produce verifiable photographs to be used in LVIA and visual representations.

Photographs illustrating views from each viewpoint will be taken with a full frame Nikon D6100 digital camera using a fixed lens with a 50 mm focal length. Each frame taken in landscape format, and up to 4 frames stitched together with 'Microsoft Image Composite Editor' software. These wide panoramic views will give an understanding of the visual context and, when printed at a defined viewing distance of 300mm, closely represent the view experienced from each viewpoint by a viewer's naked eye.

5.10.5 Proposed Methodology including Significance

5.10.5.1 Landscape Assessment Methodology

The assessment will be carried out in accordance with GLVIA3.

The study will assign a degree of sensitivity to landscape features in the vicinity of the Scheme and to each landscape character area identified.

The sensitivity of landscape receptors to change is assessed by combining judgements of their susceptibility to the type of change or development proposed and the value of the landscape.

Value

Landscape value is concerned with the relative importance and quality/condition that is attached to different landscapes.

In a planning policy context, the usual basis for recognising certain important landscapes is via application of local or national landscape designations. A landscape can nonetheless be valued by different communities for many different reasons without any formal designation (GLVIA3, 2013).

The assessment of landscape quality (condition) is based on judgements about the physical state of the landscape and about its intactness from visual, functional and ecological perspectives. It also reflects the state of repair of individual features and elements that make up the character in any one place

Susceptibility to Change

Susceptibility to change refers to the degree to which a particular landscape feature or character area is able to accommodate change without significant effects on its components or overall character

It usually follows that highly valued landscapes have higher susceptibility to change but this must also be assessed in conjunction with landscape value to give an overall assessment of sensitivity.

Assessing the Magnitude of Change to Landscape Features

The landscape assessment compares the constituent parts and overall character of the existing landscape with that which would result from the construction and operation of the scheme. It quantifies the degree of change in terms of size or scale, geographical extent of the change and its duration and reversibility.

The magnitude of change to the current (baseline) environment depends on a combination of factors: (GLVIA3, 2013):

- The extent to which the constituent characteristics of the landscape will be lost, gained or changed and the importance of each characteristic to the overall character of the landscape;
- The degree of contrast or integration of proposed elements with the existing or remaining features or characteristics of the receiving landscape that may detract from or add to its character;
- The extent of the geographical area over which the changes will take place: site specific, immediate site setting, landscape character area wide, or spanning several distinct character areas; and
- The duration and reversibility of effect.

5.10.5.2 Analysis of Visual Receptors

Assessing the Sensitivity of Visual Receptors to Change

The sensitivity of visual receptors depends on its location and context, the expectations and occupation or activity of the viewer and on the importance of the view (the latter is derived from the receptors popularity of frequency of use).

The purpose of describing the baseline visual environment is to identify the most important sensitive visual receptors around the site which have views to or across the proposed development. A visual receptor is essentially any viewer who would

be likely to be affected as a result of the proposed development. The sensitivity of each visual receptor depends on:

- Its value derived from evaluation of its location and context;
- the relationship of a receptor to planning designations;
- the existence of documentation and interpretation relating to particular views; and
- the receptors popularity or frequency of use (GLVIA3, 2013).

The susceptibility of the receptor to changes in views is derived from evaluation of the expectations and occupation or activity of the viewer and the extent to which their attention may be focused on visual amenity (GLVIA3, 2013).

Assessing the Magnitude of Visual Change

The visual assessment compares the quality of the existing view with that which would result from the construction of the scheme and then verbally quantifies the degree of change.

The magnitude of change to the current (baseline) visual environment depends on a combination of factors (GLVIA3, 2013):

- The size and scale of change to views brought about by the construction and operation of the proposed LWLV;
- The proximity of the viewpoint to visible elements of the proposed LWLV;
- The extent and composition of the view (e.g. degree of existing screening, partial, glimpsed or unobstructed views, fleeting or constant nature of view);
- The degree of contrast or integration of elements of the proposed LWLV have with the existing or remaining characteristics of the receiving landscape with its existing road infrastructure;
- The relative direct or oblique angle of the view in relation to the receptor; and
- The duration and reversibility of the proposed effects.

5.10.5.3 Assessment of Significance

The significance of impacts is assessed using the appropriate national and international quality standards and professional judgement. For clarity and transparency, typical assessment criteria will be used to attribute levels of significance. These criteria and the method for combining them to judge the significance of effects will follow guidance in GLVIA3 and will be set out in an appendix to the main report. Broadly, the significance is a function of the magnitude of the impact and the sensitivity of receptors. The reversibility and duration of the effect are also important considerations. Reversibility is judgement about the prospects and practicality of the particular effects being reversed in for example a generation. (GLVIA3, 2013)

For the assessment of the effects on each receptor, the sensitivity of the receptor is combined with magnitude of change to give an overall score for the level of the effect (GLVIA3, 2013).

Once the effects are understood, landscape mitigation measures are incorporated where possible to reduce the predicted residual effects (GLVIA3, 2013).

Finally an assessment of the residual effects is made by reassessing the magnitude of change to each receptors once landscape mitigation measures are in place and established after a period of 15 years.

5.10.5.4 Temporal Scope

The landscape and visual impacts of the proposed LWLV would vary through time. The assessment therefore considers the effects on landscape character and visual amenity arising during:

- The temporary effects of construction phase (including any standard construction mitigation measures);
- Effects on completion in the winter of the first year of operation (including measures designed into the proposed LWLV to reduce effects at source, but excluding landscape mitigation); and
- Residual effects with mitigation in the summer of the 15th year after opening. This allows the assessment to take account of the mitigating effect of the proposed landscape mitigation once established.

5.10.6 Significance Criteria

Table 9 below sets out the Significance criteria that will be used for the LVIA. **Graph 5.6.1** below shows how the judgements on receptor sensitivity and magnitude of change are typically combined to arrive at a judgement of significance.

Impact Significance Rating	Definition
Very Large	These effects are generally, but not exclusively, associated with sites or features of international or national importance that are likely to experience very damaging or very beneficial changes of high or very high magnitude leading to permanent, irreversible loss or enhancement of resource integrity. The proposed development will cause complete degradation of or a very substantial improvement to the landscape character/landscape features/existing views. These effects are key factors in the decision-making process.

Table 9:	Significance	criteria
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Impact Significance Rating	Definition
Large	These effects are generally, but not exclusively, associated with sites or features of national or regional importance that are likely to experience damaging or beneficial changes of medium to very high magnitude leading to long term irreversible loss or enhancement of resource integrity. However, a major change to a site or feature of local importance may also enter this category. The proposed development will cause substantial degradation or enhancement of the landscape character/landscape features/existing views. These effects are material factors in the decision-making process.
Moderate	These effects are generally, but not exclusively, associated with sites or features of regional or local importance that are likely to experience damaging or beneficial changes of low to high magnitude, often leading to reversible long or medium term loss or enhancement of resource integrity. The proposed development will cause noticeable degradation or enhancement of the landscape character/elements/existing views. These adverse effects may be important, but individually are not likely to be key decision-making factors. These effects are important in enhancing the subsequent design of the project. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall effects on a particular resource or receptor.
Slight	The proposed development will cause degradation or enhancements of low to medium magnitude to landscape character elements/existing views of local importance. These adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process, but are used in enhancing the subsequent design of the project.
Negligible	The proposed development will cause barely perceptible degradation or enhancement of the landscape character/elements/ existing views. Or Beneficial effects balance out adverse effects such that there is no overall beneficial or adverse effect



Sensitivity (Value + Susceptability)

Graph 5.6.1 Matrix used as guidance in combining judgements on sensitivity and magnitude of change to determine the significance of Landscape and Visual Effects. This is adapted from the version provided in IEMA's Special Report entitled; The State of Environmental Impact Assessment Practice in The UK. 2011.

5.10.7 Potential Effects and Mitigation Measures

There are sensitive landscape and visual receptors in the local area and proximate to the site. The magnitude of change to the landscape and views is likely to be reduced by the sites current condition, containing and surrounded by many humanising elements, and its urban context. Effects are likely to be moderately significant on the nearest and worst affected receptors. The wider landscape and views from further afield are not likely to receive significant effects.

The most effective mitigation measures are likely to be those embedded into the design through the iterative design and assessment process, such as setting development back from public frontages and careful and sensitive design and layout of built form and infrastructure.

Where effects remain following this design process, landscape planting will be proposed to manage and enhance views into and out of the site and to provide an

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attractive and soft setting to integrate the development into the receiving landscape.

5.11 Health and Well-being

5.11.1 Introduction

Whilst 'human beings' were a required consideration under the previous EIA Regulations (2014), the new 2017 EIA Regulations now place a requirement to consider 'population and human health' within the EIA. It is considered that the emphasis on health expands the list of considerations that now need to be assessed to include health and wellbeing.

A health assessment is a means of assessing the health consequences of a proposed project and to use this information to feed back into the design to maximise the positive and minimise the negative health impacts of the proposal.

Health assessment is multidisciplinary and cuts across the traditional boundaries of health, public health, social sciences and environmental sciences. The most commonly used definition of health assessment is taken from the World Health Organisation (WHO) Gothenburg Consensus Paper:

'.....a combination of procedures, methods and tools by which a policy, programme or project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population'.²⁰

The broader understanding of health is captured by the WHO definition:

'*Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity*'.²¹

Environmental, social, economic and fixed factors, which are collectively known as 'health determinants' influence health and well-being. The key determinants of health can be characterised as:

- Pre-determined factors such as age, genetic make-up and gender are fixed and strongly influence a person's health status;
- Social and economic circumstances such as poverty, unemployment and other forms of social exclusion strongly influence health, and improving them can significantly improve health;
- How the environment in which people live, work and play is managed its air quality, built environment, water quality can damage health, or provide opportunities for health improvement;
- Lifestyle factors such as physical activity, smoking, diet, alcohol consumption and sexual behaviour, can have significant impacts on health;

²⁰ WHO European Centre for Health Policy (1999). Health impact assessment: main concepts and suggested approach. Gothenburg consensus paper. WHO Regional Office for Europe.

²¹ World Health Organisation (WHO) (2007). Constitution of the World Health Organisation, Geneva, 1946.

• Accessibility of services such as the National Health Service (NHS), education, social services, transport (especially public transport) and leisure facilities influence the health of the population.

Of these, only the pre-determined factors are unlikely to be influenced by a development proposal. The health assessment will therefore consider all relevant health determinants other than the pre-determined factors.

5.11.2 Known Baseline

The baseline for a health assessment overlaps with the socioeconomic baseline, therefore please refer to section 5.2.2 for the baseline related to population and demographics, housing and housing composition, employment, economic activity, skills, education, deprivation, leisure and recreation. All of these are health determinants which can influence health and well-being.

The 2016 Health Needs Assessment Report²² identifies a number of key health and well-being issues specific to the study area:

- Carmarthenshire has a high proportion of people having caring responsibilities (i.e. caring for other adults that require additional support);
- There is a high proportion of people who claim to have health issues that affect their well-being;
- The population of the region is aging, with 85+ reported to likely increase by 6% upto 2030;
- Areas within Llanelli experience high level of social deprivation (
- Glanymor, Tyisha, Lliedi);
- Lower than average levels of qualifications;
- Higher than average unemployment; and
- Obesity levels within Carmarthenshire are reported higher than the Welsh average.

5.11.2.1 Rapid appraisal

As discussed above, health determinants are factors that can influence the health of a community. Guidance produced by the NHS London Healthy Urban Development Unit has produced an assessment matrix (known as HUDU Rapid Health Impact Assessment Matrix)²³ which can be used to identify a list of potential health determinants that may be relevant to a given project. This in turn allows for the identification of any likely significant effects that would need to be assessed further within the EIA.

This matrix has been used against the proposed LWLV and Table 10 identifies which of the determinants are relevant to the construction stage and which to the operation stage. The full HUDU matrix is included in Appendix B and confirms that there are no known adverse health effects likely to result from the proposed

²² <u>http://www.wales.nhs.uk/sitesplus/862/page/85702</u>

²³ NHS London Healthy Urban Development Unit (HUDU), (2013). Planning for Health 'Rapid Health Impact Assessment Matrix'.

LWLV, but rather a number of positive effects that would benefit the health and well-being of the community.

Health determinant from HUDU matrix	Relevant to Construction?	Relevant to Operation?
Housing quality and design	✓	✓
Access to healthcare services and other social infrastructure	\checkmark	✓
Access to open space and nature	\checkmark	✓
Air quality, noise and neighbourhood amenity	\checkmark	~
Accessibility and active travel	\checkmark	✓
Crime reduction and community safety	~	√
Access to healthy food		~
Access to work and training	1	✓ ✓
Social cohesion and lifetime neighbourhoods		~
Minimising the use of resources	✓ 2. <	Y III
Climate change		1

Table 10 Health determinants relevant to construction and operation phases

Construction

During the construction period any potential effects would most likely arise from construction activities and include consideration of issues related to dust, noise and job creation. These direct impacts will be covered by other topic assessments covered by the EIA. It is therefore not necessary to consider them again in the health assessment. Other potential impacts that have been identified as relevant to the construction phase will be covered by the health assessment along with consideration of cumulative health effects that may arise as a result of multiple impacts on a single receptor.

Operation

During operation of the proposed LWLV (which for the purpose of health also considers aspects related to design) it is likely that there would be a number of significant beneficial health and wellbeing effects from the project. The HUDU matrix in Appendix B provides an initial justification for these positive effects. These positive effects will be explored further during the health assessment and fed back to the design teams so that, where possible, they can be enhanced to increase health benefits further.

5.11.3 Assessment methodology

Policy review
National, regional and local policies, plans and strategies relevant to health, including National Institute for Health and Care Excellence (NICE)²⁴ public health guidance will be reviewed to provide a rationale for the health assessment. This will also be framed within the context of the Well-being of Future Generations Act, 2016. The policy review for the assessment will include local policies relevant to health such as:

- Health and wellbeing strategies; and
- Sustainable community strategies.

The aim will be to identify the local health policy and review how the LWLV proposals may impact on local policies, both positively and negatively.

Geographical scope

The geographical scope of the assessment will vary between different health determinants being assessed, however generally data will be assessed from the level of south Llanelli (consisting of Glanymore, Bigyn and Tyisha wards) and from the wider Carmarthenshire local authority area. This is consistent with the socioeconomic assessment study area.

Baseline data gathering

Baseline data will be collated from a range of sources to provide an overview of the existing population, existing health profile, socioeconomic conditions in the local community and the physical environment in the locale.

This gathering of baseline data will be coordinated with other workstreams within the EIA such as socioeconomic assessment and the air and noise assessments.

The data reviewed will include, but is not limited to:

- Public Health Wales publications such as Welsh Health Survey lifestyle Trends (2015);
- Health Board Maps, Demography (2016);
- Office for National Statistics, Census 2011 data

Public Health Wales has recently (2017) published a set of National Indicator Projections by local authority²⁵. This includes a tool for showing projections for five key public health indicators. These indicators include:

- 1. Estimated proportion of adults who reported to be overweight or obese, observed 2003-2013 to projected 2016 2025;
- Estimated proportion of adults who reported eating less than the recommended five portions of fruit and vegetables a day, observed 2008 -2015 to projected 2016 – 2025;
- 3. Estimated proportion of adults who self reported to be current smokers, observed 2003 2015, projected 2016-2025;

²⁴ <u>https://www.nice.org.uk/guidance/published?type=ph</u>

²⁵ Public Health Wales Observatory, Public Health Outcomes Framework, 2017 - <u>http://www.publichealthwalesobservatory.wales.nhs.uk/phof2016</u>

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- 4. Healthy life expectancy at birth (years), observed 2005 2010, projected 2016 2025; and
- 5. Percentage of babies born with a low birth weight, observed 2006 2015, projected 2016 2025.

These data will also be reviewed and used as part of the baseline for the assessment.

Identification of health determinants

As discussed above, health determinants are factors that can influence the health of a community. Guidance produced by the NHS London Healthy Urban Development Unit has produced an assessment matrix (known as HUDU Rapid Health Impact Assessment Matrix)²⁶ which identifies a list of potential health determinants that may be relevant to a given project. **Table 10** lists out the health determinants that are relevant to LWLV whilst Appendix B sets out the rapid health impact assessment matrix that has been completed for the proposed LWLV.

Local community to be considered

The health assessment will consider health and well-being status and current health problems of all people within the local community. However, vulnerable and/or disadvantaged groups can often experience health impacts more acutely than other groups within communities.

Vulnerable and/or disadvantaged groups within the local community will be identified using the Wales Health Impact Assessment Support Unit (WHIASU) Practical Guide to HIA vulnerable group checklist. Table 11 includes an initial review of which groups may have high relevance to the project – this will be refined during the assessment. The WHIASU vulnerable group checklist systematically considers inequalities and the impacts on a range of vulnerable groups within the population and assesses the extent and distribution of them. These groups can, for example, include older people, children and young people, those who suffer from chronic conditions, or those who are geographically isolated. Health assessments that have an equity focus are based on the principal of social and environmental justice and fairness for all.

Table 11 Vulnerable and disadvantaged groups and their relevance to the assessment

Vulnerable and disadvantaged groups	Relevance to assessment (high/low)
Age related groups:	

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²⁶ NHS London Healthy Urban Development Unit (HUDU), (2013). Planning for Health 'Rapid Health Impact Assessment Matrix'.

Vulnerable and disadvantaged groups	Relevance to assessment (high/low)
Children and young people	High
Older people.	High
Income related groups:	
People on low income	High
Economically inactive	High
Unemployed/workless	High
People who are unable to work due to ill health.	High
Groups who suffer discrimination or other social disadvantage:	
People with physical or learning disabilities /difficulties	High
Refugee groups	Low
People seeking asylum	Low
Travellers	Low
Single parent families	Low
Lesbian and gay and transgender people	Low
Black and minority ethnic groups	Low
Religious groups.	Low
Geographical groups:	
People living in areas known to exhibit poor economic and/or health indicators	High
People living in isolated/over-populated areas	High
People unable to access services and facilities.	High

Linking health determinants to health impacts

Using available literature, including previous health studies and recent research, an evidence base will be collated to identify links between the selected determinants and health impacts.

Impacts may be direct or indirect and links may be causal or compounding. Key reference material is likely to include:

- Government health policies, programmes and strategies;
- Previous health assessments for masterplans;
- Public health reports and research papers from a range of sources, including:
 - Public Health Wales;
 - WHO;
 - National Institute for Health and Care Excellence (NICE);
 - Health Development Agency (HDA).

5.11.4 Significance criteria

The assessment of potential health impacts will be based on the health determinants outlined in the HUDU Matrix and will encompass, in general, only qualitative assessment techniques. There are currently no guidelines for assigning significance to health impacts and therefore the qualitative assessment of health impacts will describe the nature of the potential impact on the determinant of health and the direction of change which will be classified as positive, negative, neutral or uncertain.

The assessment will also consider the cumulative effects of changes in a number of determinants on a given receptor (i.e. cumulative impacts from changes in the air quality, noise and visual environment on a residential receptor).

Based on the literature review links will be made between the identified impacts on the selected determinants and potential health effects/outcomes.

Health inequalities and the potential for disproportionate impacts on certain vulnerable groups will be taken into account in the assessment.

5.11.5 Consultation

Consultation will be undertaken with Carmarthenshire County Council public health officers in order to understand the range of potential effects of the proposed development, and to inform the assessment. Where appropriate, consultation will be undertaken by telephone or by email.

5.11.6 **Potential Mitigation Measures**

Where impacts are identified in the health assessment, recommendations will be proposed to reduce any negative impacts and maximise any positive impacts on health outcomes from the proposed LWLV development.

Recommendations will be fed into the design process through on-going discussions and meetings with the design team to ensure that issues related to health influence the final design. It is likely that there will be significant opportunities to enhance the health and well being effects of the proposed LWLV. Commentary will be provided on how the design of the proposed LWLV has responded to any recommendations arising out of the health assessment.

Where mitigation has been identified through other EIA topic assessments (e.g. air and noise) that will serve to improve health outcomes, this mitigation will be cross-referenced within the health assessment.

The responsible organisation(s) and the timing of actions required to implement any recommendations made will be identified.

5.12 Climate

5.12.1 Introduction

The EIA Regulations 2017 has introduced the requirement to include climate within the assessment. An assessment related to climate is composed of two elements:

- 1. Climate change resilience Evaluation of the effectiveness and feasibility of adaptation measures integrated into the project to avoid or reduce hazards and/or increase resilience of the project to climate change impacts; and
- 2. Greenhouse gas (GHG) emissions assessment Evaluation of potential greenhouse gas (GHG) emissions generated from the project and identification of mitigation measures to reduce these emissions.

Climate change impacts include consideration of the following:

- Sea level rise, coastal flooding and storm surges;
- Amount, frequency and timing of precipitation;
- Increases in average temperatures and frequency of extreme temperature events.

The terms 'carbon' and 'greenhouse gases' (GHG) are often used interchangeably, but have different meanings. GHGs are gases in the atmosphere which absorb heat, of which carbon dioxide (CO₂) is the most common and important gas. Other key GHGs include methane (CH₄) and nitrous oxide (N₂O). For the purpose of the ES the term 'carbon' will be used to mean the CO₂ equivalent (CO₂e) of all GHGs. Note that for CO₂ itself the emissions of CO₂ are, of course, identical to the emissions of CO₂e.

5.12.2 Known baseline

Climate information

Climate information for the site has been based on data available from the met office which takes measurements at Pembrey Sands approximately 12 km to the north west which has been taken over the period 1981-2010. No information related to trends has currently been identified:

Table 12 Local climate information 1981-2010

Annual average climate	Average data for 1981-2010
Min -Max. temperature (°C)	2.3°C – 19.8°C
Days of air frost (annual)	36.5
Rainfall (mm)	Annual range: 67.6 - 132.3 (annual 1094.4)
Days of rainfall > 1mm (days)	Annual range: 9.4 – 16.3
Monthly mean wind speed at 10m (knots)	11.7

The description of the future climate baseline will be based upon climate change projection data from the United Kingdom Climate Projections 2009 (UKCP09). The UKCP09 climate change projection data is the most widely used data for the UK and are available for different emission scenarios and time periods up to the 2080s.

GHG baseline

The existing GHG balance²⁷ from the site is currently not quantified. However, certain assumptions can be made; as the site is not developed and no activities are currently carried out, it can be assumed that no GHG are generated. The site is semi natural consisting of rough grass/scrub that receives no management. Based on estimations soil carbon at depths of 0-100cm the site holds 843 tonnes of CO_2/ha^{28} .

5.12.3 Key issues

Adaptation to climate change

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 ²⁷ The GHG balance is the balance between the generation and capture of greenhouse gases.
 ²⁸ Woodland Carbon CO₂de, Woodland Trust 2011

⁽https://www.forestry.gov.uk/pdf/WCC_3_2_project_baseline_soil_carbon_prior_to_project_plant ing 21July2011.pdf/\$FILE/WCC_3_2_project_baseline_soil_carbon_prior_to_project_planting_2_ 1July2011.pdf)

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Key issues related to adaptation to climate change include risk to flooding, solar gain and extremes in temperature. These will need to be taken into consideration during the design stages; both for general layout and detailed design.

Issues related to climate predominantly concern the operational phase and how buildings and infrastructure have been designed and developed to integrate climate change resilience. Flood risk (including from sea level rise) will be assessed within the water resources assessment of the EIA and will therefore not be duplicated in this chapter.

Due to the short temporal phase of construction, it is unlikely that climate change would affect the construction phase. This has therefore been scoped out of the assessment.

Greenhouse gas emissions

GHGs are the main contributor to climate change and the UK has legally binding GHG reduction targets. Construction contributes to GHG emissions through vehicle use, materials and energy consumption and during operation, user GHG emissions are potentially a significant contributor, e.g. through heating/cooling requirements, electricity consumption. During the assessment it will be necessary to identify and/or propose how the proposed LWLV mitigates against increasing GHG emissions.

5.12.4 Assessment methodology

Climate change trends

An initial review of local data related to climate change will be made for the local area and will cover identification of:

- Trends in data listed in Table 12 above and predicted future baselines (UKCP09 climate change projection data);
- Number of heat/cold temperature related deaths;
- Number of cases of subsidence/insurance claims for subsidence;
- Household energy use; and
- Total electricity and gas use.

A review will be made on how the proposed LWLV is likely to be affected by the predicted climate change trends and whether this is likely to be considered a significant effect. Recommendations will be made on design mitigation that should be integrated to allow for these affects.

Greenhouse gas emissions

The carbon assessment will be undertaken in accordance with the principal steps (Figure 1) identified in the Publically Available Specification 2080: Carbon Management in Infrastructure (PAS2080)29. A life cycle approach will be

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²⁹ Construction Leadership Council & the Green Construction Board (2016) PAS 2080: 2016: Carbon Management in Infrastructure. BSI Limited, London, UK.

adopted capturing both direct and indirect carbon emissions arising as a result from the proposed development. This will include emissions from construction and the operation of the proposed LWLV.



Figure 1: Principal steps of GHG emissions quantification (adapted from PAS 2080)

For the construction phase, the carbon emissions arising from the project prior to any value engineering or detailed design will be established to form a baseline. This will be based on the estimated Bill of Quantities.

The method applied will convert 'activity data' (such as distance travelled, litres of fuel used or tonnes of waste disposed) into CO₂e through the application of documented emission conversion factors. It is proposed that a bespoke carbon data sheet will be set up to capture construction related emissions.

CO₂e from construction covers three elements:

- 1. <u>Embodied carbon in materials</u> -The total amount of carbon produced during resource extraction, transportation, manufacturing and fabrication, to bring a product to its existing state.
- 2. <u>Carbon from the machinery used on site</u> The carbon produced from the combustion of fuel or consumption of energy by machinery and plant used to install a component.
- 3. <u>Carbon from transportation of materials and people to and from site</u> The carbon produced from the combustion of fuel or consumption of energy by the transportation used to deliver materials to site

Estimations of likely GHG emissions from the construction stage will likely be calculated based on a number of carbon modelling tools including, but not limited to:

- The Green Construction Board Infrastructure Carbon Review, Technical Report³⁰;
- Inventory of Carbon and Energy University of Bath: Sustainable Energy Research Team³¹;
- Environment Agency Carbon Planning Tool³²;
- The Materials Products Association³³ (MPA) reporting on UK concrete carbon factors; and

³⁰ https://goo.gl/lNyAru

³¹ <u>https://goo.gl/ud4lHU</u>

³²https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/571707/LIT_7067 .pdf

³³ MPA (2011) The 2011 Concrete Industry Sustainability Performance Report

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- Ecoinvent³⁴, an independent supplier of life cycle inventory (LCI) data covering construction materials in general.

CO₂e from operation include the likely following:

- 1. <u>Carbon from energy use within buildings</u> (e.g. for heating, cooling, ventilation, appliances);
- 2. <u>Carbon from maintenance operations</u> (e.g. landscaping, cleaning, vehicle use);
- 3. Carbon from vehicles travelling to and from the site

As the proposed LWLV is an outline planning application estimations of $CO_{2}e$ will be made based on benchmarks.

5.12.5 Consultation

Consultation will be carried out with other EIA topic leads to make sure that climate change adaptations/GHG emissions are covered by all topics. In terms of GHG emissions, liaison with Transport, Noise and Air Quality assessments will be necessary to ensure consistency of approach.

5.12.6 Potential Mitigation

The estimations of GHG baseline emissions will be used as a basis from which to identify mitigation measures that can be integrated into the project design to achieve an overall GHG reduction against this baseline. The ability to influence GHG emissions (i.e. to reduce them) is most effective during the design stage, therefore the assessment provides an opportunity to maximise this benefit. Table 13 lists the types of action the design team are likely to consider. An estimation will be made on what level of GHG emissions reductions are likely to be achievable should all mitigation measures be implemented.

GHG saving action	Example
Using less materials	
More efficient design	Make the most of in-situ materials
Change the specification of elements	Reducing use of carbon intensive materials
Design for less waste on site	Cut wastage rates on the top 10 materials from baseline to good practice

Table 13 GHG	reduction	actions
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³⁴ Ecoinvent database 2.2 Integrated. <u>http://www.ecoinvent.ch/</u>

Design for off-site construction to benefit from lower wastage and efficient fabrication			
Using alternative materials			
Select materials with lower carbon intensities	Buy less energy-intensive materials e.g. cement substitutes or sustainably-sourced materials such as timber		
Select reused or higher recycled content products and materials offering lower carbon intensities	e.g. reclaimed bricks, higher recycled content blocks, locally recycled aggregates		
Select materials with lower transport-related carbon emissions	Locally-sourced materials		
Select materials with high levels of durability and low through-life maintenance			
Designing and implementing energy efficient equipment			
Select most energy efficient and economically viable equipment available	e.g. LED lighting		

5.13 Cumulative Effects

5.13.1 Introduction

Cumulative effects considered within this assessment are those that arise as a result of additive impacts from more than one project (under construction or reasonably foreseeable projects), combining together to have an effect on a receptor that may be larger than if the effect were considered separately. Broadly, reasonably foreseeable projects are those that are known to the planning system or are already consented (but not yet built).

The ES will include an assessment of cumulative effects arising from the proposed LWLV in combination with confirmed and other reasonably foreseeable projects in the local area.

5.13.2 Assessment methodology

Relevant guidance

There is currently no standard methodology for cumulative effects assessment (CEA) although there is a range of guidance available. The following guidance has been taken into consideration during the preparation of this CEA:

- Advice Note 17: Cumulative effects assessment relevant to nationally significant infrastructure projects (Planning Inspectorate, 2015).
- Advice Note Nine: Rochdale Envelope (Planning Inspectorate, 2012).

Whilst the proposed LWLV is not classified as a major infrastructure scheme the Planning Inspectorate guidance is the most relevant guidance available.

Planning Inspectorate Advice Note 17 (Planning Inspectorate, 2015) provides a systematic approach to cumulative effects assessment which can be split into four distinct phases explained in Table 14. The guidance notes that the recommended process focusses on cumulative effects with 'other developments'. It should not be confused with the assessment of interrelationships between topics, which are assessed within the individual specialist topic chapters.

CEA Stage	Key Activities
Stage 1: Establish the Zone of Influence (ZOI) and identify long list of 'other developments'	 Identify the ZOI for each of the environmental topics covered by the EIS; Identify a long list of other developments in the vicinity of LWLV which may have cumulative effects; Undertake desktop review of available environmental information for identified cumulative developments
Stage 2: Identify short list of 'other developments'.	• Identify which of the identified other developments from Stage 1 has the potential to give rise to significant cumulative effects by virtue of overlaps in temporal scope, due to the scale and nature of the 'other development'/receiving environment; or any other relevant factors.
Stage 3: Information gathering	• Information related to the shortlisted cumulative developments is gathered and reviewed
Stage 4: Assessment	 CEA of shortlisted cumulative development is undertaken. Each individual 'other development' is reviewed in turn to identify whether there is potential for significant cumulative effects; Mitigation measures are identified.

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Table 14 Stages of Cumulative Effects Assessment

Zone of Influence

The Zone of Influence (ZOI) refers to the spatial area over which an effect from a project is likely to be experienced. The ZOI for the proposed LWLV varies for each environmental topic and these are set out in Table 15 below along with the identification of what type of impact is likely.

Table 15: Zone of Influence, potential impacts and receptors for ES environmentaltopics

Environmental topic	Zone of Influence for assessments	Potential impact (construction and operation)	Receptor/ resource
Air quality*	Within 350m of site boundary	Reduction in air quality from: • dust emissions during construction;	People living and working within the

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Environmental topic	Zone of Influence for assessments	Potential impact (construction and operation)	Receptor/ resource
		 exhaust emissions from vehicles during construction and operation; emissions from hospital plant 	study area distance (i.e. 350m)
Noise	Within 600m of construction works	The increase in noise from construction and/or operation.	Residential and commercial facilities within the assessment area.
Traffic	Llanelli	Increased traffic and congestion	Road users, pedestrians
Biodiversity	Footprint of construction works and immediately adjoining land	Disturbance, fragmentation, loss, wildlife casualties, creation of barriers to movement, lighting	Protected species, habitats, ecologically designated sites
Ground conditions	Within 300m of site boundary	Groundwater, human health	Groundwater quality and flow, human health of people living and working within the study area distance
Water Resources	500m	Generation of silt and oil laden runoff which may contaminate water resources. Changes to flood risk as a result of the construction activities and new scheme.	Surface water, groundwater, structures, assets and people within any flood risk zones.
Heritage	Redline boundary and a study area of up to 250m surrounding the site	Change in setting of cultural heritage Loss of heritage assets	Setting of heritage resource Visitors to/users of the heritage asset
Socio-economics	St Hellier focus but consideration is Jersey wide	Potential benefit of construction spend, displacement of construction workers, demands on accommodation and other businesses and amenity effects.	People Employers / employees Businesses
Landscape and Visual Impact	1.5km core study area in TVIA.	Change to the character of Llanelli landscape and to visual amenity.	Landscape Character areas (LCAs) including designated features.
			People's views.

*only related to construction dust

Establishing the long list of 'other developments'

The Planning Inspectorate guidance recommends that a wide range of future projects is included within the CEA which can be tiered (from Tier 1 - 3) according to how far advanced the development is within the planning system and to the level of detail that is likely to be available for each tier. These are set out in **Table 16**.

Table 16 Project tiering for the purpose of CEA

Tier 1	 Projects under construction; Permitted application(s) but not yet implemented; Submitted application(s) but not yet determined; 	Decreasing level of detail likely to be available.
Tier 2	• Projects on CCC Programme of Projects where a scoping report has been submitted;	
Tier 3	 Projects on CCC Programme of Projects where a scoping report has not been submitted; identified in the CCC Local Development Plan (LDP) recognising that much information on any relevant proposals may be limited; and identified in other plans and programmes (as appropriate) which set the framework for future development consents/approvals, where such development is reasonably likely to come forward. 	

The less information that is available for the future projects (i.e. environmental impacts predicted, project definition), the less likely that the CEA will be able to make any robust assessment in relation to these projects.

Whilst projects that are Tier 2 and Tier 3, as defined by the Planning Inspectorate guidance will be referenced within the CEA assessment, it is considered that there is limited value in including schemes for which there is no environmental assessment information available as it will not be possible to assess environmental effects.

Assessment criteria

The CEA does not aim to assign significance levels to any of the cumulative effects identified. Rather, a judgement will be made on whether the cumulative effects are likely to be more or less significant than the effects identified for the proposed JFH alone.

Topics scoped out of the CEA

The following topics have been scoped out of the CEA:

- <u>Traffic</u> For future baseline likely future developments are included within the traffic model and are therefore already considered within the transport assessment. Effects related to traffic are therefore not considered further within the CEA;
- <u>Air quality</u> operational effects are based on traffic data, which includes the developments listed below in Section 5.13.3. Therefore, any cumulative operational effects are inherent within the results outlined in the air quality and noise chapters of this report. No further cumulative

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effects would be anticipated, therefore operational air quality effects are not considered further. Cumulative effects related to construction are considered as these are not inherent within the topic chapter assessments

• <u>Noise</u> – as above for air quality

Limitations and assumptions

Assessment of cumulative effects is limited by the level of information that is available for each of the topic assessments. When consideration is given to effects that may arise as a result of impacts from other developments, the assessment becomes limited by the amount of information that is made publically available.

5.13.3 Initial long list of cumulative projects

The initial long list of projects that will be considered within the CEA will be obtained through consultation with CCC. A request has already been made in relation to the transport assessment and a response is awaited.

Environmental information relating to each of the developments identified by will be obtained from publically available information.

Appendix A

Ecology Baseline Report, 2016



Carmarthenshire County Council Wellness and Life Science Village, Delta Lakes Llanelli

Ecology Baseline Report

ECOL/REP/001

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Ove Arup & Partners Ltd 4 Pierhead Street Capital Waterside Cardiff CF10 4QP United Kingdom www.arup.com

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1 Introduction

Ove Arup & Partners Ltd. (Arup) has been commissioned by Carmarthenshire County Council to undertake ecological survey work in support of a proposed Wellness and Life Science Village in Llanelli. This report provides information to inform the development of the scheme.

This report summarises the ecological information available from previous relevant reports for the site (See Section 2.1); details the methodology used for the ecological survey work; and presents the results of the baseline ecological surveys undertaken by Arup including a programme of reptile surveys completed between September and October 2016 across various habitats within the study area, and the results of a water vole (*Arvicola amphibius*) survey undertaken on 21^{st} October 2016.

Where appropriate, recommendations are made for further surveys and design considerations to inform the development of the scheme.

1.1 Background to the Project

The site is located in the south of Llanelli, centred at approximately National Grid Reference (NGR) SS509985, and situated in an urban setting. The site is located along the coast south of Llanelli and north of the Loughor Estuary, comprising four distinct areas, including Delta Lakes; The Avenue West; The Avenue East; and Machynys as shown on Map 1.

The Delta Lakes site comprises open derelict land consisting of rough grass/scrub with a thin capping layer of limestone gravel. The New Dafen River, a standing water body, is located in the centre of the site. The Afon Dafen is culverted at the eastern boundary of the site and feeds the lake. The Afon Dafen flows into the Afon Lliedi, which in turn flows into the Loughor Estuary.

The Avenue West site is bordered by the Afon Dafen to the south and west, the B4304 (the Avenue) to the east and Northumberland Road adjoining with the B4304 to the north. The existing site is currently an unmanaged grassed over brownfield site and was once the site of the New Dock (also called the Great Western Dock).

The Avenue East site is bordered by an industrial site to the south, the B4304 (the Avenue) to the west, Embankment Road to the north and a residential area adjoining Embankment Road to the east. The site is currently an unmanaged grassed over brownfield site and was once the site of the New Dock.

The Machynys site is bordered by the B4304 the north, Pentre Nicklaus to the south west and the Machynys Peninsula Golf and Country Club to the south east and. The site is currently an unmanaged predominantly grassed site.



Machynys (5.8ha/14.3 acres) - Medi-Park

Map 1 Proposed Site Development Boundary

1.2 Aims and Objectives

The aim of the ecological survey work was to update the previous Phase 1 Habitat survey (Arup, 2011) and to complete further specific surveys for legally protected species including water voles and reptiles.

The objective of the water vole survey was to establish the presence or likely absence of water vole and to highlight potential ecological constraints to the development. This report identifies the presence of important habitat areas for water vole and where appropriate, recommendations are made for further surveys to inform the development of the scheme.

The reptile survey was conducted to gain an understanding of the reptile assemblage present within representative habitats within the study area, assessing the species present within different habitat types where possible, as these too could influence scheme design and development.

1.3 Study Area

The study area for the purpose of these surveys was based on the current scheme boundary, and areas shown on Map 1. The ecological surveys were undertaken within the four areas as described in Section 1.1. The desk study covers a 4km buffer from these areas for ecologically designated sites and a 2km buffer for protected species.

1.4 Legislation

Relevant legislation for protected sites and species is provided in Appendix A.

2 Methodology

2.1 Desk Study

To identify any records of rare, protected or notable flora and fauna within the site and surrounding area a desk study of previously recorded information was undertaken. A search using the Multi-Agency Geographic Information for the Countryside (MAGIC) website¹ was conducted for statutory nature conservation sites within 4km of the site. Biodiversity data including species records and Sites of Importance for Nature Conservation (SINCs) was provided by the West Wales Biodiversity Information Centre (WWBIC) on 22nd September 2016 over a 3km area from the centre of the site (NGR SS509985) ensuring all records within 2km of the site were captured.

Previous ecological survey reports for the site were also reviewed to determine the historical ecological value of the site and identify which species may still be present within the site. These included:

- South Llanelli Phase 1 Habitat Survey with Desk Study (Ove Arup & Partners Ltd., December 2011).
- Machynys Central Residential Development Environmental Report (Ove Arup & Partners Ltd. , December 2011).
- Machynys Central Masterplan Water Vole Survey Report (Ove Arup & Partners Ltd., October 2013).

2.2 Extended Phase 1 Habitat Survey

A Phase 1 Habitat Survey (Joint Nature Conservation Council, 2010) and 'extended' Phase 1 Survey broadly following the 'Extended Phase 1' methodology as set out in 'Guidelines for Baseline Ecological Assessment' (Institute of Environmental Assessment, 1995) was carried out within the site on 23rd August 2016 by two experienced Arup ecologists. A repeat visit was made on 3rd October 2016 to fill in gaps within the Machynys area of the site. Phase 1 Habitat Survey is a standard technique for rapidly obtaining baseline ecological information over a large area of land. It is primarily a mapping technique and uses a standard set of habitat definitions for classifying areas of land on the basis of the vegetation present. The purpose of the extended Phase 1 Habitat Survey was to map key habitats and plant species assemblages, and identify the presence and/or potential for protected species.

During the survey, all parts of the site and boundaries were walked and habitat types recorded, along with predominant flora species within each habitat. Signs of protected species, invasive plants and other notable species were also searched for during the survey, as well as noting habitats which have the potential to support protected species. Target notes (TNs) are used to record species composition within habitats and to highlight features of ecological interest.

¹ www.magic.gov.uk

2.3 Water Vole Survey

The water vole survey was undertaken by an experienced ecologist familiar with the ecology and field signs of water vole, and carried out on 21st October 2016.

Surveying for field signs was carried out by hand searching of the banks and any features that could have the potential to be used by water vole. Information was recorded using standard recording sheets in the field using tablet computers, which had Global Positioning System (GPS) mapping capability. The GPS was used to record the location for each recording sheet completed. Field signs or features relevant to the survey were photographed, with a GPS location attached to the digital image.

Waterbodies that lay outside the study area boundary but considered to be within an appropriate distance of the proposed works were also surveyed.

In incidences where a waterbody was dry or inaccessible, the length of the waterbody was walked and an assessment of the suitability of the water-body habitat was carried out as far as possible.

For the purposes of this survey waterbody type is defined as follows;

- **River** Major natural watercourse which is always in flow but and does not dry out, and are also subject to flooding events;
- **Stream** Minor natural watercourse which is usually in flow but can dry out in places, and are also subject to flooding events;
- **Ditch** Minor man-made drainage channel which dries out on a regular basis e.g. field ditches/reens;
- **Pond** Natural stagnant watercourse which usually holds water permanently; and,
- **Ephemeral pool** Natural low lying areas that hold water on a temporary basis, usually in the winter, and are also subject to flooding events.

The survey method for water voles was based on the best practice survey guidelines in the Water Vole Conservation Handbook (Strachan, R. Moorhouse, T. and Gelling, M., 2011) and the Water Vole Mitigation Handbook (Dean, M., Strachan, R. and Gow, D., 2016). Banks of water-bodies were surveyed from a minimum of two metres from the waters' edge.

2.3.1 Habitat Suitability Assessment

The assessment of habitat suitability indicates how likely water voles are to use a site given the present habitat conditions. Habitat suitability was assessed from observing the features of each water-body, with consideration to the ecology and habitat requirements of water voles.

The best sites for water voles according to Strachan, Moorhouse & Gelling (2011) are those that have a highly layered bank-side vegetation with tall grasses and stands of willow herb, loosestrife, meadowsweet or nettles, often fringed with

think stands of rushes, sedges and reed. Each water vole utilises a series of burrows, which can extend 5-6 metres from the edge of the bank into the terrestrial habitat.

Habitat suitability assessments were carried out at each water-body/watercourse visited with sites subsequently defined as being of high, moderate, low or negligible suitability based on the following criteria:

- Rate of water flow;
- Bank profiles;
- Degree of shading from overhanging trees;
- Extent of suitable emergent and bankside herbaceous vegetation in providing shelter, food and nesting material;
- Degree of cattle poaching (i.e. extent of damage to banks resulting from trampling by cattle);
- Levels of site disturbance, e.g. proximity to public rights of way, farm vehicle access tracks or road traffic;
- Potential for the water-body to dry out;
- Suitability of bank substrates for burrowing; and,
- Water quality.

Habitat suitability is categorised as follows:

- High Quality Typical high quality water vole habitat is a slow-flowing watercourse, less than 3m wide and 1m deep with moderately steep banks, minimal shading by trees and shrubs and luxuriant growth of emergent and bankside herbaceous vegetation to provide shelter and an abundance of food and nesting material.
- Moderate Quality Moderate quality water vole habitat would consist of a combination of the features associated with both high and low habitat suitability. For example, the flow and bank type may be suitable; however heavy grazing by livestock may reduce the cover of herbaceous vegetation and trample suitable habitat for burrowing.
- Low Quality- Factors which indicate that a habitat is of a low suitability for water vole include heavy shading by overhanging trees and/or shrubs reducing the cover of emergent and bankside vegetation and thus the availability of water vole food plants. Other factors that indicate habitat of low suitability include widely fluctuating water levels, seasonal drying out of the watercourse channel and banks that are unsuitable for burrowing.
- Negligible A negligible habitat suitability would be where there is either no waterbody present for example, a ditch which has completely overgrown and would not hold water. An example of this would be a ditch which has a double hedge and is no longer managed and therefore the water-body has filled in. Settlement pools or ditches which are visibly polluted and low water

quality and obviously their purpose is to act as a buffer to collect polluted material from industry.

2.3.2 Presence/Absence Survey

At each waterbody a search for the following field signs was undertaken where possible: droppings, latrines, feeding stations, burrows, footprints. Droppings are the most distinctive field sign to indicate recent use of a waterbody by water voles.

2.4 **Reptile Survey**

2.4.1 Site Selection

This survey aimed to gain an understanding of the reptile assemblage present within representative habitats within the study area. The representative sample of habitats was selected based on the results of desk study records, previous survey information and assessment of habitat quality/potential obtained from the Extended Phase 1 Habitat survey undertaken for the project. Four areas were selected for survey as shown on Figure 3 and these are summarised in Table 1 below.

Area Number	Key Habitats	
1	Disturbed and predominately sparsely vegetated ground. Tall herbs within areas of semi-improved grassland, and shrubs and gorse are present around the site boundary and around the southern banks of the lake. Refugia placed close to peripheral areas of scrub and within sparsely vegetated sunny areas.	
2	Brownfield site with poor semi-improved grassland and rubble. A ditch runs through the south-east corner with marshy grassland vegetation. Refugia placed close to rubble and marshy grassland areas.	
3	Marshy grassland with willow scrub. Refugia placed around peripheral scrub and compost areas, and within marshy grassland centre.	
4	Poor semi-improved rough grassland with scattered trees and scattered bramble and gorse scrub. Refugia placed in open sunny locations adjacent to peripheral scrub and pathways.	

Table 1 Summary of Areas Surveyed for Reptiles

2.4.2 Field Survey Methods

The methodology used in this survey followed standard guidance for reptile surveys (Froglife, 1999). The methodology involved the placement of artificial refugia within suitable areas of habitat for reptiles. The refugia used during the survey were made from rectangles of roofing felt measuring approximately 1m x 0.5m with a placement density of approximately 5-10 refuges per hectare of within suitable habitat in each area. Areas of suitable reptile habitat were targeted for survey and included south facing slopes, areas of short vegetation close to scrub and suitable hibernation habitat including rubble/wood piles and mounds of crushed aggregate where present.

A total of 196 refugia were installed on 1st September, and the positions of all refuges were recorded via GPS on tablet computers. These were subsequently used to record results of the reptile survey.

Seven subsequent visits were carried out between 14th September and 3rd October 2016 by an ecologist experienced in conducting reptile surveys. At the completion of the survey, all refugia were removed from the study area.

The artificial refugia were checked during early to late morning and/or early afternoon with a starting air temperature of between 13°C and 19°C. The weather conditions for each survey visit are provided in Appendix C.

In addition any pre-existing suitable artificial or natural refugia on site were also checked as part of the survey. Each refuge was lifted carefully to search for reptile species and, where feasible, details of the reptile species, sex, age class and condition of the reptiles encountered were recorded. Once the reptiles were allowed to escape, the refugia were replaced.

Additional signs of reptile presence such as sloughed skins were also recorded where evident and any live animals observed away from refugia were also recorded.

2.5 Bat Roost Assessment Survey

Buildings and scattered trees across the whole site were assessed for their potential to support roosting bats. The purpose of the assessment from the ground was to locate features in the trees and buildings that may be suitable for roosting bats. Examples of the types of features in trees that are regularly used by roosting bats include:

- Rot holes and cavities;
- Woodpecker holes;
- Splits and cracks in branches, such as storm damaged limbs;
- Loose bark;
- Thick-stemmed ivy; and
- Twisted and entwined limbs.

The types of features for buildings include:

- Gaps under eaves;
- Gaps around windows;
- Under loose tiles; and

• Under lead flashing.

Features were categorised in accordance with the Bat Conservation Trust (BCT) Guidelines (Collins, 2016). Further categorisation was used in accordance with BCT guidelines:

- High potential A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat (known or confirmed roost and Category 1*);
- Moderate potential A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status (Category 1);
- Low potential A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation). A tree of sufficient size and age to contain PRFs but with none seen from the ground or features seen with only very limited roosting potential (Category 2); and
- Negligible potential Negligible habitat features on site likely to be used by roosting bats (Category 3).

2.6 **Reporting Methods**

The data gathered during field survey work has been displayed on a series of plans. The reptile results have been combined from that obtained from each reptile survey visit in order to reveal patterns of reptile distribution within each study area. These results are then discussed within Section 3.2 of this report.

2.7 Limitations and Assumptions

The findings presented in this report represent those at the time of survey and reporting, and data collected from available sources. Ecological surveys are limited by factors which affect the presence of plants and animals, such as the time of year, migration patterns and behaviour. Nevertheless, these surveys were conducted at the optimal survey period and using best practice methodologies. Every effort has been made to ensure that the findings of the study present as accurate an interpretation as possible of the status of habitats and species within the study area.

Reptiles are mobile species, therefore no account can be made on a particular day as to the presence/absence of a particular species. Certain reptile species have large home ranges and may occur as transient individuals on sites connected to wider areas that support these species. However, the survey effort undertaken here is anticipated to have detected those reptile species present within the survey area. The optimal period for water vole surveys lie within April/May and August/September; October is considered to be just outside the optimum season to survey for water vole, therefore the results of this survey do not reflect the peak activity of water vole potentially present within the study area. However, the results of the survey and review of previously collected information have been used to provide a good indication of the use of the area by this species. Where there were limitations during the water vole survey, surveyors still strove to collect as much relevant information within the survey criteria as possible. The main limitations of the survey were:

- Dense vegetation including vegetation growing in and adjacent to water-body;
- Poaching of bankside occluding field signs; and,
- Steep banks and deep water.

Habitat suitability is a subjective measure. Where a ditch was inaccessible due to dense vegetation, but the waterbody could be viewed, it was possible to make an assumption with regard to suitability for water vole. Where the vegetation was so dense that we were unable to view the waterbody, then an informed assessment could not be made.

3 Results

3.1 Desk Study

3.1.1 Statutory Designated Sites

No statutory designated sites occur within the site boundary. The following designated sites occur within 4km of the site, and are indicated on Figure 1:

- Burry Inlet Special Protection Area (SPA) and Ramsar site, located approximately 300m west of the site. This site is designated for regularly supporting, in winter, over 20,000 waterfowl and for supporting internationally important wintering populations of the following four species of migratory waterfowl: pintail (*Anas acuta*), oystercatcher (*Haematopus ostralegus*), knot (*Calidris canutus*) and redshank (*Tringa totanus*). Additional species cited under the SPA designation are internationally or nationally important wintering populations of the following species of migratory wildfowl: shelduck (*Tadorna tadorna*), teal (*Anas crecca*), wigeon (*Anas penelope*), shoveler (*Anas clypeata*), grey plover (*Pluvialis squatarola*), dunlin (*Calidris alpina*), curlew (*Numenius arquata*) and turnstone (*Arenaria interpres*).
- Carmarthen Bay and Estuaries Special Area of Conservation (SAC) is located approximately located approximately 100m west of the site. This SAC is designated for its habitats (estuaries, mudflats and sandflats not covered by seawater at low tide, Atlantic salt meadows, *Salicornia* and other annuals colonising mud and sand, large shallow inlets and bays and sandbanks which are slightly covered by sea water all the time) supporting allis shad (*Alosa alosa*), twaite shad (*Alosa fallax*), river lamprey (*Lampetra fluviatilis*), sea lamprey (*Petromyzon marinus*) and otter (*Lutra lutra*).
- Burry Inlet and Loughor Estuary Site of Special Scientific Interest (SSSI) located approximately 300m west of the site. This site is the largest estuarine complex within the old West Glamorgan county and Borough of Llanelli. Comprising extensive areas of grazed saltmarsh, sand and mud flats, the area is internationally significant for its wader and wildfowl populations with overwintering totals averaging in excess of 46,000 birds.
- Pyllau Machynys SSSI is located approximately 300m south-west of the site. This site has two special features: standing water and swamp; and a dragonfly assemblage. As well as these features this site has other habitats that contribute to the special wildlife interest. These include areas of wet willow woodland and scrub, and flower-rich grassland. This diversity of habitats similarly supports a wide range of species and these too are a key component of the special interest of the site.
- Pwll Lagoon SSSI is located approximately 3.8km north-west of the site. This site has two special features: swamp; and fen woodland. The Pwll Lagoon is of special interest due to the presence of contrasting fen and woodland communities, with both calciphile (lime-loving) and calcifuge (lime-hating)

species growing in close proximity to each other. Further interest is also provided by the presence of scarce wetland plants and the anthropogenic soils which result from the degradation of pulverised fuel ash.

• There is one Local Nature Reserve (LNR) within the 4km search area, North Dock Dunes LNR which lies along the coast approximately 500m east of the site.

3.1.2 Non-statutory Designated Sites

No SINCs or other non-statutory sites have been identified.

3.1.3 Species Records

A number of reptile records within 2km were returned by WWBIC, and are summarised below.

- One record of slow-worm (*Anguis fragilis*) and one record of common lizard (*Zootoca vivipara*) (193m south-west of the Machynys area);
- Two records of slow worm and two records of common lizard within the Avenue East area;
- One historic record of grass snake (*Natrix natrix*) and one historic record of common lizard 84m east of the Machynys area.

The data returned from WWBIC included a number of water vole (*Arvicola amphibius*) records:

- One historic record of water vole within the New Dafen Lake;
- One historic record of water vole within a large ditch 100m south-east of the New Dafen Lake;
- Five historic records 920m east of the study area near Trostre;
- Numerous historic records 1.4-1.8km east/north-east of the study area around Trostre Industrial Park.

Bats recorded within the area include:

- An unspecified species roost 232m north-east at Hafan y Morfa, an unspecified roost 517m east and a suspected unspecified roost 1.4km north-east;
- Unspecified activity 615m north, common pipistrelle (*Pipistrellus pipistrellus*) recorded foraging 650m north-west, common and soprano pipistrelle (*Pipistrellus pygmaeus*) recorded 670m north-west and common pipistrelle activity 1.4-1.6km north.

Ground nesting birds recorded within the area include:

• Numerous records of skylark (*Alauda arvensis*), the nearest recorded 98m west of the New Dafen River;

² Records before 2000.

- Numerous records of lapwing (*Vanellus vanellus*) (including breeding pairs and nests), the nearest record 537m south at Machynys Golf Club;
- Curlew (*Numenius arquata*) recorded 248m south at Machynys Golf Club, and within the Loughor Estuary;
- Snipe (*Gallinago gallinago*) recorded 183m west of the New Dafen River and 1.3km east at the National Wetlands Centre.

Section 7 Species identified within the vicinity of the site include:

- Moths including green brindled crescent (*Allophyes oxyacanthae*) and rosy rustic (*Hydraecia micacea*) within the Machynys area;
- Butterflies including small heath (*Coenonympha pamphilus*), grayling (*Hipparchia semele*) and wall (*Lasiommata megera*) within the Machynys area. An historic record of a small blue butterfly (*Cupido minimus*) was made in the North Dock area in 1989; and
- Bees including moss carder bee (*Bombus (Thoracobombus) muscorum*) south of Machynys.

3.2 Field Survey Results

3.2.1 Extended Phase 1 Habitat Survey

The previous Extended Phase 1 Habitat survey report (Ove Arup & Partners Ltd., December 2011) states that:

The majority of the site at Delta Lakes is disturbed and sparsely vegetated ground, with large areas of semi-improved neutral grassland particularly to the north of the site near the lake. Tall herbs are present within the grassland, in patches and along the southern boundary of the site. Shrubs and European gorse (Ilex europaeus) are present around the site boundary, with some small areas of bramble (Rubus fruticosus agg) scrub. A small area of Japanese knotweed (Fallopia japonica) has also been recorded alongside the lake.

The Avenue West site is predominantly poor semi-improved grassland, with scattered scrub and small trees. An area of thick bramble exists along the southern edge of the site. The site also contains a former scouring basin containing water and swamp vegetation/common reed (Phragmites australis), located on the southern side of the site. Japanese knotweed is present, scattered across the site as shown on Figure 2a.

The Avenue East site is more diverse, with an area of marshy grassland and willow (Salix spp.) trees in the centre. The remainder of the site is poor semiimproved rough grassland, scattered bramble and gorse scrub and trees, and amenity grassland along the road/pavement verges. Two discrete areas of Japanese knotweed were recorded as shown on Figure 2b.

Within the Avenue South (Machynys) site the main habitats are poor semi-improved grassland and bare ground with rubble. A wetter area is present at the south-east corner of this area, with a small ditch running through it and marshy grassland

vegetation. A small area of broadleaved trees exists to the west of this wet area, and along the southern boundary with the road. Two discrete areas of Japanese knotweed were recorded as shown on Figure 2c.

In the six years since this survey was undertaken, the habitats at the site have altered slightly through succession as described below.

3.2.1.1 Habitats

A total of 13 habitat types were identified within the site. These are shown in Figures 2a-c and listed below with the representative Phase 1 habitat codes.

- Semi-natural broad-leaved woodland (A1.1.1);
- Broadleaved plantation woodland (A1.1.2)
- Broadleaved parkland / scattered trees (A3.1);
- Mixed woodland (A1.3.1)
- Poor semi-improved grassland (B6);
- Marshy grassland (B5)
- Amenity grassland (J1.2);
- Introduced shrub (J1.4);
- Dense scrub (A2.1);
- Scattered scrub (A2.2);
- Tall ruderal (C3.1)
- Standing water (G1); and
- Swamp/reed-bed (F1).

The predominant habitat types are described in more detail below.

Semi-natural broad-leaved woodland and broadleaved parkland/scattered trees

Areas of semi-natural broad-leaved woodland are present along the northern edge of the Machynys area and bordering the south-east of the main Delta Lakes site. The woodland includes such species as sycamore (*Acer pseudoplatanus*), silver birch (*Betula pendula*), beech (*Fagus sylvatica*), oak (*Quercus robur*), goat willow (*Salix caprea*) and ash (*Fraxinus excelsior*). Scots pine (*Pinus sylvestris*) and bramble (*Rubus fruticosus* agg.) scrub are present along the eastern edge within the Machynys area.

Within the Avenue East area scattered trees are present, with predominant species being alder (*Alnus glutinosa*) and goat willow. Scattered trees are also present along the southern edge of the New Dafen lake.

Poor semi-improved grassland

Areas of poor semi-improved grassland were identified in large areas of all parts of the site. The main Delta Lakes site is colonised by red clover (*Trifolium pratense*), hawkbit (*Scorzoneroides autumnalis*), ragwort (*Senecio jacobaea*), hedge mustard (*Sisymbrium officinale*), tufted vetch (*Vicia cracca*), hemp

agrimony (*Eupatorium cannabinum*), teasel (*Dipsacus fullonum*), yarrow (*Achillea millefolium*), silverweed (*Argentina anserina*), common sorrel (*Rumex acetosa*), common knapweed (*Centaurea nigra*), ribbed melilot (*Melilotus officinalis*), meadowsweet (*Filipendula ulmaria*), ribwort plantain (*Plantago lanceolata*), cock's-foot (*Dactylis glomerata*), meadow vetchling (*Lathyrus pratensis*), red fescue (*Festuca rubra*), common fleabane (*Pulicaria dysenterica*) and false oat-grass (*Arrhenatherum elatius*). Compact rush (*Juncus conglomeratus*) and sharp-flowered rush (*J. acutiflorus*) are present in the wetter areas of the site.

The Machynys site comprises a similar assemblage of species, including black medick (*Medicago lupulina*), common sorrel, broad-leaved everlasting pea (*Lathyrus latifolius*), meadow buttercup (*Ranunculus acris*), dandelion (*Taraxacum officinale*), silverweed, teasel, Yorkshire fog (*Holcus lanatus*) and yarrow.

Amenity grassland

The soft landscaping to the north of the lake includes small areas of amenity grassland. The amenity grassland is dominated by perennial ryegrass (*Lolium perenne*), annual meadow grass (*Poa annua*) and ribwort plantain.

Marshy grassland

A large area of marshy grassland is present within the eastern part of the Machynys area of the site. This area is occupied by species including hemp agrimony, horsetail, sedges, compact rush and sharp-flowered rush.

Dense scrub and scattered scrub

Areas of scrub are present across the site, specifically in areas around the woodlands and waterbodies and also scattered patches within the poor semiimproved grassland. The scrub comprises of goat willow, dog rose (*Rosa canina*), gorse (*Ulex europaeus*) and bramble.

Tall ruderal

A large area of tall ruderal habitat is present within the eastern section of the main Delta Lakes area. Species identified here include rosebay willowherb (*Chamerion angustifolium*) and common nettle (*Urtica dioica*) as well as other species commonly found on disturbed ground including scarlet pimpernel (*Anagallis arvensis*) and oxeye daisy (*Leucanthemum vulgare*).

Introduced shrub

Japanese knotweed (*Fallopia japonica*), an invasive alien species listed under Schedule 9 of the Wildlife and Countryside Act 1981, is present across the site as shown on Figures 2a-c.

A small area of montbretia (*Crocosmia x crocosmiiflora*), also a Schedule 9 species, is also present within the eastern part of the main Delta Lakes area of the site.

Standing water/swamp

Standing water and ditches are present in the following locations within the site:

- Main Delta Lakes area New Dafen lake and reedbed;
- Avenue East area wet ditch running across centre of site; and
- Machynys area dry ditches to the south of the area.

The marginal riparian flora associated with the waterbodies is predominantly common reed (*Phragmites australis*) and yellow flag iris (*Iris pseudacorus*). The banks of the reedbed and the dry ditches are also covered with bramble scrub and rosebay willowherb.

3.2.1.2 Protected Species

No evidence of badger was observed during the Phase 1 Habitat survey, nor on subsequent surveys for protected species, however dedicated searches were not conducted.

The site also provides suitable habitat for nesting birds and reptiles, especially within the woodland, scrub and grassland habitats provided in the western area of the site.

3.2.2 Reptiles

The reptile survey area and refugia locations are shown on Figure 3.

A total of 100 reptile observations were made during the entire survey period. Records came from all of the four survey areas. All reptile observations (including incidental sightings) are listed in Appendix B and shown on Figures 5-8.

Two species of reptile were recorded; the most frequently recorded species was common lizard, recorded in all areas. The highest number of animals seen on any single visit in one area was twelve, on 30th September in Area 2. It can be assumed that a good population of common lizard exists in all areas.

Slow-worm were recorded eleven times during the survey period; as such, it can be assumed that a good population of slow-worm exists within the study area, associated particularly with the marginal scrub vegetation around the southern boundary of the New Dafen in Area 1 and throughout Area 2.

No adder or grass snake were recorded during the survey, however suitable habitat exists within the study area for both species.

In addition, three species of amphibian were recorded during the surveys; common toad (*Bufo bufo*), common frog (*Rana temporaria*) and palmate newt (*Lissotriton helveticus*). All species were recorded in Area 2.

These records included one juvenile palmate newt was recorded on 3rd October, and one common toad on 22nd and 28th September. Two common frog were recorded on 20th September, one on the 30th September and one on the 3rd October.

Great crested newts are assumed not to be present at the site due to the lack of previous records and lack of suitable habitat for this species. Though low numbers of palmate newt were recorded, the habitat was not of sufficient quality to support great crested newts due to the low water levels within the ditch and the partial contamination evident in the area.

3.2.3 Water Voles

The water vole survey area is shown on Figure 4. Five water-bodies were surveyed within the study area for the potential to provide suitable habitat for water vole. The results of the habitat suitability assessment and whether water vole signs were found and deemed to be present/absent are provided in Table 2. The water-body locations and presence/absence field signs are shown in Figure 9.

Waterbody Number	Туре	Habitat Suitability	Presence/Absence
1	Lake	High	Present
2	Ditch	Medium	Absent
3	Ditch	Low	Absent
4	Reen	High	Absent
5	Ditch	Negligible	Absent

 Table 2 Habitat Suitability Assessment for Water Voles and Presence/Absence

 Results

The water vole survey carried out within the study area identified five waterbodies potentially suitable for water vole; waterbodies 1, 2 and 4 in particular.

Water vole droppings, feeding signs and two suspected burrows were found along the northern bank of the New Dafen Lake (the locations of field signs are shown on Figure 9); this indicates a low population of water vole are present within the lake (likely to be a few individuals).

No other field signs were identified, however it should be noted that access to survey waterbody 2 was limited due to the presence of steep banks and very dense scrub. An historic record of water vole exists within this ditch, therefore it is likely that water vole will utilise this area, despite its apparent lack of connectivity to other water bodies.

Access to survey waterbody 4 was also limited due to deep water, however this reen contains excellent water vole habitat and has connectivity to other waterbodies within the Machynys Golf Course to the east, where water vole are known to be present.
Waterbody 3 was considered to have low potential for water vole due to its isolation and lack of connectivity to other water-bodies, in addition to the lack of vegetation structure preferred by water vole.

Waterbody 5 was considered to have negligible potential as it appeared to be dry for the majority of the year, with no aquatic or emergent vegetation present; the ditch contains predominately scrub and willow carr vegetation.

3.2.4 Badgers

One large mammal hole was observed within Area 5 underneath a stand of sea buckthorn (*Hippophae rhamnoides*); a camera trap was deployed on 4th October 2016 in order to confirm the species using this hole. The camera was retrieved on 21st October, where it was confirmed as a fox (*Vulpes vulpes*). No badgers were observed on the camera, or any field signs observed during the surveys. There is suitable commuting and foraging habitat present within the site for badger, particularly within areas of dense scrub and broadleaved/mixed woodland however no signs were found during the course of the surveys.

3.2.5 Bats

One building at the north-east corner of the New Dafen Lake was considered to have moderate bat roost potential (TN8). The building contains features suitable for bat roosts including gaps underneath roof tiles, gaps behind fascia's and soffit boxes. No signs of bats were observed externally.

No trees within the site were identified as having potential for roosting bats, due to their relatively small size and lack of potential roost features. Bats may however use the woodland and waterbodies as foraging areas.

3.2.6 Otters

No evidence of otters was found during the course of the surveys. The New Dafen lake habitat within the site is potentially suitable for this species however the lake is heavily disturbed by human activity which reduces the likelihood that otters would occupy this area on a regular basis.

3.2.7 Dormice

There are no records of dormice within the search area. Potentially suitable habitat for this species exists within the woodland to the north of Machynys Golf Course however this habitat is unconnected to other suitable habitat and is too small to support a viable dormouse population.

3.2.8 Breeding Birds

Suitable habitat for breeding birds exists in the form of scrub, woodland/scattered trees, bare ground and waterbody emergent vegetation. Common species noted during the course of the surveys included blue tit (*Cyanistes caeruleus*), blackbird

(*Turdus merula*) and wren (*Troglodytes troglodytes*) however breeding status/locations were not confirmed.

3.2.9 Invertebrates

Areas of the site are of particular value to invertebrates, particularly butterflies, moths, crickets, bees, dragonflies and hoverflies. The semi-improved grassland areas within the main Delta Lakes area and the Machynys area were noted to be of particular importance, where the habitat has been left undisturbed and scrub has not taken over. Additionally the wetter areas of the site such as the marshy grassland and ditches are valuable for a range of invertebrate species.

No kidney vetch was identified on the site which the small blue butterfly relies on.

3.2.10 Section 7 Mammal Species

No evidence of any mammals listed on the Section 7 Priority Species list was found. There is potential habitat for hedgehog (*Erinaceus europaeus*) within the woodland and scrub in the Machynys area.

4 Conclusions and Recommendations

The 2016 ecological surveys undertaken have updated and expanded the baseline data available for the site. The following recommendations are made at this stage. It is recommended that a full ecological impact assessment is undertaken for the project once the design has further evolved.

4.1 **Designated Sites**

Under the Conservation of Habitats and Species Regulations 2010 ('Habitats Regulations') an assessment of the potential for significant effects on European Designated sites is required to ensure that no adverse effect will arise from the proposals on the Carmarthen Bay and Estuaries SAC and the Burry Inlet SPA/Ramsar site adjacent to the Delta Lakes site. This will also need to consider cumulative effects from developments in the surrounding area. A Habitats Regulations screening assessment of any planning application will need to be undertaken by the Competent Authority (the Local Planning Authority in this instance) in consultation with Natural Resources Wales (NRW) to determine if the proposed development is likely to result in a significant effect on the European Designated sites. A report to inform this assessment will need to be produced. The main risks to nature conservation and biodiversity would include:

- Surface water run-off and other discharges to the watercourses flowing into the Burry Inlet; and
- Dust and air emissions on ecologically sensitive areas.

Potential effects on the SSSI features of the European sites and the Machynys Ponds SSSI should be considered in any application taken forward. NRW will need to be consulted in this process to ensure that they are in agreement with any proposed mitigation and also to provide assent for any proposed works which have the potential to affect a SSSI.

No non-statutory sites are likely to be affected by the proposals.

4.2 Habitats

Vegetation clearance should be kept to a minimum where possible, especially concerning trees, hedgerows and semi-improved grasslands. Habitats lost as a result of the development will require assessment based on the relative effects and mitigation considered. Habitat connectivity around the site and out into the surrounding areas should also be maintained and enhanced where possible.

4.3 Invasive Plants

A number of stands of Japanese knotweed have been identified at various locations within the site. In dealing with this species the Environment Agency (EA) guidance 'Managing Japanese knotweed on development sites: the knotweed code of practice' should be referred to. Safe disposal of montbretia should also be undertaken to avoid spreading this invasive species.

4.4 Water Vole

It is recommended that marginal vegetation and reed-bed around the New Dafen Lake is retained, in addition to the identified water-bodies. If necessary, replacement and enhancement measures may need to be implemented within the study area depending on final design.

Mitigation measures should be designed for this species once the design is finalised. Due to their legal protection, and the likelihood for the proposed works to result in the disturbance of water vole and possible habitat loss, discussion with Natural Resources Wales (NRW) with regards to the requirement for a protected species licence is recommended, particularly around the New Dafen Lake. Mitigation recommendations include the retention of water-bodies identified as having potential for water vole, in addition to the retention of reed bed and marginal vegetation habitat. If a protected species licence is required, it is likely that a 'net benefit' for water vole will be required, which will involve habitat enhancement within the site, or off-site.

4.5 Reptiles

Due to their legal protection, mitigation for reptiles should be designed into the project, including any necessary measures to avoid killing of reptiles during construction. If sufficient habitat cannot be retained on site, reptiles will need to be translocated to a suitable receptor site. This should be identified and surveyed well in advance of the proposed works commencing within the study area. The mitigation strategy should also include the creation of artificial hibernacula, ecologically sensitive removal of suitable reptile habitat and semi-permanent reptile fencing to ensure reptiles are excluded from working areas.

4.6 Bats

One building was assessed as having moderate potential for roosting bats. Following BCT guidance, this should include two dusk emergence and/or predawn re-entry surveys during May-September. These surveys would inform whether a European Protected Species (EPS) licence is required for the work.

4.7 Badgers

Given the suitability of habitats on site, it is recommended that a dedicated survey for badgers is conducted within the site up to at least 50m from any construction activities. Such surveys can be carried out at any time of the year, but are often best undertaken in the winter months when setts are more visible.

4.8 Breeding Birds

Any removal of vegetation on the site should ideally be undertaken outside of the bird breeding season, which is taken to extend from March to September.

If this is not possible it will be necessary for an ecologist to visit the site to check any vegetation which needs to be removed or cut down for nests in advance of the clearance work being carried out. In the event that an active nest is found then it must be left undisturbed until any dependent chicks are fledged and are independent of the nest, with an appropriate buffer to be advised on site by the ecologist.

4.9 **Potential Ecological Enhancements**

The following bullet points detail potential ecological enhancements that could be considered for this site. It is recommended that these are refined and developed into a package of measures alongside ecological mitigation as the project evolves:

- Retention of the existing bankside habitat up to at least 3m from the edge of the water and provision of undisturbed refuges in the areas water voles have been identified would provide this species with a more secure habitat and provide the opportunity to support the population of this nationally declining species;
- Use of natural materials should be included in the design where possible, avoiding piling and hard landscaping, for the benefit of water voles and other species.
- Protection of the central island within the New Dafen lake and enhancement for water voles by removing scrub/tree species and planting food resources for water voles would be another enhancement opportunity;
- The existing reedbed within the eastern area of the main site would also benefit from removal of reed vegetation along one side and planting water vole friendly species, to increase the area of available habitat for water voles.
- In addition consideration should be given to increasing connectivity for water voles across the site from the New Dafen lake to the Machynys section, by leaving a 'green corridor' which water voles can safely move along.
- Additional planting to compensate for the loss of habitats supporting species of nature conservation value. These will be of species appropriate to preserve the character of the local landscape. Except in the vicinity of buildings where amenity planting may be more appropriate, all other planting should be of native species and, where possible, of local origin.
- The landscape planting regime should not include sea buckthorn, an invasive plant present in the local area which is threatening the natural dune habitats.
- An ephemeral pond exists to the east of the lake, which could be enhanced for amphibians and other wildlife;
- Enhancement of areas of habitat for invertebrates, including retaining / translocating areas of flower rich turf.
- Enhance the habitat around scouring basin and lake to provide cover and foodplants for breeding birds, water voles, amphibians and reptiles.
- Incorporation of swift/house martin nesting features in the buildings should be considered, along with other nest boxes for a suitable range of breeding birds;

- Incorporation of 'bat-friendly' features into building design, such as bat boxes or bat bricks;
- Consideration of the use of Sustainable Urban Drainage Systems within the scheme and associated opportunities for biodiversity enhancement as part of the landscaping of the site.

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Appendix A

Legislative Context

A1 Statutory Designated Sites

A network of nationally designated sites has been established through the designation of Sites of Species Scientific Interest (SSSI) under the Wildlife and Countryside Act 1981 (as amended). The protected afforded by the Act means it is an offence to carry out or permit to be carried out any operation listed within the notification without the consent of the Statutory Nature Conservation Organisation³ (Natural Resources Wales).

The protection afforded to SSSIs is used to underpin the designation of areas at a European Level. European Sites comprise:

- Special Areas of Conservation (SAC) designated under the Conservation of Habitats and Species Regulations 2010 (as amended) (known as the Habitat Regulations);
- Special Protection Areas (SPA) designated under the Wildlife and Countryside Act.

Wetlands of International Importance (Ramsar Sites) declared under the Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971 are normally also notified as SSSIs but are only considered European Sites as a matter of UK and Local Government Policy.

The Habitats Regulations transpose the requirements of Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the Habitats Directive) into law within England and Wales, while the Wildlife and Countryside Act transposes Directive 79/409/EEC on the Conservation of Wild Birds (the Birds Directive) into law within England and Wales. Equivalent legislation exists to transpose these directives in the law within Scotland and Northern Ireland.

The Habitats Regulations require that consideration is given to the implications of plans and projects (developments) on European Sites. Specifically Regulation 61(1) states:

"A competent authority, before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which –

(a) is likely to have a significant effect on a European site or European marine site (either alone or in combination with other plans or projects), and

(b) is not directly connected with or necessary to the management of that site,

must make an appropriate assessment of the implications for that site in view of that site's conservation objectives."

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³ Section 28 of the Wildlife and Countryside Act 1981 (as substituted by Schedule 9 of the Countryside and Rights of Way Act 2000).

The formal consideration of effects on European sites is therefore undertaken by the determining authority such as the Local Planning Authority (LPA).

Local Nature Reserves (LNR) can be given protection against damaging operations through powers within the National Parks and Access to the Countryside Act 1949 (as amended). However this protection is usually conveyed through inclusion of protection within local planning policy relating to these sites and other non-statutory sites such as Sites of Importance for Nature Conservation.

A2 European Protected Species

The Habitats Regulations convey special protection to a number of species of fauna which are listed in Schedule 2 of the Regulations and are referred to as European Protected Species (EPS):

- All UK resident bat species;
- Common otter (*Lutra lutra*);
- Wild cat (*Felis silvestris*);
- Common dormouse (Muscardinus avellanarius);
- All whale and dolphin species;
- Pool frog (*Rana lessonae*);
- Natterjack toad (*Bufo calamita*);
- Great crested newt (*Triturus cristatus*);
- Smooth snake (Coronella austriaca);
- Sand lizard (Lacerta agilis);
- All marine turtles;
- Sturgeon (*Acipenser sturio*);
- Large blue butterfly (*Maculinea arion*);
- Fisher's estuarine moth (Gortyna borelii lunata); and
- Lesser whirlpool ram's-horn snail (Anisus vorticulus).

Regulation 41 makes it an offence to:

- a) Deliberately capture, injure or kill any wild animal of a EPS;
- b) Deliberately disturb wild animals of such a species;
- c) Deliberately takes or destroys the eggs of such a species;
- d) Damages or destroys a breeding site or resting place of such an animal.

Disturbance in the context of the offences above is disturbance which is likely to impair the ability of the animals to survive, to breed or reproduce, to nurture their young, to hibernate, to migrate, or to affect significantly the local distribution of the species.

Licences can be granted by the relevant Statutory Nature Conservation Organisation (SNCO) for developments (sometime referred to as EPS Licences or Derogation Licences) providing the purposes of the licence is for "preserving public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment".

A3 UK Protected Species

The Wildlife and Countryside Act 1981 provide protection to both EPSs and other species including (but not limited to) wild birds, water voles and reptiles.

All wild birds, their nests and eggs are protected with some rare species afforded extra protection from disturbance during the breeding season (these species are listed in Schedule 1 of the Act). It is illegal to take any wild bird or damage or destroy the nests and eggs of breeding birds. There are certain exceptions to this in respect of wildfowl, game birds and certain species that may cause damage.

Water vole receive protection under the Wildlife and Countryside Act 1981 which prohibits the killing, injuring or taking by any method.

All native reptile species in the UK are subject to partial protection from intentional or reckless killing or injury only.

Badgers and their setts are protected under the Protection of Badgers Act 1992 which makes it an offence to kill, injure or take a badger, or interfere with a sett.

A4 Other Legislation Relating to Species

The Environment Act (Wales) (2016) Section 7 requires Welsh Ministers to publish, review and revise lists of living organisms and types of habitat in Wales, which they consider are of key significance to sustain and improve biodiversity in Wales. The Welsh Ministers must take all reasonable steps to maintain and enhance the living organisms and types of habitat included in any list published under this section, and encourage others to take such steps.

A5 Hedgerow Regulations 1997

The Hedgerow Regulations 1997 set out a framework for the protection of hedgerows against removal where they are deemed to be important either due to their age, ecological or archaeological features. Approval is required from the local authority prior to the removal of Important Hedgerows.

Appendix B

Reptile Survey Results

B1

Table B1 Reptile Field Survey Results.

Species	Area	Date	Sex/Life Stage	Number
Common lizard	1	14 th September	Adult	1
Common lizard	1	14 th September	Adult	1
Common lizard	1	14 th September	Adult	1
Common lizard	2	14 th September	Adult	1
Common lizard	2	14 th September	Adult	1
Common lizard	2	14 th September	Adult	1
Common lizard	3	14 th September	Sub-adult	1
Common lizard	3	14 th September	Adult	1
Common lizard	3	14 th September	Adult	1
Common lizard	3	14 th September	Adult	1
Common lizard	3	14 th September	Sub-adult	3
Slow-worm	1	16 th September	Adult female	1
Common lizard	2	16 th September	Adult	3
Common lizard	2	16 th September	Skin	1
Common lizard	2	16 th September	Adult	1
Slow-worm	2	16 th September	Male	1
Common lizard	2	16 th September	Sub-adult	1
Common lizard	3	16 th September	Adult	1

Species	Area	Date	Sex/Life Stage	Number
Slow-worm	4	16 th September	Sub-adult	1
Common lizard	1	20 th September	Adult	1
Slow-worm	1	20 th September	Skin	1
Slow-worm	1	20 th September	Adult female	1
Slow-worm	2	20 th September	Sub adult	1
Common lizard	2	20 th September	Adult	1
Common lizard	2	20 th September	Adult	1
Common lizard	2	20 th September	Adult	1
Common lizard	2	20 th September	Adult	1
Slow-worm	3	20 th September	skin	1
Common lizard	3	20 th September	Adult	1
Common lizard	3	20 th September	Adult	1
Common lizard	3	20 th September	Adult	1
Common lizard	4	20 th September	Adult	1
Common lizard	4	20 th September	Adult	1
Common lizard	4	20 th September	Adult	1
Common lizard	4	20 th September	Adult	1
Common lizard	4	20 th September	Adult	1
Common lizard	4	20 th September	Adult	1
Common lizard	4	20 th September	Adult	1
Slow-worm	2	22 nd September	Male	1

Species	Area	Date	Sex/Life Stage	Number
Common lizard	2	22 nd September	Adult	1
Common lizard	2	22 nd September	Adult	1
Common lizard	2	22 nd September	Adult	1
Common lizard	2	22 nd September	Adult	1
Common lizard	3	22 nd September	Adult	1
Common lizard	1	28 th September	Sub-adult	2
Common lizard	1	28 th September	Sub-adult	2
Common lizard	2	28 th September	Sub-adults	7
and slow-worm				1
Common lizard	2	28 th September	Adult	1
Common lizard	1	30 th September	Adult	1
Common lizard	1	30 th September	Adult	1
Common lizard	1	30 th September	Adult	2
Common lizard	2	30 th September	Adult	2
Common lizard	2	30 th September	Sub adults	1
Slow-worm				1
Common lizard	2	30 th September	Sub adults	2
Common lizard	2	30 th September	Adult	1
Common lizard	2	30 th September	Adult	2
Common lizard	2	30 th September	Skin	1
Common lizard	2	30 th September	Adult	1
Slow-worm	2	30 th September	Sub-adult	1

Species	Area	Date	Sex/Life Stage	Number
Common lizard	3	30 th September	Adult	1
Common lizard	3	30 th September	Adult	1
Common lizard	3	30 th September	Adult	1
Common lizard	4	30 th September	Adult	2
Common lizard	4	30 th September	Adult	2
Common lizard	4	30 th September	Adult	2
Common lizard	4	30 th September	Adult	2
Common lizard	1	3 rd October	Adult	1
Common lizard	1	3 rd October	Adult	1
Common lizard	1	3 rd October	Adult	1
Common lizard	1	3 rd October	Adult	2
Common lizard	2	3 rd October	Adult	1
Common lizard	2	3 rd October	Adult	1
Common lizard	2	3 rd October	Sub-adult	1
Common lizard	2	3 rd October	Sub-adult	1
Common lizard	2	3 rd October	Sub-adult	1
Common lizard	3	3 rd October	Adult	1
Common lizard	4	3 rd October	Sub-adult	1

Appendix C

Weather Conditions During the Surveys

C1

Survey Type	Date	Temperature (°C)	Wind Speed (Bft)	Wind Direction	Cloud Cover	Conditions
	14.09.2016	19	1	NE	0	Sunny
Reptile Surveys	16.09.2016	16	2	NE	20	Sunny
	20.09.2016	14	1	NE	10	Sunny
	22.09.2016	15	1	SE	10	Sunny
	28.09.2016	17	2	SW	100	Light drizzle
	30.09.2016	13	1	SW	20	Dry
	03.10.2016	15	2	SE	10	Sunny
Water Vole Survey	21.10.2016	14	1	SE	40	Dry

Appendix B

HUDU Rapid Assessment Matrix



B1 HUDU Rapid Health Impact Assessment Matrix

	Assessment criteria	Relevant?	Details/evidence	Potential health impact	Initial considerations for the design team and further recommendations
Housi	ng quality and design				
1.1	Does the proposal seek to meet all 16 design criteria of the Lifetime Homes Standard?	Yes	Likely but not yet confirmed	Positive	Incorporate the '10 changes we could make' 'Active By Design' principles/best practice. See: 'Active by Design: Designing Places for Healthy Lives A Short Guide', <u>http://www.designcouncil.org.uk/resources/guide/</u> <u>active-design-designing-places-healthy-lives</u>
1.2	Does the proposal address the housing needs of older people, i.e. extra care housing, sheltered housing, lifetime homes and wheelchair accessible homes?	Yes	The project itself looks at providing housing needs of aging people	Positive	Aim to maximise the number of dwellings with ground floor access or lift access built to "Lifetime Homes" standards to be wheelchair accessible, or easily adaptable for residents that are wheelchair users – E.g. the living room should be at entrance level. There should be a space for turning a wheelchair in dining areas and living

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				\sim	rooms and adequate circulation space for wheelchairs elsewhere.
1.3	Does the proposal include homes that can be adapted to support independent living for older and disabled people?	Yes	As above - the project aims to meet the needs of older people and homes would be adapted to support independent living	Positive	Also Incorporate WHO 'Age Friendly Cities' features into design and BHNT Programme to help chart progress. (E.g. recommendations include - <i>"sufficient and affordable housing for</i> <i>frail and disabled older people, with appropriate</i> <i>services is provided locally."</i> See: <u>http://www.who.int/ageing/publications/Age_frie</u> <u>ndly_cities_checklist.pdf</u> Also apply 'The Principles of Inclusive Design'. (CABE, 2006) and 'Inclusion by Design: Equality, Diversity and the Built Environment' (CABE, 2008) for instance, avoid steps and replace them with a gentle incline between floors and add low window-sills for a better view. See that doors are highly visible, lay non-slip mats and make automatic doors the automatic choice.
1.4	Does the proposal promote good design through layout and orientation, meeting internal space standards?	Yes	Likely but not yet confirmed	Positive	Continue to monitor progress via applying Age Friendly Cities (UK) Programmes best practice recommendations e.g. Interior spaces and level surfaces allow freedom of movement in all rooms and passageways.

	Assessment criteria	Relevant?	Details/evidence	Potential health impact	Initial considerations for the design team and further recommendations
1.5	Does the proposal include a range of housing types and sizes, including affordable housing responding to local housing needs?	Yes	Housing will be various types and sizes, but no allowance has been made for affordable housing.	Positive	Look more at requirements for local need and options for incorporating affordable housing.
1.6	Does the proposal contain homes that are highly energy efficient (e.g. a high SAP rating?	Yes	Not yet known	Positive	Reference best practice guidance, includes: A Code for Sustainable Homes or BREEAM assessment should be undertaken for all major development proposals. The Code for Sustainable Homes (CSH) is a national standard to guide the design and construction of sustainable homes. The Code gives a rating from 1 to 6. The higher the rating, the more sustainable the design of the home. Level 4 is roughly the equivalent of a BREEAM excellent score. The assessment includes health and wellbeing criteria with credits available for Lifetime Homes, sound insulation, daylight and private outdoor space. <u>http://www.communities.gov.uk/planningandbuil</u> ding/sustainability/codesu stainablehomes/

	Assessment criteria	Relevant?	Details/evidence	Potential health impact	Initial considerations for the design team and further recommendations				
					Building Research Establishment Environmental Assessment Method (BREEAM) assesses the environmental performance of new and refurbished				
Access to healthcare services and other social infrastructure									
2.1	Does the proposal retain or re-provide existing social infrastructure?	Yes	There is currently no existing social infrastructure on the site	Positive	LWLV should seek to provide social infrastructure that is accessible to the wider community and which meets the existing and projected future needs.				
2.2	Does the proposal assess the demand for healthcare services?	Yes	Healthcare services is a core component of the project and would seek to match NHS requirements	Positive	The design of LWLV needs to reflect the needs assessment for the area.				
2.3	Does the proposal provide for healthcare services either in the form of a financial contribution or in-kind? Does a healthy facility provided as part of the development match	Yes	Healthcare services is a core component of the project and would seek to match NHS requirements	Positive	NHS requirements need to be met				
	Assessment criteria	Relevant?	Details/evidence	Potential health impact	Initial considerations for the design team and further recommendations				
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	NHS requirements and plans?			\sim					
2.4	Does the proposal assess the capacity, location and accessibility of other social infrastructure, e.g. schools, social care and community facilities?	Yes	The Wellness Hub would make provisions for leisure centre, hospitality facilities, wellness hotel, café, shop, crèche and pharmacy.	Positive	It is considered that the proposal would assess the capacity, location and accessibility of other social infrastructure and therefore no further recommendations are made at this stage.				
2.5	Does the proposal explore opportunities for shared community use and co- location of services?	Yes	The Wellness Hub would be shared with the community	Positive	It is considered that the proposal would explore opportunities for shared community use and co- location of services and therefore no further recommendations are made at this stage.				
2.6	Does the proposal contribute to meeting primary, secondary and post 19 education needs?	Yes	There would be no provision for primary or secondary education on the site although a four form entry primary school is being provided by CCC just north of the site in Draka. However, post 19 education will be catered for on the site as the University of Swansea, together with a number of partners are seeking to	Positive	It is considered that the proposal would contribute to meeting educational needs and therefore no further recommendations are made at this stage.				

	Assessment criteria	Relevant?	Details/evidence	Potential health impact	Initial considerations for the design team and further recommendations
			develop a medical research facility that would be linked to the Medical school.	\sim	
Access	s to open space and nature				
3.1	Does the proposal retain and enhance existing open and natural spaces?	Yes	North of New Dafen River the area is likely to remain as green space that is open access. Green space on the south of the site would be via tree planting and creation of green space surrounding the plots.	Positive	It is considered that the proposal would retain and enhance existing open and natural spaces. The design teams should look for ways to maintain connectivity between these areas both with the site and to the surrounding neighbourhoods.
3.2	In areas of deficiency, does the proposal provide new open or natural space, or improve access to existing space?	Yes	The existing site is currently not easily accessible by the public. This will change following construction with areas across the site being publically accessible. A footpath will be included to the north of New Dafen River which will facilitate recreational use of the open space here.	Positive	It is considered that the proposal would provide new open or natural space, or improves access to existing space and therefore no further recommendations are made at this stage.

	Assessment criteria	Relevant?	Details/evidence	Potential health impact	Initial considerations for the design team and further recommendations
3.3	Does the proposal provide a range of play spaces for children and young people?	Yes	Play spaces for children and young people are not evident within the Masterplan at this stage	Neutral	There is space within the development to provide play spaces for children and opportunities for achieving this should be explored.
3.4	Does the proposal provide links between open and natural spaces and the public realm?	Yes	A network of parks and green spaces will thread their way through the new neighbourhood and provide the opportunity for circular walks.	Positive	It is considered that the proposal would provide links between open and natural spaces and the public realm and therefore no further recommendations are made at this stage.
3.5	Are the open and natural spaces welcoming and safe and accessible for all?	Yes	This detail is not yet known although it is expected that the spaces would meet these criteria.	Uncertain	Open and natural spaces that are welcoming, safe and accessible by all should be designed in.
3.6	Does the proposal set out how new open space will be managed and maintained?	Yes	The management of open spaces would need to be addressed as part of a wider estates management strategy for the development.	Positive	This should be agreed prior to the development taking place.

	Assessment criteria	Relevant?	Details/evidence	Potential health impact	Initial considerations for the design team and further recommendations
Air qu	ality, noise and neighbourh	nood amenity	7		
4.1	Does the proposal minimise construction impacts such as dust, noise, vibration and odours?	Yes	Construction impacts would be minimised through the effective implementation of the CEMP.	Neutral	Monitor CEMP measures to ensure that they are effective in mitigating impacts. Put in place effective community liaison and response measures to deal quickly with any non- compliances or adverse impacts.
4.2	Does the proposal minimise air pollution caused by traffic and energy facilities?	Yes	The details of this are not yet known but there will be a requirement for energy use for the buildings and traffic generation.	Uncertain	The proposal should consider how to minimise the impacts of air pollution caused by traffic, e.g. through the promotion of walking and cycling. Consideration for the provision of electric car charging points should be made along with inclusion of suitable bike storage facilities to promote cycling over car use and building design to minimise energy use.

	Assessment criteria	Relevant?	Details/evidence	Potential health impact	Initial considerations for the design team and further recommendations
4.3	Does the proposal minimise noise pollution caused by traffic and commercial uses?	Yes	It is currently not known whether the proposal minimises the impacts of noise pollution caused by traffic and commercial use. This will be explored during the design development. Construction impacts on the noise environment would be minimised through the CEMP.	Uncertain	The proposal should consider how to minimise noise pollution caused by traffic and commercial uses through. This could include measures to reduce traffic (see 4.2). Consideration of where commercial uses are located should be given during design development.
Access	sibility and active travel				
5.1	Does the proposal prioritise and encourage walking (such as through shared spaces)?	Yes	A network of parks and green spaces will thread their way through the new neighbourhood to provide connectivity between buildings. Opportunities would also be provided for circular walks.	Positive	The layout of the development should be designed to encourage residents to walk.
5.2	Does the proposal prioritise and encourage cycling (for example by providing secure cycle	Yes	The detail of this is not yet known	Unknown	The proposal should identify how bike storage/cycle lanes can be included to promote cycling over car use. This would be relevant in

	Assessment criteria	Relevant?	Details/evidence	Potential health impact	Initial considerations for the design team and further recommendations
	parking, showers and cycle lanes)?			\sim	terms of the Wellness Hub and sites that have public access/use.
5.3	Does the proposal connect public realm and internal routes to local and strategic cycle and walking networks?	Yes	Details not yet known	Unknown	The proposal should include appropriate signage to nearby local and strategic cycle/walking networks.
5.4	Does the proposal include traffic management and calming measures to help reduce and minimise road injuries?	Yes	Details not yet known	Unknown	Consider the need for traffic management and calming measures
5.5	Is the proposal well connected to public transport, local services and facilities?	Yes	The details of the proposed provision in not yet know.	Unknown	Consider how to connect the site to the wider area of Llanelli.

	Assessment criteria	Relevant?	Details/evidence	Potential health impact	Initial considerations for the design team and further recommendations				
5.6	Does the proposal seek to reduce car use by reducing car parking provision, supported by the controlled parking zones, car clubs and travel plan measures?	Yes	Details not yet known	Unknown	The proposal should seek to reduce car use from residents, staff and public users.				
5.7	Does the proposal allow people with mobility problems or a disability to access buildings and places?	Yes	The proposals include rehabilitation and assisted living which will require easy access for people with mobility problems or disability to accessing buildings/places.	Positive	Good and inclusive accessibility should be incorporated into the design for people with a range of temporary or permanent mobility impairments.				
Crime	Crime reduction and community safety								

	Assessment criteria	Relevant?	Details/evidence	Potential health impact	Initial considerations for the design team and further recommendations
6.1	Does the proposal incorporate elements to help design out crime?	Yes	Details of this are not yet known.	Unknown	The proposal should incorporate elements to help design out crime such as natural surveillance and active frontage. Consultation should take place with the Crime Prevention Advisor.
6.2	Does the proposal incorporate design techniques to help people feel secure and avoid creating 'gated communities'?	Yes	The existing Masterplan appears to facilitate community interaction - e.g. pathways between buildings provide opportunities for pocket parks which provide safe informal play and help with community interaction.	Positive	Details of the design should make sure that these features are embedded.
6.3	Does the proposal include attractive, multi-use public spaces and buildings?	Yes	The Wellness Hub is planned to be the heart of LWLV and the gateway for all visitors. It is planned to include a reception facility for all Village services and a number of services including a leisure centre, hotel, café, shop, crèche, pharmacy and meeting areas.	Positive	Any buildings open to the public should be fully accessible for all such as the disabled.

	Assessment criteria	Relevant?	Details/evidence	Potential health impact	Initial considerations for the design team and further recommendations			
6.4	Has engagement and consultation been carried out with the local community?	Yes	Engagement has not yet been carried out with the local community.	Positive	Refer to Section 9 for other engagement recommendations.			
Access	Access to healthy food							
7.1	Does the proposal facilitate the supply of local food, i.e. allotments, community farms and farmers' markets?	Yes	No provision has been made to facilitate the supply of local food.	Neutral	Due to issues related to site history, it is unlikely that allotments would be recommended on the land.			
7.2	Is there a range of retail uses, including food stores and smaller affordable shops for social enterprises?	Yes	There doesn't appear to be any provision for food stores and smaller affordable shops for social enterprises.	Negative	Opportunities should be sought to include provision of food stores that are affordable and also for space for social enterprises.			

	Assessment criteria	Relevant?	Details/evidence	Potential health impact	Initial considerations for the design team and further recommendations
7.3	Does the proposal avoid contributing towards an over-concentration of hot food takeaways in the local area?	No	The development does not have provision for hot fast food takeaways.	Neutral	The proposal avoids contributing towards an over-concentration of hot food takeaways in the local area and no further recommendations are made at this stage.
Access	s to work and training				
8.1	Does the proposal provide access to local employment and training opportunities, including temporary construction and permanent 'end-use' jobs?	Yes	Temporary job provision during the construction phase and during the operation phase due to all the services that would be provided. The Hub would house the main conference and other meeting spaces to support the wider village and which could also be used for educational and training events. The Health and Well-being Academy and Institute of Life Sciences that is proposed would include research and development opportunities.	Positive	Consider opportunities to source local employment during construction and operation through promotion of jobs in local job centres and schools/colleges. Include apprentice and volunteering schemes.

	Assessment criteria	Relevant?	Details/evidence	Potential health impact	Initial considerations for the design team and further recommendations				
8.2	Does the proposal provide childcare facilities?	Yes	Within the Hub it is proposed to include crèche facilities.	Positive	Consider what level of service this would provide, e.g. for people using the leisure centre, staff or for use more widely by the community?				
8.3	Does the proposal include managed and affordable workspace for local businesses?	No	The proposal aims to provide health related services and research facility opportunities and therefore general business workspace is not relevant.	Neutral	N/A				
8.4	Does the proposal include opportunities for work for local people via local procurement arrangements?	Yes	This level of detail is not yet known	Unknown	Local employment and the use of local suppliers during construction and operation should be promoted.				
Social	Social cohesion and lifetime neighbourhoods								
9.1	Does the proposal connect with existing communities, i.e. layout and movement which avoids physical barriers and severance and land	Yes	The site itself is severed from the wider community as a result of the B4304 and Northumberland Road	Positive	The building design process should aim for connection and careful integration with existing communities as far as this is possible given the existing constraints (from road network).				

	Assessment criteria	Relevant?	Details/evidence	Potential health impact	Initial considerations for the design team and further recommendations
	uses and spaces which encourage social interaction?			$\sum_{i=1}^{n}$	
9.2	Does the proposal include a mix of uses and a range of community facilities?	Yes	LWLV includes a range of uses including the Wellness Hub (which includes a ranges of services such as leisure centre, café, crèche), Neuro Village (a set of services for caring for people with special needs), Health & wellbeing Academy and Institute of Life Sciences (academy to establish facilities that support research, innovation, development and education), Primary Care Centre (flexible space providing GP services, point of care testing, dental services, audiology, optometry and possibly day surgery and assisted living.	Positive	It is considered that the proposed schemes will include a mix of uses and a range of community facilities and no further recommendations are made at this stage.
9.3	Does the proposal provide opportunities for the	Yes	The details of this are not yet know but it is likely that the healthcare provision will provide opportunities for voluntary and community sectors	Positive	Consider using public art to foster community capital and enhance the public realm.

	Assessment criteria	Relevant?	Details/evidence	Potential health impact	Initial considerations for the design team and further recommendations	
	voluntary and community sectors?		e.g. assisted living support, working with Wellbeing Hub	$\langle \rangle$	Involve the community, particularly children in planting. Opportunities for the scheme sponsor to be a charity or a trust.	
9.4	Does the proposal address the principles of Lifetime Neighbourhoods?	Yes	It is not yet known whether the proposals address the principles of Lifetime Neighbourhoods.	Positive	The Lifetimes Homes Standards should be followed.	
Minimising the use of resources						
10.1	Does the proposal make best use of existing land?	Yes	The development site is on brownfield land which would be improved through the proposals, in particular through any remediation works that would be required.	Positive	It is considered that the proposal makes best use of existing land and no further recommendations are made at this stage.	
10.2	Does the proposal encourage recycling (including building materials)?	Yes	These details are not yet known	Unknown	The design should encourage recycling including building materials	

	Assessment criteria	Relevant?	Details/evidence	Potential health impact	Initial considerations for the design team and further recommendations	
10.3	Does the proposal incorporate sustainable design and construction techniques?	Yes	The details of this are not yet known	Unknown	Design team should include local sourcing, embodied energy and waste minimisation in appraisal of construction materials.	
					The sourcing and transport of trees and planting should, where possible, minimise travel distance and consider sustainability credentials of source.	
Climate change						
11.1	Does the proposal incorporate renewable energy?	Yes	The energy strategy for the site is not yet known but is likely to include an element of renewable energy either sourced onsite or from a renewable source.	Positive	LWLV proposal should incorporate energy efficiency measures in all buildings and renewable energy measures such as PV panels on roofs or biomass boilers.	
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	Assessment criteria	Relevant?	Details/evidence	Potential health impact	Initial considerations for the design team and further recommendations
11.2	Does the proposal ensure that buildings and public spaces are designed to winter and summer temperatures, i.e. ventilation, shading and landscaping?	Yes	The details of this are not yet known	Unknown	All new buildings should be built in accordance with the 'fabric first' approach, meeting the requisite Fabric Energy Efficiency Standards (FEES) under Building Regulations part L1A. A range of options are available to meet the FEES, including high U-values for walls, windows, doors etc. through to thermal bridging and air permeability.
11.3	Does the proposal maintain or enhance biodiversity?	Yes	 Details of this are not yet known although it is likely that measures will be incorporated in to the Proposed Developed to ensure that the site is enhanced for biodiversity, where possible. Such measures may include: Habitats associated with grassland hedgerows and trees to be actively managed during the operational phase to benefit biodiversity; Provision of additional bat roost opportunities; 	Positive	Planting choices/landscaping proposals should create an attractive spaces for communities to enjoy. Create natural spaces for educational purposes e.g. bat and bird boxes, or bug homes/inset boxes etc. Avoid plants with poisonous berries that may create health hazards for small children.

	Assessment criteria	Relevant?	Details/evidence	Potential health impact	Initial considerations for the design team and further recommendations
			 Newly created habitat will include native shrub and tree planting and communal areas will be managed to benefit biodiversity, providing additional suitable habitat for nesting birds 		>
11.4	Does the proposal incorporate urban drainage techniques?	Yes	No details are currently available.	Unknown	Consideration should be given to a rainwater harvesting strategy which could be implemented across the site at either individual household or communal levels, potentially accompanied by some grey water recycling. Review should be made on potential for water attenuation with green roofs, permeable surfacing and a fully integrated SUDs system.