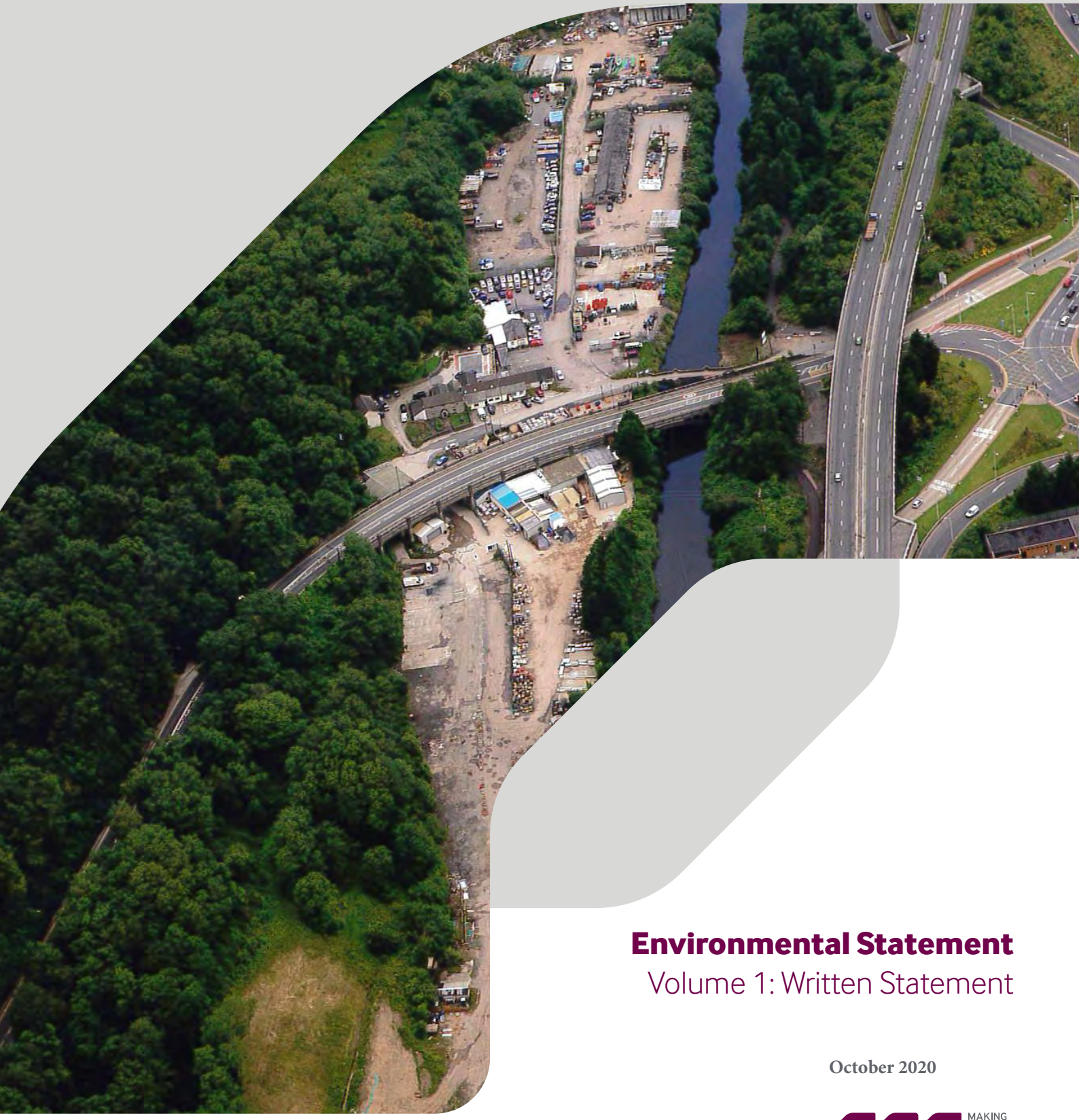
Leckwith Quays

Leckwith Road, Cardiff



Environmental Statement

Volume 1: Written Statement

October 2020

MAKING COMPLEX EASY

rpsgroup.com

Mr Phil Worthing

Leckwith Quays, Leckwith Road, Cardiff
Environmental Statement

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Chapter 1: Introduction

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1 INTRODUCTION

1.1 Preamble

1.1.1 This Environmental Statement (ES) has been prepared on behalf of Mr Phil Worthing (the Applicant) in support of a hybrid planning application for the residential development of up to 250 dwellings (to be submitted in outline) with associated highway and bridge improvement works (to be submitted in full), on land at Leckwith Quays, Leckwith Road.

1.1.2 The ES has been prepared in accordance with the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017.

1.1.3 In recognition of the cross-boundary nature of the application proposals, an identical copy of the ES is being submitted to both the Vale of Glamorgan Council and Cardiff Council.

1.2 Legislative Framework

1.2.1 Environmental Impact Assessment (EIA) is the process of compiling, evaluating and presenting all likely significant environmental effects of a proposed development and ensures such effects are fully understood. The purpose of an EIA is to provide the local planning authority, when determining a planning application, with sufficient information to allow it to properly assess the environmental effects of a scheme.

1.2.2 The assessment process is designed to help produce an environmentally sensitive scheme. Detection of potentially significant adverse environmental impacts will enable appropriate mitigation measures to be built into the design at an early stage.

1.2.3 The legislative background for EIA originated with the European Community Directive on 'The Assessment of the Effects of Certain Public and Private Projects on the Environment' (85/337/EEC) as amended by Directive 97/11/EC. These directives are implemented for the purpose of determining planning applications via the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 which came into force on 16th May 2017.

1.2.4 The above Regulations establish the criteria which determine whether EIA is necessary or not and identify the nature and scale of the projects and their applicability to be determined as Schedule 1 or Schedule 2 projects. Schedule 1 projects require EIA in every case. Schedule 2 projects may or may not require EIA dependent on whether the project in question is likely to give rise to significant environmental effects by virtue of factors such as nature, size or location.

1.2.5 Paragraph 33 of Circular 11/99 'Environmental Impact Assessment' identifies three main types of cases where EIA will be needed for Schedule 2 developments: a) for major developments, which are of more than local importance; b) for developments which are proposed for particularly environmentally sensitive or vulnerable locations; and c) for developments with unusually complex and potentially hazardous environmental effects.

1.2.6 Schedule 3 of the 2017 Regulations also sets out criteria which must be taken into account in determining whether a scheme is likely to have significant effects relating to the characteristics of the development which include:

a) the size and design of the whole development;

b) cumulation with other existing development and/or approved projects;

c) the use of natural resources in particular land, soil, water and biodiversity;

d) the production of waste;

e) pollution and nuisances;

f) the risk of major accidents and/or disasters which are relevant to the project concerned, including those caused by climate change, in accordance with scientific knowledge;

g) the risks to human health (for example due to water contamination or air pollution).

1.3 Screening and Scoping Opinion

1.3.1 A formal Scoping Opinion Request was submitted to both the Vale of Glamorgan and Cardiff Council's as the Local Planning Authorities on 31st October 2019.

1.3.2 The Scoping Opinion from the Vale of Glamorgan Council was issued on 5th December 2019 (ref: P/DC/2019/01198/SC2). Cardiff Council issued their Scoping Opinion on 31st January 2020 (ref: SC 19/00016/MJR). All these matters have been duly considered and addressed in this ES. A copy of the LPA's Scoping Opinions are included at **Appendix 1.1**.

1.4 Structure of the Statement

1.4.1 The ES consists of three documents:

- Main text (this document) providing a description of the scheme and results of the assessments subdivided by topic.
- Figures and Appendices containing technical data to support the text.
- A Non-Technical Summary (NTS) providing a brief description of the scheme and a broad summary in layman's terms of the significant issues and impacts likely to arise, along with proposals for mitigation measures.

1.4.2 This document is divided into the following chapters:

1. Introduction
2. Site Description and Project Proposals
3. Planning Policy Context
4. Highways and Transportation
5. Ecology
6. Landscape and Visual Character
7. Flooding and Hydrology
8. Ground Conditions
9. Archaeology and Built Heritage
10. Noise and Vibration
11. Air Quality

1.5 The Assessment Team

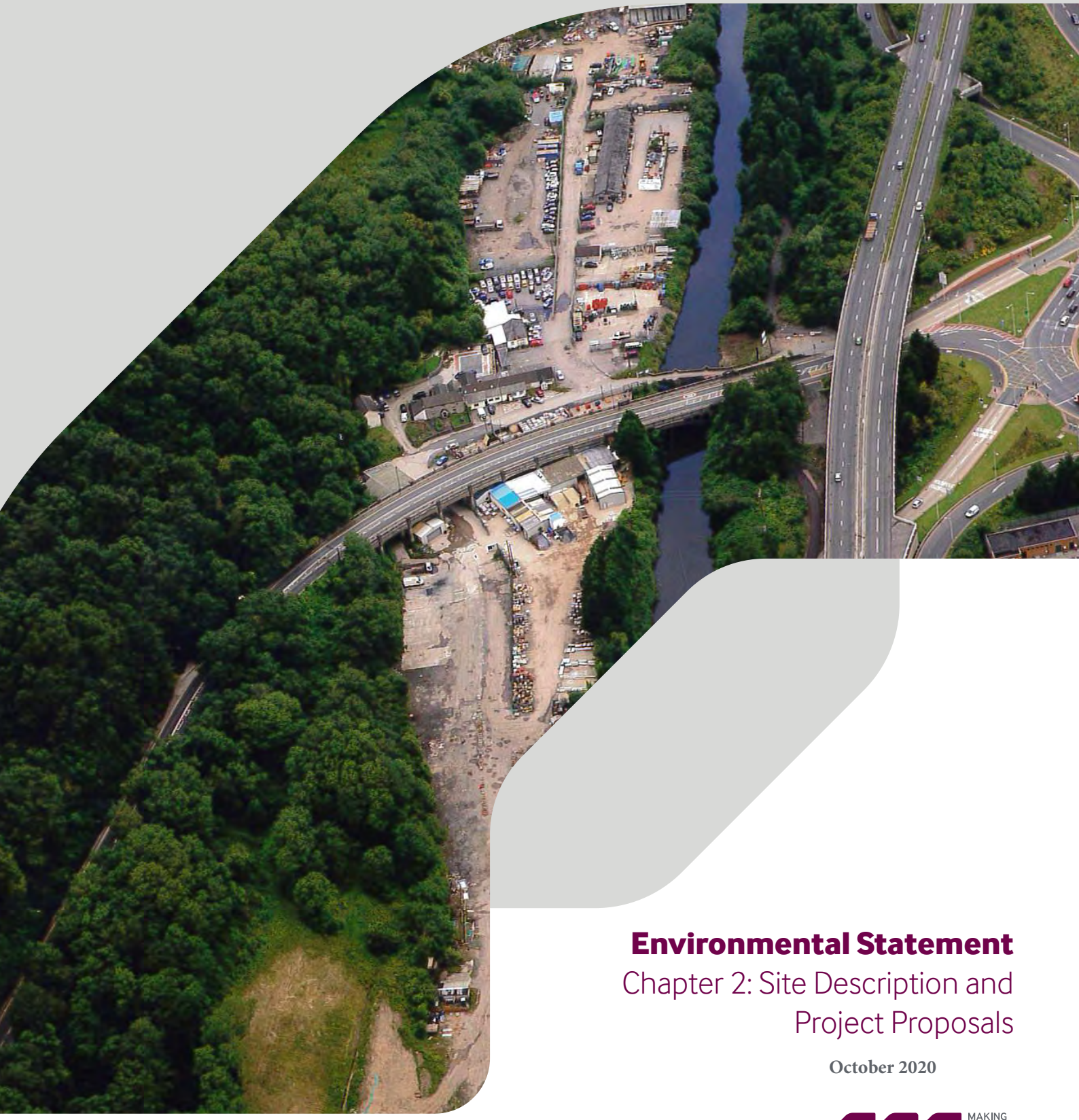
1.5.1 The EIA has been managed by RPS, taking into account information provided by the Applicant and design team. The authors of this ES are set out in **Table 1.1** below.

Table 1.1 Assessment Team

ES Chapter	Main Author/Contributor
ES Chapters 1 – 3	RPS
ES Chapter 4	AECOM
ES Chapter 5	David Clements Ecology
ES Chapter 6	Novell Tullett
ES Chapter 7	WSP
ES Chapter 8	WSP
ES Chapter 9	GGAT
ES Chapter 10	Mach Acoustics
ES Chapter 11	WSP

Leckwith Quays

Leckwith Road, Cardiff



Environmental Statement

Chapter 2: Site Description and Project Proposals

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2 SITE DESCRIPTION AND DEVELOPMENT PROPOSALS

2.1 Site Description

2.1.1 The application site extends to 8.96ha and straddles the border between the administrative boundaries of the Vale of Glamorgan (to the west) and Cardiff (to the east). The land is known as Leckwith Yard/Works. It is located to the west of the River Ely and is contained within the Vale of Glamorgan. It is accessed off the B4267 Leckwith Road via the 'Old Leckwith Bridge' which is a Grade II* listed building and Scheduled Ancient Monument. This access also serves the Ely Trail which is, primarily, an off-road walking/cycling route. The Leckwith Road Viaduct rises and continues to run above and across the site continuing up towards Llandough. A site location plan is included at **Figure 2.1**.

2.1.2 The site is made up of two plateaux either side of the bridge which are both largely cleared and levelled. The land is currently used for commercial and industrial uses comprising a number of buildings and hard standing areas, all of which are to be demolished as part of the development proposals.

2.1.3 The site is located adjacent to the River Ely and the Grangetown-Ely Link Road which runs along the north-eastern boundary of the site. To the south and west large areas of woodland, comprising Leckwith Wood and Factory Woods, border the site.

2.1.4 The site is currently located outside the defined settlement limits of both Cardiff and the Vale of Glamorgan and is therefore considered in planning policy terms to be located within the countryside. However, the site is located in very close proximity to Cardiff's Capital Retail Park and other existing commercial, industrial and sporting uses.

2.1.5 As outlined above, the 'Old Leckwith Bridge' is located within the site and is designated as a Grade II* listed building and Scheduled Ancient Monument. Whist the site does not have any international or national biodiversity designations the Leckwith Woods, Factory Woods and the River Ely are all designated locally as a Site of Importance for Nature Conservation (SINC). The site is also located within the Cwrt-yr-Ala Basin Special Landscape Area (SLA), a mineral safeguarding area (limestone) and it lies within Flood Zone C1 as shown on the relevant Development Advice Map of the Welsh Government's Technical Advice Note No15, Flood Risk. It is therefore formally recorded as being "served by significant infrastructure including flood defences".

2.1.6 The site is also located within a Health and Safety Executive Consultation Zone and the implications thereof will be addressed within the ES.

2.2 The Development Proposals

2.2.1 The proposals seek to redevelop the existing brownfield site for residential uses (up to 250 units) comprising a mix of houses and apartments with associated public open space, landscaping and parking areas. The proposals include the realignment of the existing B4267 Leckwith Road link and a new bridge crossing of the River Ely. The existing B4267 runs through the site on a viaduct which is in a very poor state of repair. The new road alignment has been arranged to allow the existing road to remain open during its construction. The new bridge has been positioned immediately upstream of the existing, listed, masonry bridge which is to be retained to allow pedestrian and cyclist access to the site.

2.2.2 It is currently proposed that the development is split into two parcels on either side of the proposed new bridge crossing - referred to as the northern (1.3 ha) plateau and the southern plateau (6.4 ha). The northern area will deliver a residential development of up to 80 dwellings,

whilst the southern plateau will deliver circa 170 dwellings. A new signalised four arm junction is proposed to allow access to each development parcel. The site extends along approximately 890m of the Ely riverbank on the Vale of Glamorgan side.

2.2.3 The development proposals are cross boundary in that the residential element of the proposed development lies solely within the administrative boundary of the Vale of Glamorgan whilst some of the highway works fall within the administrative boundary of Cardiff and the jurisdiction of Cardiff Council.

2.2.4 A series of parameter plans which illustrate the proposed development relating to land use, building heights and movement and access are included at **Figure 2.2, 2.3 and 2.4**. These will form the framework for the future development of the site which will be submitted as "reserved matters". The parameter plans illustrate, in particular, a proposed 'worse-case scenario' in order to ensure that potential environmental impacts are adequately assessed and to allow the proposed scheme maximum flexibility.

2.2.5 An Indicative Concept Masterplan is also included at **Figure 2.5** and illustrates the following:

- Approximate position of development blocks and uses;
- Realignment of the existing B4267 Leckwith Road Bridge;
- Access points and internal road layout;
- Pedestrian and cycle links;
- Landscaping and open space areas; and
- Drainage features including attenuation areas.

2.3 Aims and Objectives of the Development Proposal

2.3.1 The proposal at Leckwith Quay seeks to develop an unsightly brownfield site into a distinctive, sustainable and attractive place to live. It will provide up to 250 dwellings of varying typologies, with a new road to replace the part of the B4267 that runs through the site.

2.3.2 A key aim of the development proposals is to fund the replacement of the existing B4267 Leckwith Road which is in a critical state of disrepair and in need of urgent repair or redevelopment. Without such repair or replacement, it is likely that the bridge will have to be closed to traffic thereby rendering the B4267 inaccessible from the east.

2.3.3 The proposed development seeks to reflect the transition from urban Cardiff to the rural Vale. The development responds to its unique location, positioned between the river to the east and the woodland hillside to the west with a series of wooded corridors running between these two elements, helping to divide the site into 3 distinct character areas.

2.3.4 Leckwith Quay will become a place of unique character, where people can take a walk along the riverside and through the ancient woodland on the same journey.

2.3.5 The proposed development seeks to provide legible and well-connected routes for pedestrians and cyclists, with direct links on to the Ely trail leading to Cardiff Bay, thus promoting sustainable active travel.

2.3.6 The development seeks to provide a robust strategy to protect, maintain and enhance habitat and promote biodiversity whilst also enhancing the built heritage assets of the Vale and enhancing the special landscape area.

2.4 Alternatives

2.4.1 The application site represents an under-utilised brownfield site. The owner does not have control of other land in the vicinity and there is therefore no alternative available to the

redevelopment of this site. The redevelopment scheme also includes the replacement of the existing B4267 Leckwith Road which is in a critical state of disrepair and in need of urgent repair or redevelopment. Without such repair or replacement, it is likely that the bridge will have to be closed to traffic thereby rendering the B4267 inaccessible from the east. There are in effect no realistic alternative routes that will address this urgent issue.

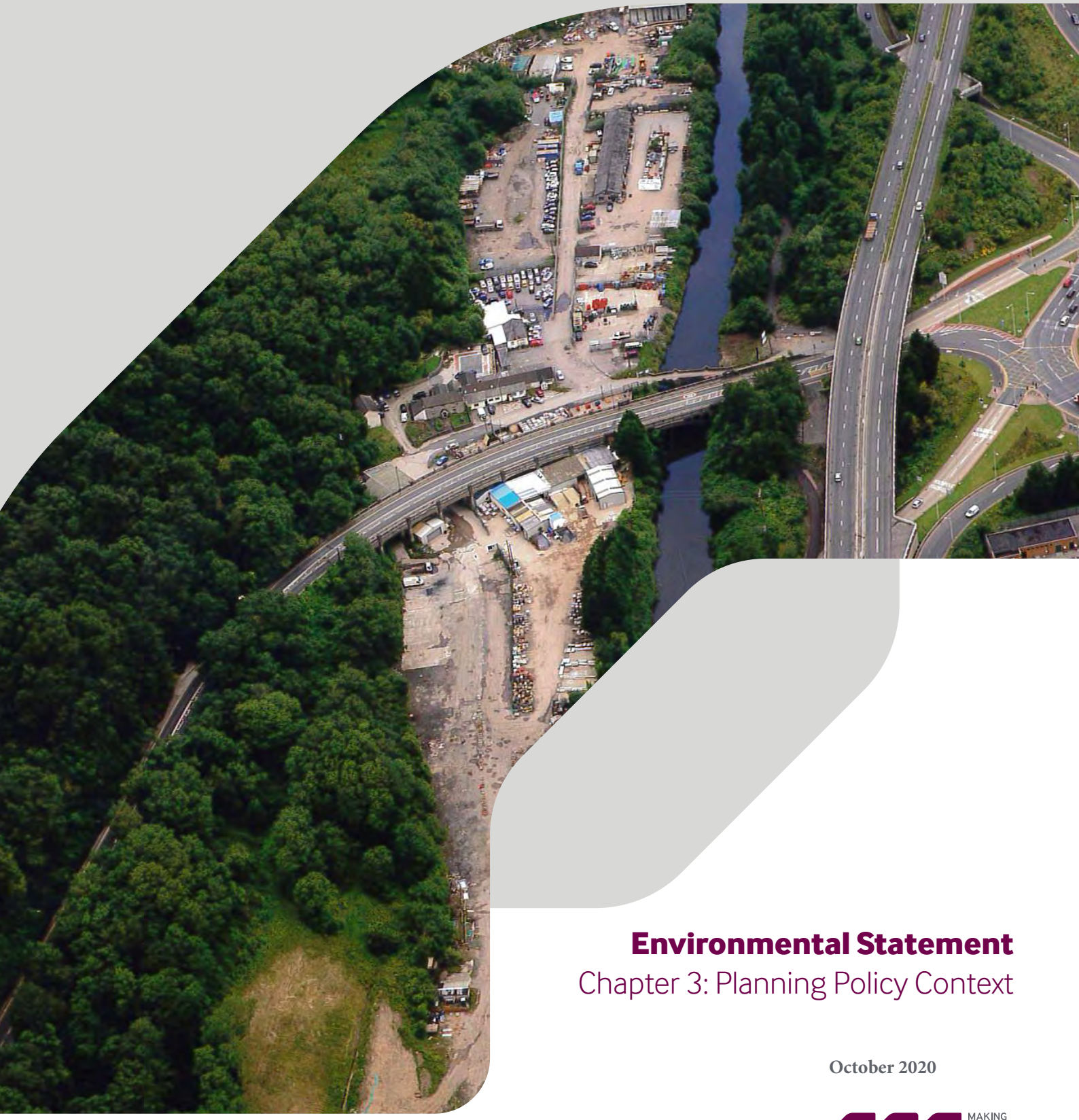
2.4.2 The design proposals for the development have evolved over time and have been informed by pre-application discussions with both Council's; and have not assessed alternative sites because of the urgent need to effect repairs to the alignment of the B4267 at this location. They have also been the subject of a variety of technical assessments and surveys. The route and new bridge configuration presented in this application is regarded as the most beneficial and efficient option available and, of course, is a scheme that is proposed as a part of the development thereby removing the need for it to be funded directly through the public purse.

2.4.3 Due to the size and shape of the site and its associated heritage, ecological, landscape and waterscape constraints the distribution of land uses has broadly remained the same throughout the design evolutionary period. The design has been landscape-led and seeks to make the most efficient use of the land whilst respecting its character and identified features, constraints and opportunities.

2.4.4 Given that a key part of the development project is to fund the replacement of the existing B4267, therefore, there are no other reasonable alternative locations within which to locate the development proposals whilst at the same time providing the necessary redevelopment of the bridge.

Leckwith Quays

Leckwith Road, Cardiff



Environmental Statement

Chapter 3: Planning Policy Context

October 2020

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3 PLANNING POLICY CONTEXT

3.1 Introduction

3.1.1 This chapter sets out the planning policy and legislative context against which the development proposal will be considered. It provides a broad overview of the context relating to the development proposal, with more topic specific policy and legislation being referred to in individual chapters as necessary.

3.1.2 An analysis of the development proposal having regard to the planning policy and legislative context is provided in the Planning Report that accompanies the application.

3.2 National Legislation and Policy

Well-being of Future Generations Act 2015

3.2.1 The Well-being of Future Generations (Wales) Act 2015 places a duty on public bodies to place the principles of sustainability and sustainable development at the heart of its decision-making processes. The objectives of the Act are as follows:

"A Prosperous Wales

- *Promoting resource-efficient and climate change resilient settlement patterns which minimise land take and urban sprawl, especially through the reuse of suitable previously developed land and buildings, wherever possible avoiding development on greenfield sites;*
- *Play an appropriate role to facilitate sustainable building standards;*
- *Play an appropriate role in securing the provision of infrastructure to form the physical basis for sustainable communities;*
- *Support initiative and innovation and avoid placing unnecessary burdens on enterprises so as to enhance the economic success of both urban and rural areas, helping businesses to maximise their competitiveness;*

A Resilient Wales

- *Contributing to the protection and improvement of the environment, so as to improve the quality of life, and protect local and global ecosystems;*

A Healthier Wales

- *Contribute to the protection and, where possible, the improvement of people's health and well-being as a core component of achieving the well-being goals and responding to climate change;*

A More Equal Wales

- *Promoting access to, inter alia, employment, shopping, education and community facilities and open and green space, maximising opportunities for community development and social welfare;*
- *Promote quality, lasting, environmentally-sound and flexible employment opportunities;*
- *Respect and encourage diversity in the local economy;*

A Wales of Cohesive Communities

- *Locating development so as to minimise the demand for travel, especially by private car;*

- *Fostering improvement to transport facilities and services which maintain or improve accessibility to services and facilities, secure employment, economic and environmental objectives, and improve safety and amenity;*
- *Fostering social inclusion by ensuring that full advantage is taken of the opportunities to secure a more accessible environment for everyone that the development of land and buildings provides. This includes helping to ensure that the development is accessible by means other than the private car;*

A Wales of Vibrant Culture and Thriving Welsh Language

- *Helping to ensure the conservation of the historic environment and cultural heritage;*
- *Positively contribute to the well-being of the Welsh language;*

A Globally Responsive Wales

- *Support the need to tackle the causes of climate change by moving towards a low carbon economy.*"

Planning Policy Wales Edition 10 (December 2018)

3.2.2 Planning Policy Wales ("PPW") was revised in 2018 to take account of the Well-Being of Future Generations (Wales) Act 2015. Figure 3 of PPW identifies five key planning principles aimed at 'achieving the right development in the right place' as follows:

- Growing our economy in a sustainable manner;
- Making better use of resources;
- Facilitating accessible and healthy environments;
- Creating and sustaining communities; and
- Maximising environmental protection and limiting environmental impact.

3.2.3 "Placemaking" now forms the core of PPW10 and must be embraced in development management decisions to achieve the creation of sustainable places. PPW10 explains that planning decisions must seek to support the well-being of people and communities across Wales. Planning applications such as this one are delivering development in established places. The key factor for the applicant and the decision maker in this respect, therefore, is the ability of this development to contribute to achieving what is regarded as 'a sustainable place'.

3.2.4 PPW10 specifies that: 'Good placemaking is therefore essential to the delivery of sustainable development and achieving improvements in the well-being of communities'. Integration is a fundamental component to ensure the right development is in the right place.

3.2.5 Figure 6 of PPW sets out how development proposals should be assessed. Stage 1 should assess the proposal against the "Strategic and Spatial Choices". Stage 2 should assess the detailed impact and contribution the proposal will make to "Active and Social Places", "Productive and Enterprising Places" and " Distinctive and Natural Places". PPW is clear that the considerations within each of the themes will vary on a case by case basis, depending on the proposal concerned but, that the merits or otherwise of a proposal need to be considered in the public interest. Approaching a proposal in this manner should result in a proposal that contributes to the sustaining of or creation of sustainable places, thereby delivering on the national sustainable placemaking outcomes.

Plan Led System and Housing Land Supply

3.2.6 The plan-led system underpins the delivery of sustainable places. PPW10 outlines in paragraph 1.17 that a plan-led approach is the most effective way to secure sustainable development… Legislation secures a presumption in favour of sustainable development in accordance with the

development plan unless material considerations indicate otherwise to ensure that social, economic, cultural and environmental issues are balanced and integrated.

Sustainable Development

3.2.7 PPW outlines the Welsh Government's duty under the Well-being of Future Generations (Wales Act) 2015 (WBFGA 2015) to deliver sustainable development: "Sustainable Development" means the process of improving the economic, social, environmental and cultural well-being of Wales by taking action, in accordance with the sustainable development principle, aimed at achieving the well-being goals (PPW page 9).

3.2.8 Sustainable development has been at the core of planning policy since PPW was first published in 2002. Some 16 years on the principles of sustainability and sustainable development, at the heart of decision-making process, are set out at paras 2.21 and 2.22.

3.2.9 Paragraph 4.7.4 of PPW10 advises that local planning authorities should assess the extent to which their development plan settlement strategies and new development are consistent with minimising the need to travel and increasing accessibility by modes other than the private car. PPW suggests that a broad balance between housing and employment opportunities in both urban and rural areas should be promoted to minimise the need for long distance commuting. Local authorities should adopt policies to locate major generators of travel demand such as housing, employment, retailing, leisure and recreation, and community facilities including libraries, schools and hospitals within existing urban areas or in other locations which are, or can be, reached by walking or cycling, or which are or can be well served by public transport.

Other relevant policies in PPW include:

3.2.10 Chapter 3 "Strategic and Spatial Choices" is centred on good design and its fundamental contribution to creating sustainable places where people want to live and work. Good design should consider the following: Environmental Sustainability, Movement, Access, Character and Community Safety.

3.2.11 Chapter 4 covers the theme of "Active and Social Places". A key issue for this theme is ensuring there is sufficient housing land available to meet the need for new private market and affordable housing.

3.2.12 Paragraph 4.1.51 advises that parking provision should be informed by the local context, including public transport accessibility, urban design principles and the objective of reducing reliance on the private car and supporting a modal shift to walking. Furthermore, paragraph 4.1.51 stipulates planning authorities must support schemes which keep parking levels down, especially off-street parking.

3.2.13 Paragraph 4.2 requires planning authorities to understand all aspects of the housing market in their areas including the requirement, supply and delivery of housing.

3.2.14 Chapter 5 (Productive and Enterprising Place) deals with a, amongst other themes, making best use of material resources and promoting the circular economy. Placemaking embraces the inter-relationships between the built and natural environment. Choices about the use of material resources should be based on making the most appropriate and sustainable use of finite resources and promoting the principals of a circular economy.

3.2.15 Chapter 6 (Distinctive & Natural Places) states that non-statutory designations, such as Special Landscape Areas or Sites of Importance for Nature Conservation, should be soundly based on a formal scientific assessment of the nature conservation, landscape or geological value of the site. It confirms that non-statutory designations carry less weight than statutory designations although they should be given adequate protection in the development management process. It is stated, however, that such designations should not unduly restrict acceptable development.

3.2.16 PPW states that Planning authorities should ensure that development minimises impact and provides opportunities for enhancement within areas identified as important for the ability of species to adapt and/or to move to more suitable habitats.

3.2.17 PPW states that the sustainable transport hierarchy (figure 8 page 48) must be a key principle when considering and determining planning applications. When determining a planning application for development that has transport implications, local planning authorities should take into account the provisions of the Active Travel (Wales) Act 2013.

Technical Advice Note 1: Joint Housing Land Availability Studies (2015)

3.2.18 The Welsh Government's revised and updated TAN 1 was adopted in January 2015. The TAN seeks to align the housing land supply and LDP monitoring processes and forms part of the Welsh Government's wider proposals to improve local delivery of the planning system as set out in its consultation paper 'Positive Planning'.

3.2.19 The TAN outlines, at paragraph 2.1, that *'The requirement to maintain a 5-year supply of readily developable housing land in each LPA across Wales remains a key planning policy requirement of the Welsh Government' and that 'The planning system, through the LDP process, must provide the land that is needed to allow for new home building and LPAs are required to ensure that sufficient land is genuinely available to provide a 5-year supply of land for housing'*.

3.2.20 Paragraph 3.4 of the TAN confirms that where an *'…AMR identifies a shortfall in the 5-year housing land supply, as required by PPW, the LPA should consider revising or reviewing the LDP either in whole or in part'*.

3.2.21 In addition, paragraph 6.2, further confirms that *'The housing land supply figure should also be treated as a material consideration in determining planning applications for housing. Where the current study shows a land supply below the 5-year requirement, the need to increase supply should be given considerable weight when dealing with planning applications provided that the development would otherwise comply with development plan and national planning policies'.*

3.2.22 On the 18th July 2018 the Cabinet Secretary for Energy, Planning and Rural Affairs however wrote to the Local Planning Authorities in Wales to confirm the immediate suspension of Paragraph 6.2 of TAN 1. Welsh Government has since followed this in October 2019 with the publication of a consultation paper entitled: 'Delivery of housing through the planning system: Revisions to Planning Policy Wales and associated advice and guidance'. The documents key proposals were to (1) To remove the requirement in Planning Policy Wales for local planning authorities to provide a five-year supply of land for housing; (2) to consequently revoke Technical Advice Note 1 (TAN1) in its entirety; and (3) to replace the monitoring of housing land supply by the monitoring of housing delivery based on the Local Development Plan (LDP) housing trajectory, to be reported through the Annual Monitoring Report (AMR).

3.2.23 As such, therefore, although matters changed in July 2018 the letter of 18th July 2018 confirms that Local Planning Authorities are still required to acknowledge any shortfall in the Housing Land Supply below the 5-year target and then to make their own determination on the weight which should be afforded to such a shortfall in the decision-making process until such a time TAN1 is revoked.

Technical Advice Note 5: Nature Conservation and Planning (2009)

3.2.24 Technical Advice Note (TAN) 5 provides advice about how the land use planning system should contribute to protecting and enhancing biodiversity and geological conservation. The TAN provides advice for local planning authorities on:

- The key principles of positive planning for nature conservation;
- Nature conservation and Local Development Plans;
- Nature conservation in development management procedures;

- Development affecting protected internationally and nationally designated sites and habitats; and
- Development affecting protected and priority habitats and species.

Technical Advice Note 11: Noise (1997)

3.2.25 Guidance on noise relating to planning for new developments in Wales is given in TAN 11. The TAN specifically seeks to ensure than noise generating development does not cause an unacceptable degree of disturbance on existing uses, and that noise-sensitive development is not located in areas which are, or are expected to become, subject to unacceptably high levels of noise.

Technical Advice Note 12: Design (2016)

3.2.26 Technical Advice Note (TAN) 12 promotes a collaborative, creative, inclusive, innovative and holistic approach to design and the use of design briefs is advocated as a route to good design.

3.2.27 Section 5.12 is concerned with the design of employment and commercial areas. Paragraph 5.12.1 stipulates the design of employment areas is important as high quality design can add value to commercial property, support the image of modern businesses and encourage further investment.

3.2.28 Paragraph 5.12.3 makes it clear that where employment premises are grouped together, a sufficient scale of planting and earth forms is essential, to absorb the bulk of the building, ancillary circulation and parking areas. It states that mixed employment uses would improve the feasibility and viability of such schemes and care should be taken to avoid the creation of insular estates. Furthermore, efforts should be made to present a positive, outward looking image by ensuring key buildings in the development front onto road and help improve connectivity.

Technical Advice Note 15: Development and Flood Risk (2004)

3.2.29 This TAN provides guidance in relation to development and flooding providing advice on matters including the use of development advice maps to determine flood risk issues, how to assess the flooding consequences of proposed development and action that can be taken through development plans and development control (management) procedures to mitigate flood risk when planning for new development.

3.2.30 In October 2019 the Welsh Government published a consultation on a revised and updated TAN15 which seeks to

- replace the development advice map with a new Wales flood map;
- place a greater emphasis on the development plan and the value of strategic flood consequences assessments;
- integrate guidance on coastal erosion with flood risk issues in TAN 15; and
- provide guidance for regeneration initiatives affecting communities in flood risk areas;

3.2.31 Following the consultation period, it is understood that an updated TAN will be published in due course. It is important to note, though, that at the date of producing this ES a revised TAN has not been published and for now, therefore, it is the original TAN15 published in 2004 that prevails.

Technical Advice Note 18: Transport (2007)

3.2.32 Technical Advice Note (TAN) 18 highlights the role that integrating land use planning and development of transport infrastructure can play in addressing the environmental aspects of sustainable development. Paragraph 2.3 sets out how integration can help Welsh Government achieve wider sustainable development policy objectives through a number of measures:

- Ensuring new development is located where there is, or will be, good access by public transport, walking and cycling, to minimise the need for travel;
- Managing parking provision – using maximum car parking standards as a form of demand management;
- Encouraging the location of development near other related uses to encourage multi-purpose trips;
- Promoting cycling and walking; and
- Supporting the provision of high quality, inclusive public transport.

3.2.33 Section 7 of TAN 18 is concerned with public transport. Paragraph 7.1 acknowledges that new and improved public transport provision has the potential to provide alternatives to private vehicle use and to change existing travel demands. It states further that where enhanced public transport services or infrastructure is necessary to serve new development, but provision on a commercial basis is not viable, a developer contribution may be appropriate.

3.2.34 Paragraph 8.12 stipulates development which attracts substantial movements of freight, including large scale warehousing and distribution, should be located away from congested inner areas and residential neighbourhoods.

3.2.35 Paragraph 8.19 states that development plans should consider the contribution air traffic makes to the Welsh economy and also consider the benefits of having suitable ancillary or dependent facilities, although this should be balanced against the environmental impact on surrounding areas in terms of road and rail access, traffic and noise generation or floodplain protection.

3.2.36 Paragraph 8.20 states further that in determining planning applications planning authorities need to give careful consideration to the extent to which proposed development is related to the operation of the airport and is sustainable given the existing and planned levels of public transport.

3.2.37 Paragraph 9.2 requires developers to submit a Transport Assessment with any planning applications that are likely to result in significant trip generation. Early engagement with the relevant local highway authority is encouraged.

Technical Advice Note 24: The Historic Environment (2017)

3.2.38 Technical Advice Note (TAN) 24 sets out conservation principles to assess the potential impacts of a development proposal on the significance of any historic asset(s) and to assist in the decision making where the historic environment is affected. The six principles are as follows:

- Historic assets will be managed to sustain their values;
- Understanding the significance of historic assets is vital;
- The historic environment is a shared resource;
- Everyone will be able to participate in sustaining the historic environment;
- Decisions about change must be reasonable, transparent and consistent;
- Documenting and learning from decisions is essential.

3.2.39 Paragraph 1.12 encourages the use of these principles when considering development proposals and other works to historic assets. There are four heritage values which need to be understood before the significance of the asset can be assessed.

- Evidential value;
- Historical value;

- Aesthetic value;
- Communal value.

3.2.40 An understanding of these values forms the basis of a statement of significance prepared as part of a Heritage Impact Statement.

3.3 Local Planning Policy

3.3.1 Section 38(6) of the Planning and Compulsory Purchase Act 2004 states that decisions made under the planning acts should be made in accordance with the Development Plan unless material considerations indicate otherwise.

3.3.2 In this case, the relevant Development Plans are: Vale of Glamorgan Local Development Plan (adopted June 2017) and Cardiff Local Development Plan (adopted January 2016).

Vale of Glamorgan Local Development Plan (2017)

3.3.2 The Vale of Glamorgan Local Development Plan (LDP) was adopted 28th June 2017. According to the adopted LDP Proposals Map, the site is located outside the defined settlement boundary. Accordingly, Policy MD1(Location of New Development) outlines that new development on unallocated sites should:

1. Have no unacceptable impact on the countryside;
2. Reinforce the role and function of the key settlement of Barry, the service centre settlements, primary settlements or minor rural settlements as key providers of commercial, community and healthcare facilities;
3. Where appropriate promote new enterprises, tourism, leisure and community facilities in the Vale of Glamorgan;
4. In the case of residential development, support the delivery of affordable housing in areas of identified need;
5. Have access to or promote the use of sustainable modes of transport;
6. Benefit from existing infrastructure provision or where necessary make provision for new infrastructure without any unacceptable effect on the natural or built environment;
7. Where possible promote sustainable construction and make beneficial use of previously developed land and buildings;
8. Provide a positive context for the management of the water environment by avoiding areas of flood risk in accordance with the sequential approach set out in national policy and safeguard water resources; and
9. Have no unacceptable impact on the best and most versatile agricultural land.

3.3.1 The Proposals Map also identifies that the site is located within the Cwrt-yr-Ala Basin Special Landscape Area. The site also overlaps with a small area of the Factory Wood Site of Importance for Nature Conservation and lies adjacent to Leckwith Woods which is designated as a Site of Importance for Nature Conservation. The site is also shown as being located within a Limestone Category 2 area. As such the following policies are also relevant to the development proposals:

- Policy MG17 (6) which outlines that within Special Landscape Areas, development proposals will be permitted where it is demonstrated they would cause no unacceptable harm to the important landscape character of the area.
- Policy MG21 which states that development proposals that are likely to have an adverse impact on sites of importance for nature conservation or priority habitats and species will only be permitted where the need for development clearly outweighs the conservation value,

appropriate and proportionate mitigation and compensation measures can be provided and the development conserves, and where possible, enhances biodiversity interests.

- Policy MG22: which outlines that all known mineral resources of sandstone, sand and gravel and limestone are safeguarded. New development will only be permitted where it has been demonstrated that: any reserves can be economically extracted prior to the commencement of the development (criterion 1 refers); extraction would have an unacceptable impact on environmental or amenity considerations (criterion 2 refers); the development would have no significant impact on the possible working of the resource (criterion 3 refers); or the resource is of poor quality/quantity (criterion 4 refers).

3.3.2 Other LDP policies of relevance to the application proposals include:

- Policy SP1: 'Delivering the Strategy' which seeks to improve the living and working environment within the Vale including to provide a range and choice of housing to meet the needs of all sectors of the community as well as delivering key infrastructure.
- Policy SP7: 'Transportation' outlines that sustainable transport improvements that serve the economic, social and environmental needs of the Vale of Glamorgan and promote the objectives of the South East Wales Regional Transport Plan and the Local Transport Plan will be favoured.
- Policy SP10: 'Built and Natural Environment' which states that development proposals must preserve and where appropriate enhance the rich and diverse built and natural environment and heritage of the Vale of Glamorgan.
- Policy MG4: 'Affordable Housing' which outlines that the provision of 40% affordable housing will be required in developments located in the rural Vale of Glamorgan which result in a net gain of 1 dwelling or more. The policy goes on to state that on sites of 10 or more dwellings, affordable housing shall be provided on site unless exceptional circumstances are demonstrated, with the requirement being rounded up to the nearest whole number.
- Policy MD2: 'Design of New Development' seeks to create high quality, healthy, sustainable and locally distinct places and as such development proposals should (inter alia): be of a high standard of design (criterion 1 refers), respond appropriately to the local context and character of neighbouring buildings and uses (criterion 2 refers), provide a safe and accessible environment for all users giving priority to pedestrians, cyclists and public transport users (criterion 5 refers), have no unacceptable impact on highway safety, nor cause or exacerbate existing traffic congestion (criterion 6 refers), conserve and enhance the quality of, and access to, existing open spaces and community facilities (criterion 7 refers), safeguards existing public and residential amenity (criterion 8 refers), provide public open, private amenity space and car parking in accordance with the Council's standards (criterion 9 refers), incorporate sensitive landscaping (criterion 10 refers) and mitigate the causes of climate change by minimising carbon and other greenhouses gas emissions and predicted future effects of climate change (criterion 12 refers).
- Policy MD3: 'Provision for Open Space' states that where there is an identified need of public open space, new residential development with a net gain of 5 or more dwellings will be required to provide public open space in accordance with adopted standards.
- Policy MD4: 'Community Infrastructure and Planning Obligations' outlines that where appropriate and having regard to development viability the Council will seek to secure new and improved community infrastructure, facilities and services appropriate to the scale, type and location of proposed development through the use of planning obligations.
- Policy MD6: 'Housing Densities' states that residential development proposals within the key service and primary settlements will be permitted where the net residential density is a minimum of 30 dwellings per hectare. Lower density levels will only be permitted where it can be demonstrated that:

1) Development at the prescribed densities would have an unacceptable impact in the character of the surrounding area;

2) Reduced densities are required as a result of significant site constrains or to preserve a local amenity feature; and

3) The proposal is for a mixed-use development where residential use is the subordinate element.

- Policy MD7: 'Environmental Protection' requires development proposals to demonstrate that they will not result in an unacceptable impact on people, residential amenity, property and/or the natural environment from a number of factors including the pollution of land, surface water, ground water and the air; land contamination; hazardous substances; noise, vibration, odour nuisance and light pollution; flood risk and consequences; coastal erosion or land stability; loss of the best and most versatile agricultural land; or any other identified risk to public health and safety. Where impacts are identified the Council will require applicants to demonstrate that appropriate measures can be taken to minimise the impact identified to an acceptable level.
- Policy MD8 'Historic Environment' outlines that development proposals must protect the qualities of the built and historic environment of the Vale of Glamorgan. For listed buildings, development proposals must preserve or enhance the building, its setting and any features of significance it possesses. In relation to sites of archaeological interest, development proposals must preserve or enhance archaeological remains and where appropriate their settings.
- Policy MD9: 'Promoting Biodiversity' outlines that new development proposals are required to conserve and where appropriate enhance biodiversity interest unless it can be demonstrated that (1) the need for the development clearly outweighs the biodiversity value of the site and (2) the impacts of the development can be satisfactory mitigated and managed.

Cardiff Council Local Development Plan (2016)

3.3.3 The Cardiff Local Development Plan (LDP) was adopted 28th June 2017. According to the adopted LDP Proposals Map, the area of the application site which is located in the administrative area of Cardiff and is not designated for any particular land use but falls within the existing highway. The land is however shown as being located within a river corridor and the River Ely itself is designated locally as a Site of Nature Conservation Importance. As such Policy EN4 (River Corridors) outlines that the natural heritage, character and other key features of Cardiff's river corridors will be protected, promoted and enhanced together with facilitating sustainable access and recreation.

3.3.4 Given no development other than some of the proposed highways works are located within Cardiff it is not considered that any of the other policies of the Plan are material to the determination of this application. However, for the purpose of this ES the following LDP Policies are cited:

- Policy KP5 'Good Quality and Sustainable Design' requires new development to be of a high quality, sustainable design and make a positive contribution to the creation of distinctive communities, places and spaces by:

  i. Responding to the local character and context of the built and landscape setting so that layout, scale, form, massing, height, density, colour, materials, detailing and impact on the built and natural heritage are all addressed within development proposals;

  ii. Providing legible development which is easy to get around and which ensures a sense of continuity and enclosure;

iii. Providing a diversity of land uses to create balanced communities and add vibrancy throughout the day;

v. Providing a healthy and convenient environment for all users that supports the principles of community safety, encourages walking and cycling, enables employment, essential services and community facilities to be accessible by sustainable transport and maximises the contribution of networks of multi-functional and connected open spaces to encourage healthier lifestyles;

vi. Maximising renewable energy solutions;

vii. Achieve a resource efficient and climate responsive design that provides sustainable water and waste management solutions and minimise emissions from transport, homes and industry;

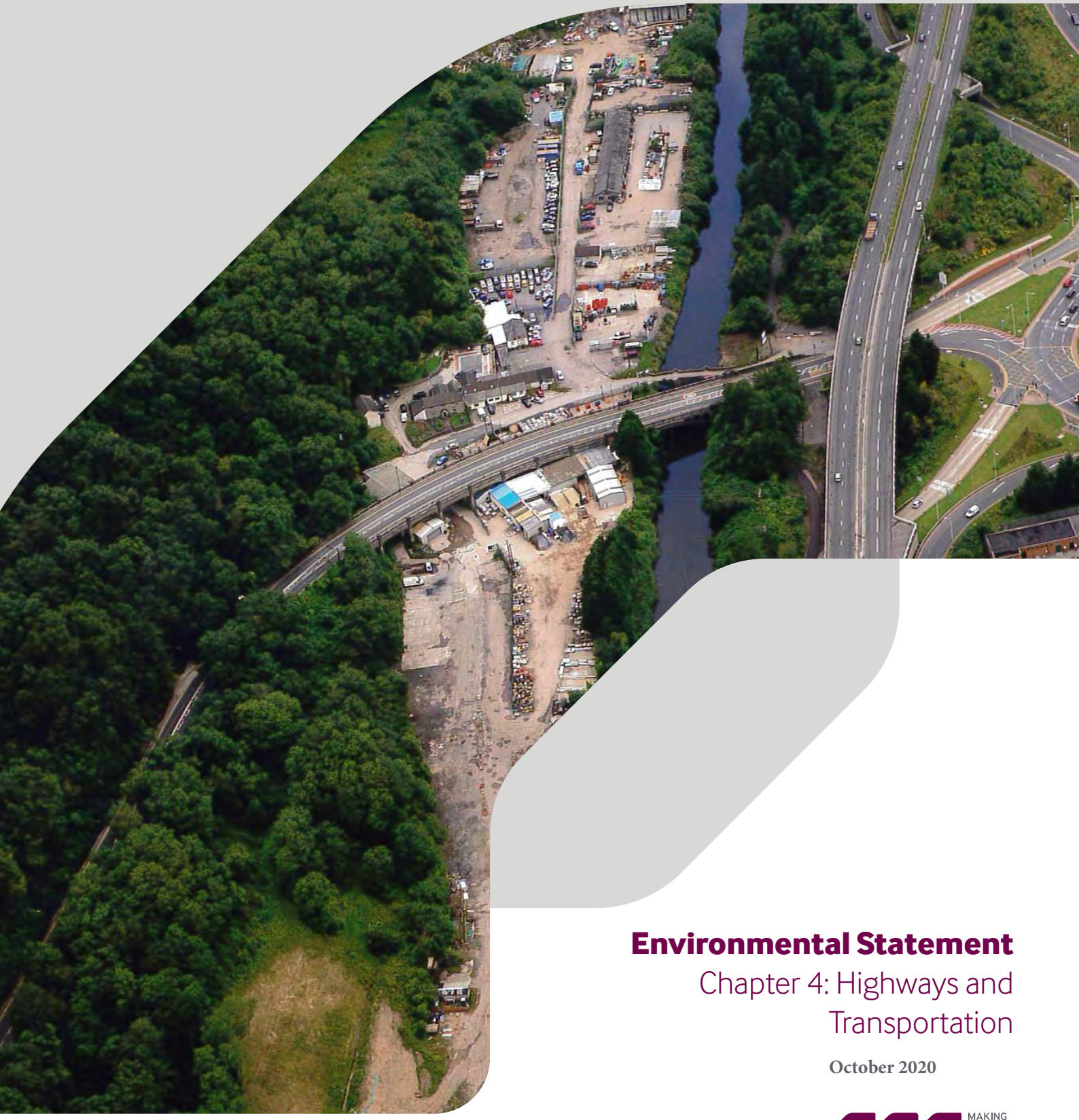
viii. Achieving an adaptable design that can respond to future social, economic, technological and environmental requirements;

x. Ensuring no undue effect on the amenity of neighbouring occupiers and connecting positively to surrounding communities;

- Policy KP6 'New Infrastructure' requires new development to make appropriate provision for, or to contribute towards, all essential, enabling and necessary infrastructure required as a consequence of the development.
- Policy KP8 'Sustainable Transport' which outlines that development in Cardiff will be integrated with transport infrastructure and services in order to:
  - i. Achieve the target of a 50:50 modal split between journeys by car and journeys by walking, cycling and public transport.
  - ii. Reduce travel demand and dependence on the car;
  - iii. Enable and maximise use of sustainable and active modes of transport;
  - iv. Integrate travel modes;
  - v. Provide for people with particular access and mobility requirements;
  - vi. Improve safety for all travellers;
  - vii. Maintain and improve the efficiency and reliability of the transport network;
  - viii. Support the movement of freight by rail or water; and
  - ix. Manage freight movements by road and minimise their impacts.
- Policy T5 'Managing Transport Impacts' which outlines that where necessary, safe and convenient provision will be sought in conjunction with development inter alia pedestrians, disabled people, cyclists, powered two-wheelers and public transport.
- Policy T6 'Impact on Transport Networks and Services' which says that development will not be permitted which would cause unacceptable harm to the safe and efficient operation of the highway, public transport and other movement networks including pedestrian and cycle routes, public rights of way and bridle routes.

Leckwith Quays

Leckwith Road, Cardiff



Environmental Statement

Chapter 4: Highways and Transportation

October 2020

MAKING COMPLEX EASY

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Mr Phil Worthing

4 HIGHWAYS AND TRANSPORTATION

4.1 Introduction

4.1.1 This chapter provides an assessment of the likely transport effects arising from construction and operation of the project.

4.1.2 A comprehensive Transport Assessment (TA), which is a separate document accompanying the planning application, has been prepared. The TA examines in detail the transport effects of the Proposed Development on the existing transport system and provides the basis for this assessment; this is included at **Appendix 4.1**. An Outline Travel Plan (TP), which forms part of the embedded mitigation, is included at **Appendix 4.2**.

4.2 Assessment Methodology

Planning Policy Context

4.2.1 This section identifies the legislation, policy and guidance of relevance to the assessment of the potential transport effects associated with the Proposed Development.

4.2.2 Legislation, policy and guidance have been considered on a national, regional and local level. A comprehensive review has been undertaken as part of the TA **(Appendix 4.1)**. The assessment has been carried out with reference to these documents, which are listed in the following sub-sections.

National

4.2.3 The national policy of the Welsh Government (WG) that has been consulted is as follows:

- Planning Policy Wales: Edition 10, WG (2018);
- Technical Advice Note 18: Transport, WG (2007);
- Wales Transport Strategy, WG (2008);
- Active Travel (Wales) Act, WG (2013); and
- Wellbeing of Future Generations (Wales) Act, WG (2015).

Local – Vale of Glamorgan

4.2.4 The policies of the Vale of Glamorgan (VoG) that have been consulted are as follows:

- Local Development Plan 2011-2026, VoG (2017);
- Parking Standards Supplementary Planning Guidance, VoG (2019); and
- Local Transport Plan 2015-2030, VoG (no date).

Local – City and County of Cardiff

4.2.5 The policies of the City and County of Cardiff (CCC) that have been consulted are as follows:

- Local Development Plan 2006-2026, CCC (2016);
- Managing Transportation Impacts (Incorporating Parking Standards) Supplementary Planning Guidance, CCC (2018);
- Residential Design Guidance Supplementary Planning Guidance, CCC (2017); and
- Local Transport Plan 2015-2020, CCC (no date).

Relevant Guidance

4.2.6 In addition to the relevant policy context, reference has been made to the following guidance:

- Guidelines for the Environmental Assessment of Road Traffic, Institute of Environmental Management and Assessment (IEMA) (1993);
- Guidelines for Planning for Public Transport in Developments, Institution for Highways and Transportation (IHT) (1999);
- Guidelines for Providing for Journeys on Foot, IHT (2000);
- Manual for Streets, Department for Transport (DfT) (2007); and
- Manual for Streets 2, Chartered Institution of Highways and Transportation (CIHT) (2010).

Study Area

4.2.7 The study area considered as part of this assessment is consistent with that considered as part of the TA **(Appendix 4.1)**. The northern extent of the highway network is the signal-controlled crossroads junction between B4267 Leckwith Road, Sloper Road and Broad Street. The study area extends south along the B4267 Leckwith Road, beyond Leckwith Interchange and south of the site. The study area is bounded to the south by the A4055 Cardiff Road/Barry Road, which runs in a southwest-northeast alignment prior to its junction with the A4160 Penarth Road/Cogan Hill.

4.2.8 The study area has been agreed with both the VoG and CCC, and is considered to be in accordance with the IEMA Guidelines.

Baseline Methodology

4.2.9 The baseline has been identified through a combination of desk-based research, site visits and traffic surveys. The traffic surveys are discussed at 'Baseline Environment'.

Consultation

4.2.10 The scope of the assessment has been determined through a formal EIA scoping process undertaken with both the VoG and CCC. Comments raised through this process relevant to this chapter are documented in **Table 4.1**.

Table 4.1: Consultation Responses Relevant to this Chapter

Date	Consultee and Issues Raised	How/ Where Addressed
5th December 2019 (VoG)	Inclusion of appropriate reference to parking standards and justification for the proposed level of provision.	Included at Section 3.5 of the TA (Appendix 4.1).
	Provision of traffic flow information derived from traffic surveys (referenced in the EIA scoping report, but not included in the submission).	Supplied via email on 20th December 2019 and included as part of the TA (Appendix 4.1).
	Provision of traffic distribution details (referenced in the EIA scoping report, but not included in the submission).	Supplied via email on 20th December 2019 and included as part of the TA (Appendix 4.1).
	Assessment of the impact of the Proposed Development in 2030.	Included at Section 7 of the TA (Appendix 4.1).
	Assessment of the impact of the Proposed Development at Merrie Harrier junction.	Included at Section 7 of the TA (Appendix 4.1).
	Provision of technical appendices referenced in the EIA scoping report, but not included in the submission.	Supplied via email on 20th December 2019 and included as part of the TA (Appendix 4.1).
	Consideration of traffic associated with football matches at Cardiff City Stadium.	Discussed at Section 5.3 of the TA (Appendix 4.1).
31ST January 2020 (CCC)	Inclusion of review of key active travel links.	Included at Section 2 of the TA (Appendix 4.1).
	Inclusion of a TP.	Included at Appendix 4.2.
	Consideration to the traffic impacts during construction.	Discussed at Section 3.6 of the TA (Appendix 4.1).

Assessment Criteria and Assignment of Significance

4.2.11 The IEMA Guidelines suggest two rules which can be used to identify the appropriate extent of the assessment area, as follows:

- Rule 1 – Include road links where traffic flows would increase by more than 30% (or the number of Heavy Goods Vehicles (HGVs) would increase by more than 30%); and
- Rule 2 – Include any other specifically sensitive areas where traffic flows would increase by 10% or more.

Receptor Sensitivity/Value

4.2.12 Paragraph 2.5 of the IEMA guidelines defines sensitive locations as receptors that are sensitive to traffic, which could include, but are not limited to; schools, hospitals, places of worship and historical buildings. **Table 4.2** shows the types of receptors which fall into the different categories of sensitivity based on the potential impact of increases in traffic flows, as set out in the IEMA guidance.

Table 4.2: Sensitivity of Receptors

Sensitivity	Definition
High	Receptors of greatest sensitivity to traffic flow: schools, colleges, playgrounds, accident blackspots, retirement homes, urban/residential roads without footways that are used by pedestrians.
Medium	Traffic flow sensitive receptors including: congested junctions, doctor's surgeries, hospitals, shopping areas with roadside frontage, roads with narrow footways, un-segregated cycleways, community centres, parks, recreation facilities.
Low	Receptors with some sensitivity to traffic flow: places of worship, public open space, nature conservation areas, listed buildings, tourist attractions and residential areas with adequate footway provision.
Negligible	Receptors with low sensitivity to traffic flows and those sufficiently distanced from affected roads and junctions.

Magnitude of Impact

4.2.13 Potential traffic impacts are considered to be of high, medium, low or very low magnitude. The IEMA Guidelines identify general thresholds for traffic flow increases for each of the magnitude categories, shown in **Table 4.3**.

Table 4.3: Impact Criteria (IEMA Guidelines)

Magnitude	Change in traffic flow	Definition
High	>90%	These effects are likely to be important considerations at a regional or district scale and, if adverse, are potential concerns to the project, depending on the relative weight attached to the issue in the decision making process.
Medium	60% - 90%	These effects, if adverse, while important at the 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 resource.
Low	30% - 60%	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 and consideration of mitigation should be made.
Negligible	0% - 30%	No effects or those which are beneath levels of perception, within normal bounds or variation, or within the margin of forecasting error.
No change	No change	No change in traffic flows.

Significance of Effects

4.2.14 The sensitivity of the receptor and the magnitude of change are considered in order to determine the significance of the impact, in accordance with **Table 4.4**.

Table 4.4: Assessment Matrix

Sensitivity	Magnitude of Impact				
	No Change	**Negligible**	**Low**	**Medium**	**High**
Negligible	No Change	Negligible	Negligible	Negligible	Minor
Low	No Change	Negligible	Negligible	Minor	Moderate
Medium	No Change	Negligible	Minor	Moderate	Major
High	No Change	Minor	Moderate	Major	Major

4.2.15 Potential effects are therefore concluded to be of major, moderate, minor or negligible significance, defined as follows:

- Major: These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.
- Moderate: These beneficial or adverse effects may be important, but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a particular resource or receptor.
- Minor: These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process, but are important in enhancing the subsequent design of the project.
- Negligible: No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

4.2.16 The exercise classifies effects based on percentage changes of traffic flows on links, and the sensitivity of the receptor. However, there is also a need to incorporate professional judgement and experience to determine whether the classified effect also meets a qualitative definition in line with the descriptive text in **Table 4.3**. For example, a small actual increase in traffic flows resulting in a high percentage impact would be classified as 'major' due to a low baseline, whilst the actual effect itself may be more in line with the definition of a 'minor' effect.

4.2.17 Following the classification of an effect as detailed in **Table 4 4**, a clear statement is made as to whether the effect is 'significant' or 'not significant'. Major and moderate effects are considered to be significant and minor and negligible effects are considered to be not significant.

Limitations of the Assessment

4.2.18 At this stage, available details regarding the construction and operational phases of the Proposed Development are commensurate with the application status. As is typical practice, a series of assumptions have been made in order to be able to conduct a robust assessment of the likely impacts of the Proposed Development on traffic and transport.

4.2.19 The assumptions used to inform the assessment are set out in the TA **(Appendix 4.1)** which is submitted as part of this application, and are based on good industry practice, site-specific evidence and data (where possible), and professional judgment and experience. Assumptions have been made in regard to the following:

- The assessment has been based on masterplan and development quanta provided by the client team and set out in detail in the Design and Access Statement (DAS);
- Identification of construction and operational trip generation and distribution; and
- Derivation of future year traffic flow scenarios.

4.3 Baseline Environment

Introduction

4.3.1 This section of the report provides a description of the site location and its existing usage, the local highway network, current safety and traffic conditions, and a review of accessibility to non-car modes of travel.

Site Location and Existing Use

4.3.2 The site is located in Leckwith, approximately 2.5km to the southwest of Cardiff City Centre. It is bounded to the northeast by the Ely River and is otherwise surrounded by woodland. A grade-separated section of the B4267 Leckwith Road intersects the site in a north-south alignment. Capital Retail Park and the Hadfield Road Industrial Estate lie approximately 700m and 1.1km to the northeast/east of the site respectively.

4.3.3 The existing site is currently used for a range of long running commercial/light industrial uses and two residential dwellings. It is accessed via a junction with the B4267 Leckwith Road, just north of the Ely River. This access also serves the Ely Trail, which is a predominantly off-road walking/cycling route. There is a bridge over the Ely River that connects the site and the access; the bridge is designated as a Scheduled Ancient Monument and Grade II Listed. The B4267 Leckwith Road connects to the A4232 at Leckwith Interchange, approximately 100m to the northeast of the site access.

Local Highway Network

4.3.4 The study area considered as part of the TA and for this assessment is shown on Figure 2.1 of the TA **(Appendix 4.1)**. The northern extent of the highway network is the signal-controlled crossroads junction between B4267 Leckwith Road, Sloper Road and Broad Street. The study area extends south along the B4267 Leckwith Road, beyond Leckwith Interchange and south of the site. The study area is bounded to the south by the A4055 Cardiff Road/Barry Road, which runs in a southwest-northeast alignment prior to its junction with the A4160 Penarth Road/Cogan Hill.

B4267 Leckwith Road/Sloper Road/Broad Street Junction

4.3.5 This is a four-arm signal-controlled crossroads junction which forms the northern extent of the study area. The major arm is the B4267 Leckwith Road, with Sloper Road and Broad Street forming the minor arms to the east and west respectively. There are Advanced Stop Lines (ASL) on all arms of the junction and signalised pedestrian crossings on Sloper Road, Broad Street and B4267 Leckwith Road northbound. Yellow boxes marking ‘Keep Clear’ areas are present on both sides of the B4627 carriageway as well as right-turn storage lanes in both the northbound and southbound direction.

B4267 Leckwith Road, between Ninian Park Station and Lawrenny Avenue

4.3.6 In this section of the study area the B4267 Leckwith Road comprises two lanes in the northeast-bound direction and one lane in the southwest-bound. On the approach to Lawrenny Avenue, it develops a ghost island right-turn lane in the southwest-bound direction, whilst the northeast-bound carriageway reduces to one lane and contains a yellow box marking traffic exclusion area to allow right-turn movements to Lawrenny Avenue to occur without obstruction. This section of the B4267 Leckwith Road has regular street lighting, is subject to a 30mph speed limit and has a variable carriageway width between 9m and 12m.

B4267 Leckwith Road/Ffordd Fred Keenor Junction

4.3.7 This is a three-arm signal-controlled junction which provides the primary access into Cardiff City Football Club (CCFC) Stadium and Leckwith Park & Ride (P&R). The B4267 Leckwith Road is the major arm and consists of three lanes in the southwest-bound direction and four lanes in the northeast-bound direction, with two of these being dedicated to right-turn movements. A yellow box is present on the B4267 Leckwith Road southwest-bound to keep the junction clear and allow for movements into Ffordd Fred Keenor, without obstruction. Signalised pedestrian crossings are present on both the B4267 Leckwith Road southwest-bound approach and northeast-bound exit arms, as well as Ffordd Fred Keenor.

4.3.8 Fford Fred Keenor continues southeast from the junction for approximately 80m where it forms a four-arm roundabout junction. The other arms provide access to the P&R and other parking areas, and CCFC (both entrance and exit of the stadium).

B4267 Leckwith Road/Brian Clarke Way/Cardiff International Sports Campus (CISC) Junction

4.3.9 This is a four-arm signal-controlled crossroads junction, comprising the B4267 Leckwith Road as the major arms, with the two minor arms formed by Brian Clarke Way (serving Capital Retail Park) and CISC. The B4267 Leckwith Road has four lanes in both directions. In the northeast-bound direction, the two offside lanes are dedicated to right-turn movements. In the southwest-bound direction, there is a single right-turn filter lane for movements into CISC. There are yellow boxes present on both sides of the main carriageway to allow for turning movements into the minor arms without obstruction. Signalised pedestrian crossings are present across all arms except the B4267 Leckwith Road southwest-bound.

Leckwith Interchange

4.3.10 The B4267 Leckwith Road continues southwest as a dual-carriageway before it reaches Leckwith Interchange, a large five-arm signal-controlled gyratory comprising the B4267 Leckwith Road, A4232 northbound and southbound on/off-slips, and Hadfield Road. There are up to four lanes on the gyratory, with yellow boxes prohibiting traffic entering to queue at each approach arm entry. The junction is well-lit and provides toucan crossings at the following locations:

- A4232 northbound and southbound off-slips;
- B4267 Leckwith Road (northeast-bound and southwest-bound entries);
- Hadfield Road (entry); and
- Internal Stop Lines (ISLs) on the circulatory, between the entries/exits of all arms.

4.3.11 A single pedestrian/cyclist link, running in a northeast-southwest alignment intersects the central island, and there is an orbital pedestrian/cyclist link to facilitate all movements between arms/crossing locations.

4.3.12 The B4267 Leckwith Road southeast-bound approach consists of three lanes. Hadfield Road is a single carriageway road that widens to two lanes on its approach to the junction. Both the B4267 Leckwith Road and A4232 northbound consist of two lanes on their respective approaches. The A4232 southbound off-slip approach consists of four lanes with the two nearside lanes allocated to left-turn movements onto the B4267 Leckwith Road southeast-bound.

B4267 Leckwith Road, between Leckwith Interchange and University Hospital Llandough (UHL)

4.3.13 This link primarily serves residential areas west of the A4232. South of Leckwith Interchange, the B4267 Leckwith Road is single carriageway in both directions, has regular street lighting and is subject to a 40mph speed limit. It generally has a carriageway width of 6.5m, widening as necessary to allow for ghost island right-turn lanes. Adjacent and to the north of UHL, the B4267 Leckwith Road has regular street lighting to facilitate walking trips to/from residential areas which border the site, and has a speed limit of 30mph. The average width of the carriageway serving UHL and residential areas is approximately 7m.

4.3.14 This section of the B4267 Leckwith Road includes priority junctions with the existing site access and Pen-y-Turnpike Road, located approximately 100m and 1.3km southwest of Leckwith Interchange, respectively.

B4267 Penlan Road/UHL Junction

4.3.15 This is a three-arm signal-controlled junction which provides access to UHL. ASLs are provided on both approaches of the B4267 Penlan Road and there are signalised pedestrian crossings on the UHL access and B4267 Penlan Road northbound arms. The B4267 Penlan Road is subject to a speed limit of 20mph within the vicinity of the junction.

Merrie Harrier

4.3.16 This is a network of junctions that form the south-western extent of the study area. The network comprises the following:

- Three-arm priority T-junction (B4267 Penlan Road/Secondary Access to UHL);
- Three-arm priority T-junction (B4267 Penlan Road/Corbett Road);
- Four-arm signal-controlled junction (B4267 Penlan Road/A4055 Barry Road/Andrew Road/A4055 Cardiff Road);
- Three-arm signal-controlled junction (A4055 Cardiff Road/B4267 Redlands Road); and
- Bus gate for northeast-bound movements on the A4055 Cardiff Road, located southwest of the junction.

4.3.17 ASLs are present on all approach arms of the network, other than Andrew Road which is only accessible by buses. There is a signalised pedestrian crossing on the A4055 Barry Road approach arm. The B4267 Penlan Road, A4055 Barry Road, B4267 Redlands Road and A4055 Cardiff Road all have two lanes on their respective approaches. At the time of writing, the Secondary Access to UHL is closed off.

A4055 Barry Road, between B4267 and A4160

4.3.18 This section of the A4055 Barry Road is subject to a 40mph speed limit, is predominantly dual carriageway and is street lit. The width of the carriageway ranges between 10m and 15m.

Barons Court

4.3.19 This is a four-arm signal-controlled junction which forms the south-eastern extent of the study area. It comprises the A4160 Penarth Road (northern arm), A4055 (eastern arm), A4160 Cogan Hill (southern arm) and the A4055 Barry Road (western arm). ASLs and signalised pedestrian crossings are present on all approach arms of the junction. The A4160 Cogan Hill and both arms of the A4055 have three lanes at the stop line, with an additional left-turn filter lane. The A4160 Penarth Road has two lanes on approach, with an additional filter lane for the left-turn.

Existing Traffic Conditions

4.3.20 Existing traffic conditions are based on traffic survey data collected in 2019. Each road within the study area has been assigned a link, which is used to assist in the assessment of traffic impacts.

4.3.21 The links are used as proxies for sensitive receptors in the vicinity of the various highways, including motorised and non-motorised road users as well as users of nearby amenities and residences. The locations of the links and defined ‘sensitivity’ are included in **Appendix 4.3**. **Table 4.5** summarises the traffic flows on the links and level of sensitivity.

Table 4.5: Link Sensitivity and 2019 Peak Hour Flows

No.	Description	Sensitivity	Peak	2019 Peak Hour Flow (Veh/hr)	% Heavy Vehicles
1	Broad Street	Medium	AM	1,005	2%
			PM	1,056	1%
2	B4267 Leckwith Road, northeast of Sloper Road/Broad Street	Medium	AM	1,887	4%
			PM	2,000	1%
3	Sloper Road	Medium	AM	1,018	5%
			PM	1,141	1%
4	B4267 Leckwith Road, between Sloper Road/Broad Street and Lawrenny Avenue	Medium	AM	2,104	3%
			PM	2,117	1%
5	Lawrenny Avenue	High	AM	644	0%
			PM	160	0%
6	B4267 Leckwith Road, between Lawrenny Avenue and Ffordd Fred Keenor	Medium	AM	1,916	3%
			PM	2,041	1%
7	Ffordd Fred Keenor, between B4267 Leckwith Road and P&R/CCFC	Medium	AM	99	18%
			PM	288	5%
8	B4267 Leckwith Road, between Ffordd Fred Keenor and Brian Clarke Way/CISC	Medium	AM	1,921	3%
			PM	2,137	1%
9	Brian Clarke Way	Medium	AM	706	3%
			PM	1,396	0%
10	CISC	Medium	AM	12	0%
			PM	200	5%
11	B4267 Leckwith Road, between Brian Clarke Way/CISC and Leckwith Interchange	Medium	AM	2,058	3%
			PM	2,378	1%
12	Hadfield Road	Low	AM	1,353	9%
			PM	1,331	3%
13	A4232 Southbound On-Slip	Negligible	AM	516	4%
			PM	309	3%
14	A4232 Northbound Off-Slip	Negligible	AM	209	7%
			PM	634	1%
15	B4267 Leckwith Road, between Leckwith Interchange and Proposed Site Access	Medium	AM	1,594	2%
			PM	1,649	1%
16	A4232 Northbound On-Slip	Negligible	AM	681	6%
			PM	1,249	2%
17	A4232 Southbound Off-Slip	Negligible	AM	1,358	4%
			PM	842	2%
18	B4267 Leckwith Road, between Proposed Site Access and Pen-y-Turnpike Road	Medium	AM	1,481	1%
			PM	1,556	1%
19	Pen-y-Turnpike Road	Medium	AM	938	0%
			PM	1,014	1%
20	B4267 Leckwith Road, southeast of Pen-y-Turnpike Road	Medium	AM	835	2%
			PM	758	1%
21	B4267 Penlan Road, north of UHL	Low	AM	910	2%
			PM	703	1%
22	UHL	Medium	AM	803	2%

			PM	722	2%
23	B4267 Penlan Road, north of Merrie Harrier	Medium	AM	1,023	3%
			PM	831	2%
24	Corbett Road	High	AM	6	0%
			PM	3	0%
25	A4055 Cardiff Road, south of Merrie Harrier	Medium	AM	1,124	6%
			PM	1,408	2%
26	B4267 Redlands Road, south of Merrie Harrier	Medium	AM	1,422	2%
			PM	1,339	1%
27	Andrew Road	Medium	AM	4	25%
			PM	2	50%
28	A4055 Barry Road, between Merrie Harrier and Barons Court	Medium	AM	1,683	4%
			PM	1,981	1%
29	A4160 Penarth Road, northwest of Barons Court	Medium	AM	1,048	4%
			PM	1,248	2%
30	A4160 Cogan Hill, southeast of Barons Court	Medium	AM	2,320	2%
			PM	2,305	1%
31	A4055, northeast of Barons Court	Medium	AM	2,891	3%
			PM	3,014	1%

Road Safety

4.3.22 Personal Injury Collision (PIC) data has been obtained from the WG for the five-year period from 1st January 2014 to 31st December 2018 (the most recent for which data was available). A total of 51 PICs were reported in the five-year period, of which 42 were categorised as ‘slight’. Of the remaining PICs, eight were categorised as ‘serious’ and one was categorised as ‘fatal’.

4.3.23 Analysis undertaken at Section 2.5 of the TA **(Appendix 4.1)** has not identified any existing highway safety issues that require more detailed examination or that could be exacerbated by the proposed development.

Walking and Cycling, Local Facilities and Public Transport

4.3.24 The site benefits from existing provision for pedestrians and cyclists in the locality, including shared footways/cycleways on both sides of the B4267 Leckwith Road, a comprehensive network of crossing facilities, and neighbouring off-road routes. Employment areas and a range of local facilities are located within walking and cycling distance of the site.

4.3.25 Regular bus services are accessible from bus stops located on the B4267 Leckwith Road; whilst parts of the site are slightly beyond the IHT’s suggested ‘acceptable’ walking distance, this is not considered to be a significant barrier given the frequency of services and provision of pedestrian links between the site and the bus stops. Ninian Park railway station is located around 1.1km from the site and provides regular services to Cardiff Central, which in turn provides access to regular services to wider destinations such as London, Manchester, Swansea and Bristol.

Future Baseline Conditions

4.3.26 The methodology for derivation of future baseline conditions is set out in the TA **(Appendix 4.1)**. In short, the of future baseline conditions are derived from the application of traffic growth forecasts (obtained from an industry-standard database) and traffic associated with committed development (includes sites that are allocated in the LDPs for both the VoG and CCC, and sites that have been granted planning permission).

4.3.27 These forecasts are informed by projected housing and employment growth, and do not take account of potential behavioural change, specifically in regard to travel mode choice. The CCC aspires to reduce levels of car use to achieve a mode split of 50:50 between trips by car and sustainable travel (walking, cycling and public transport) by 2026. Along with the potential for wider policy measures (e.g. road pricing), this could reduce the extent of forecast of traffic growth or lead to a reduction in background traffic. The forecasts for future baseline conditions (in terms of traffic flows) are therefore considered a 'worst-case'.

4.4 Mitigation Measures Adopted as Part of the Project

4.4.1 A number of embedded mitigation measures have been identified through the iterative EIA process and have been incorporated into the design and construction planning of the Proposed Development.

4.4.2 As these mitigation measures have been embedded into the design, are legal requirements, or are standard practices that will be implemented, the assessment of likely significant effects assumes that they are in place. These embedded mitigation measures are summarised in this section so that it is clear where and why these measures have been included and the way in which they have contributed to the management and reduction of environmental effects.

4.4.3 For highways and transportation, the following mitigation measures have been embedded into the design and construction management of the Proposed Development.

Construction

4.4.4 Construction impacts will be managed through a Construction Management Plan (CMP) or similar document, the measures of which would be intended to protect the environment, amenity and safety of local residents, businesses, the general public and the surroundings in the vicinity of the Proposed Development. As part of the management plan, a construction vehicle routeing regime for access to the construction site will be identified and agreed with the local and strategic highway authorities to ensure that drivers of construction related vehicles do not use inappropriate routes which are unsuitable by virtue of their width, alignment or character. The regime will aim to ensure that construction vehicles avoid residential areas and use the strategic highway network wherever possible.

4.4.5 Potential impacts of construction traffic include noise, vehicle exhaust emissions, dust, and mud and debris on roads, as well as possible road safety issues. Mitigation of these impacts will be achieved through strict adherence to the proposed construction routes and permitted hours of working, as well as by controls under health and safety legislation and good construction site practices.

4.4.6 The CMP will be agreed with both the VoG and CCC following the award of planning consent but prior to works starting on site.

Operation

4.4.7 The TA **(Appendix 4.1)** includes a Transport Implementation Strategy (TIS), which includes a commitment to prepare a TP, to be secured by a planning condition; an Outline TP is included at **Appendix 4.2**. The role of a TP is to seek to reduce single-occupancy vehicle use to/from a development or site and promote the uptake of sustainable travel. The TP includes mode-share targets and a monitoring programme to assess progress against these targets.

4.4.8 The Proposed Development has been designed as a walkable neighbourhood; the network of footways on-site and network of footways/cycleways created as part of the access arrangements will create a range of travel options both on-road and as traffic free routes. Footways and cycleways alongside the carriageway will be provided at high quality with clear spaces for non-motorised travel.

4.4.9 The layout and design of the Proposed Development has focused on the strength of its sustainable location, the proposals include re-purposing the existing listed bridge for a walking and cycling route. In addition to this, the proposals fully exploit the site's position adjacent the Ely Trail and includes enhancements which make pedestrian and cyclists crossings safer and more convenient.

4.5 Assessment of Construction Effects

4.5.1 Construction activities will not only include the building of residential development, but will also involve civil engineering works to provide new roads, including access roads and associated infrastructure.

4.5.2 Construction of the Proposed Development will give rise to deliveries of materials and products that would be transported by heavy goods vehicles. In addition, each construction phase will require on-site operation of construction equipment and plant.

4.5.3 There is likely to be a requirement for traffic management measures during the construction of the new bridge and the demolition of the current bridge. There may also be a requirement for temporary road closures to facilitate the new connection. This will be progressed with the Highway Authorities and additional construction traffic routes will be identified and agreed during this temporary situation.

4.5.4 The likely numbers of construction vehicles is dependent on the rate of construction, which in turn is affected by prevailing market forces. It is envisaged that construction of the Proposed Development will commence in 2021 and be complete by 2025, based on a reasonable build-out rate of 50-75 dwellings per year. Forecasts have been prepared for construction traffic based on the higher annual build rate of 75 dwellings; these forecasts are indicative and based on our professional experience. The forecasts are therefore subject to the contractor appointed for construction.

4.5.5 An annual build rate of 75 dwellings typically requires around 50 operatives/site staff. As a worst-case, assuming no car sharing or non-car trips, these operatives/site staff would generate around 50 vehicle movements in the morning as well as in the evening. These are well within the levels of traffic generation forecast for the Proposed Development during the operational phase, which has been assessed in detail at Section 4.6 of this Chapter.

4.5.6 In terms of HGVs, an annual build rate of 75 dwellings is forecast to generate around 3,300 HGV movements per year, based on reasonable assumptions regarding materials, road and drainage construction, excavation, etc. This equates to 14 HGV movements per day (assuming 250 working days per year) and 2 HGV movements per hour (assuming an 8-hour construction schedule).

4.5.7 HGV traffic will be subject to a routeing agreement as part of a CMP or similar document, which will likely involve routeing to/from the A4232 at Leckwith Interchange, requiring the use of Links 13 to 17. These are generally high-capacity roads, accustomed to carrying high volumes of traffic and associated HGV movements.

4.5.8 The increase in HGV traffic on these links will be no more 2 HGV movements per hour. This will result in a negligible magnitude of change on these links and, with reference to the link sensitivities in **Table 4.5** and the assessment matrix in **Table 4.4**, the effect will be **minor adverse**, which is not significant.

4.5.9 The construction period is medium-term and therefore only temporary in its effects. Management control mitigation measures will be implemented during construction in the form of controls imposed by planning conditions, health and safety requirements and good construction site practices, as discussed above.

Future Monitoring

4.5.10 The CMP or similar document will include a monitoring regime to ensure the practices contained within are adhered to, e.g. vehicle routeing, management of deliveries, etc.

Accidents and/or Disasters

4.5.11 The construction phase will give rise to an increase in traffic on the study area network. With an increase in traffic comes an increase in the risk of accidents. However, the level of increase in traffic will be of such a level that there will be no discernible increase in risk. Any risks associated with construction traffic will managed through the CMP or similar document.

4.6 Assessment of Operational Effects

4.6.1 The TA **(Appendix 4.1)** sets out the methodology for assessment of the Proposed Development during its operational phase (i.e. once it is complete and occupied) and is summarised below.

4.6.2 The assessment has been undertaken for two future years as follows:

- 2025: This is likely to be the point by which the Proposed Development will be complete, based on consent in 2020, commencement of construction in 2021 and a reasonable build-rate of 50-75 dwellings per year. Assessment of this year is considered appropriate in terms of determining the impact of the Proposed Development and any need for intervention/mitigation.
- 2030: This has been specifically requested by the VoG in its scoping correspondence. Assessment of this year has been included for information purposes only. It is not considered an appropriate measure of development impact and requirements for mitigation, given it is four years after the end of the LDP (2026) for the VoG and CCC, and therefore beyond reasonable forecasts for housing and employment growth. This future scenario is usually deemed appropriate for a strategic site or large scale development; applying this to a small scale development some five years after completion only serves to assess traffic growth on the network and not development impact.

4.6.3 The TA **(Appendix 4.1)** includes scenarios for future years both without (Do-Minimum) and with the Proposed Development (Do-Nothing). A further scenario has been tested that considers the effects of the proposed development with intervention/mitigation (Do-Something). The 'Do-Something' scenarios include a reduction in traffic generation of the proposed development as a result of the implementation of a TP. The TP **(Appendix 4.2)** has been identified as part of the embedded mitigation and therefore, for ES purposes, the assessment of effects has been based on comparison between Do-Minimum and Do-Something scenarios. All future year scenarios include traffic growth, based on growth factors and traffic from neighbouring committed development. The Do-Something scenarios include traffic associated with the Proposed Development; this has been forecast using an industry-standard approach.

4.6.4 **Table 4.6** sets out the traffic impacts and significance of effects of the Proposed Development during the operational phase of the Proposed Development, up to 2025. **Table 4.7** sets out the traffic impact and significance of effects during the operational phase up to 2031.

4.6.5 The significance of traffic and transport effects with the Proposed Development fully occupied have been determined in accordance with IEMA guidelines, outlined in Section 4.2 of this Chapter.

Table 4.6: 2025 Operational Assessment

No.	Description	Sensitivity	Peak	Do-Minimum (Vehicles)	Do-Minimum (HGVs)	Do-Something (Vehicles)	Do-Something (HGVs)	% Increase in Vehicles	% Increase in HGVs	Magnitude	Significance
1	Broad Street	Medium	AM	1,203	24	1,208	24	0.44%	0.00%	Negligible	Minor Adverse
			PM	1,270	13	1,275	13	0.40%	0.00%		
2	B4267 Leckwith Road, northeast of Sloper Road/Broad Street	Medium	AM	2,029	86	2,059	86	1.43%	0.00%	Negligible	Minor Adverse
			PM	2,142	27	2,170	27	1.31%	0.00%		
3	Sloper Road	Medium	AM	1,132	58	1,132	58	0.02%	0.00%	Negligible	Minor Adverse
			PM	1,282	15	1,283	15	0.02%	0.00%		
4	B4267 Leckwith Road, between Sloper Road/Broad Street and Lawrenny Avenue	Medium	AM	2,323	60	2,358	60	1.49%	0.00%	Negligible	Minor Adverse
			PM	2,334	31	2,367	31	1.43%	0.00%		
5	Lawrenny Avenue	High	AM	707	0	707	0	0.00%	0.00%	No Change	No Change
			PM	174	0	174	0	0.00%	0.00%		
6	B4267 Leckwith Road, between Lawrenny Avenue and Ffordd Fred Keenor	Medium	AM	2,104	59	2,138	59	1.65%	0.00%	Negligible	Minor Adverse
			PM	2,250	32	2,284	32	1.48%	0.00%		
7	Ffordd Fred Keenor, between B4267 Leckwith Road and P&R/CCFC	Medium	AM	108	19	108	19	0.00%	0.00%	No Change	No Change
			PM	311	16	311	16	0.00%	0.00%		
8	B4267 Leckwith Road, between Ffordd Fred Keenor and Brian Clarke Way/CISC	Medium	AM	2,107	63	2,142	63	1.64%	0.00%	Negligible	Minor Adverse
			PM	2,350	29	2,383	29	1.42%	0.00%		
9	Brian Clarke Way	Medium	AM	763	25	763	25	0.00%	0.00%	No Change	No Change
			PM	1,509	1	1,509	1	0.00%	0.00%		
10	CISC	Medium	AM	13	0	13	0	0.00%	0.00%	No Change	No Change
			PM	216	11	216	11	0.00%	0.00%		
11	B4267 Leckwith Road, between Brian Clarke Way/CISC and Leckwith Interchange	Medium	AM	2,246	64	2,281	64	1.54%	0.00%	Negligible	Minor Adverse
			PM	2,588	31	2,621	31	1.29%	0.00%		

No.	Description	Sensitivity	Peak	Do-Minimum (Vehicles)	Do-Minimum (HGVs)	Do-Something (Vehicles)	Do-Something (HGVs)	% Increase in Vehicles	% Increase in HGVs	Magnitude	Significance
12	Hadfield Road	Low	AM	1,454	126	1,470	126	1.15%	0.00%	Negligible	Negligible
			PM	1,430	44	1,446	44	1.12%	0.00%		
13	A4232 Southbound On-Slip	Negligible	AM	560	24	572	24	2.30%	0.00%	Negligible	Negligible
			PM	333	11	338	11	1.50%	0.00%		
14	A4232 Northbound Off-Slip	Negligible	AM	225	16	230	16	2.37%	0.00%	Negligible	Negligible
			PM	685	4	698	4	1.83%	0.00%		
15	B4267 Leckwith Road, between Leckwith Interchange and Proposed Site Access	Medium	AM	1,722	26	1,818	26	5.57%	0.00%	Negligible	Minor Adverse
			PM	1,777	20	1,869	20	5.19%	0.00%		
16	A4232 Northbound On-Slip	Negligible	AM	735	42	754	42	2.54%	0.00%	Negligible	Negligible
			PM	1,346	32	1,353	32	0.54%	0.00%		
17	A4232 Southbound Off-Slip	Negligible	AM	1,461	52	1,468	52	0.53%	0.00%	Negligible	Negligible
			PM	911	18	929	18	2.00%	0.00%		
18	B4267 Leckwith Road, between Proposed Site Access and Pen-y-Turnpike Road	Medium	AM	1,602	14	1,625	14	1.46%	0.00%	Negligible	Minor Adverse
			PM	1,677	17	1,700	17	1.34%	0.00%		
19	Pen-y-Turnpike Road	Medium	AM	1,009	0	1,022	0	1.27%	0.00%	Negligible	Minor Adverse
			PM	1,090	6	1,102	6	1.13%	0.00%		
20	B4267 Leckwith Road, southeast of Pen-y-Turnpike Road	Medium	AM	904	14	915	14	1.17%	0.00%	Negligible	Minor Adverse
			PM	818	11	828	11	1.24%	0.00%		
21	B4267 Penlan Road, north of UHL	Low	AM	985	17	995	17	1.07%	0.00%	Negligible	Negligible
			PM	759	10	770	10	1.34%	0.00%		
22	UHL	Medium	AM	868	18	872	18	0.46%	0.00%	Negligible	Minor Adverse
			PM	778	17	782	17	0.50%	0.00%		
23		Medium	AM	1,102	34	1,108	34	0.59%	0.00%	Negligible	Minor Adverse

No.	Description	Sensitivity	Peak	Do-Minimum (Vehicles)	Do-Minimum (HGVs)	Do-Something (Vehicles)	Do-Something (HGVs)	% Increase in Vehicles	% Increase in HGVs	Magnitude	Significance
	B4267 Penlan Road, north of Merrie Harrier		PM	894	20	900	20	0.71%	0.00%		
24	Corbett Road	High	AM	6	0	6	0	0.00%	0.00%	No Change	No Change
			PM	3	0	3	0	0.00%	0.00%		
25	A4055 Cardiff Road, south of Merrie Harrier	Medium	AM	1,220	67	1,220	67	0.00%	0.00%	No Change	No Change
			PM	1,521	23	1,521	23	0.00%	0.00%		
26	B4267 Redlands Road, south of Merrie Harrier	Medium	AM	1,530	32	1,535	32	0.36%	0.00%	Negligible	Minor Adverse
			PM	1,438	20	1,444	20	0.37%	0.00%		
27	Andrew Road	Medium	AM	4	1	4	1	0.00%	0.00%	No Change	No Change
			PM	2	1	2	1	0.00%	0.00%		
28	A4055 Barry Road, between Merrie Harrier and Barons Court	Medium	AM	1,827	74	1,828	74	0.06%	0.00%	Negligible	Minor Adverse
			PM	2,142	26	2,143	26	0.05%	0.00%		
29	A4160 Penarth Road, northwest of Barons Court	Medium	AM	1,137	47	1,141	47	0.37%	0.00%	Negligible	Minor Adverse
			PM	1,347	33	1,351	33	0.30%	0.00%		
30	A4160 Cogan Hill, southeast of Barons Court	Medium	AM	2,511	53	2,516	53	0.21%	0.00%	Negligible	Minor Adverse
			PM	2,496	28	2,502	28	0.20%	0.00%		
31	A4055, northeast of Barons Court	Medium	AM	3,140	82	3,140	82	0.00%	0.00%	No Change	No Change
			PM	3,273	40	3,273	40	0.00%	0.00%		

Table 4.7: 2030 Operational Assessment

No.	Description	Sensitivity	Peak	Do-Minimum (Vehicles)	Do-Minimum (HGVs)	Do-Something (Vehicles)	Do-Something (HGVs)	% Increase in Vehicles	% Increase in HGVs	Magnitude	Significance
1	Broad Street	Medium	AM	1,248	25	1,253	25	0.42%	0.00%	Negligible	Minor Adverse
			PM	1,317	13	1,322	13	0.39%	0.00%		
2	B4267 Leckwith Road, northeast of Sloper Road/Broad Street	Medium	AM	2,115	89	2,144	89	1.38%	0.00%	Negligible	Minor Adverse
			PM	2,231	28	2,259	28	1.26%	0.00%		
3	Sloper Road	Medium	AM	1,178	60	1,178	60	0.02%	0.00%	Negligible	Minor Adverse
			PM	1,333	16	1,334	16	0.01%	0.00%		
4	B4267 Leckwith Road, between Sloper Road/Broad Street and Lawrenny Avenue	Medium	AM	2,418	62	2,452	62	1.43%	0.00%	Negligible	Minor Adverse
			PM	2,429	32	2,462	32	1.37%	0.00%		
5	Lawrenny Avenue	High	AM	736	0	736	0	0.00%	0.00%	No Change	No Change
			PM	181	0	181	0	0.00%	0.00%		
6	B4267 Leckwith Road, between Lawrenny Avenue and Ffordd Fred Keenor	Medium	AM	2,190	61	2,225	61	1.58%	0.00%	Negligible	Minor Adverse
			PM	2,342	33	2,375	33	1.42%	0.00%		
7	Ffordd Fred Keenor, between B4267 Leckwith Road and P&R/CCFC	Medium	AM	112	20	112	20	0.00%	0.00%	No Change	No Change
			PM	324	17	324	17	0.00%	0.00%		
8	B4267 Leckwith Road, between Ffordd Fred Keenor and Brian Clarke Way/CISC	Medium	AM	2,194	66	2,229	66	1.58%	0.00%	Negligible	Minor Adverse
			PM	2,445	30	2,479	30	1.36%	0.00%		
9	Brian Clarke Way	Medium	AM	795	26	795	26	0.00%	0.00%	No Change	No Change
			PM	1,572	1	1,572	1	0.00%	0.00%		
10	CISC	Medium	AM	13	0	13	0	0.00%	0.00%	No Change	No Change
			PM	225	11	225	11	0.00%	0.00%		
11	B4267 Leckwith Road, between Brian Clarke Way/CISC and Leckwith Interchange	Medium	AM	2,339	67	2,374	67	1.48%	0.00%	Negligible	Minor Adverse
			PM	2,694	32	2,728	32	1.24%	0.00%		

No.	Description	Sensitivity	Peak	Do-Minimum (Vehicles)	Do-Minimum (HGVs)	Do-Something (Vehicles)	Do-Something (HGVs)	% Increase in Vehicles	% Increase in HGVs	Magnitude	Significance
12	Hadfield Road	Low	AM	1,515	131	1,531	131	1.10%	0.00%	Negligible	Negligible
			PM	1,489	46	1,505	46	1.08%	0.00%		
13	A4232 Southbound On-Slip	Negligible	AM	583	25	596	25	2.21%	0.00%	Negligible	Negligible
			PM	347	11	352	11	1.44%	0.00%		
14	A4232 Northbound Off-Slip	Negligible	AM	234	17	240	17	2.27%	0.00%	Negligible	Negligible
			PM	714	4	726	4	1.76%	0.00%		
15	B4267 Leckwith Road, between Leckwith Interchange and Proposed Site Access	Medium	AM	1,794	27	1,890	27	5.34%	0.00%	Negligible	Minor Adverse
			PM	1,850	21	1,943	21	4.99%	0.00%		
16	A4232 Northbound On-Slip	Negligible	AM	766	43	785	43	2.44%	0.00%	Negligible	Negligible
			PM	1,401	33	1,409	33	0.52%	0.00%		
17	A4232 Southbound Off-Slip	Negligible	AM	1,522	55	1,530	55	0.51%	0.00%	Negligible	Negligible
			PM	948	19	966	19	1.92%	0.00%		
18	B4267 Leckwith Road, between Proposed Site Access and Pen-y-Turnpike Road	Medium	AM	1,669	14	1,692	14	1.40%	0.00%	Negligible	Minor Adverse
			PM	1,747	18	1,769	18	1.29%	0.00%		
19	Pen-y-Turnpike Road	Medium	AM	1,052	0	1,065	0	1.22%	0.00%	Negligible	Minor Adverse
			PM	1,135	7	1,147	7	1.08%	0.00%		
20	B4267 Leckwith Road, southeast of Pen-y-Turnpike Road	Medium	AM	942	14	953	14	1.12%	0.00%	Negligible	Minor Adverse
			PM	852	11	862	11	1.19%	0.00%		
21	B4267 Penlan Road, north of UHL	Low	AM	1,026	18	1,036	18	1.03%	0.00%	Negligible	Negligible
			PM	791	10	801	10	1.29%	0.00%		
22	UHL	Medium	AM	904	19	908	19	0.44%	0.00%	Negligible	Minor Adverse
			PM	810	18	814	18	0.48%	0.00%		
23		Medium	AM	1,148	36	1,154	36	0.57%	0.00%	Negligible	Minor Adverse

No.	Description	Sensitivity	Peak	Do-Minimum (Vehicles)	Do-Minimum (HGVs)	Do-Something (Vehicles)	Do-Something (HGVs)	% Increase in Vehicles	% Increase in HGVs	Magnitude	Significance
	B4267 Penlan Road, north of Merrie Harrier		PM	931	21	938	21	0.68%	0.00%		
24	Corbett Road	High	AM	7	0	7	0	0.00%	0.00%	No Change	No Change
			PM	3	0	3	0	0.00%	0.00%		
25	A4055 Cardiff Road, south of Merrie Harrier	Medium	AM	1,270	70	1,270	70	0.00%	0.00%	No Change	No Change
			PM	1,584	24	1,584	24	0.00%	0.00%		
26	B4267 Redlands Road, south of Merrie Harrier	Medium	AM	1,594	33	1,599	33	0.35%	0.00%	Negligible	Minor Adverse
			PM	1,498	21	1,504	21	0.35%	0.00%		
27	Andrew Road	Medium	AM	4	1	4	1	0.00%	0.00%	No Change	No Change
			PM	2	1	2	1	0.00%	0.00%		
28	A4055 Barry Road, between Merrie Harrier and Barons Court	Medium	AM	1,903	77	1,904	77	0.06%	0.00%	Negligible	Minor Adverse
			PM	2,231	27	2,232	27	0.05%	0.00%		
29	A4160 Penarth Road, northwest of Barons Court	Medium	AM	1,184	49	1,189	49	0.36%	0.00%	Negligible	Minor Adverse
			PM	1,403	34	1,407	34	0.29%	0.00%		
30	A4160 Cogan Hill, southeast of Barons Court	Medium	AM	2,615	56	2,621	56	0.20%	0.00%	Negligible	Minor Adverse
			PM	2,600	29	2,605	29	0.20%	0.00%		
31	A4055, northeast of Barons Court	Medium	AM	3,270	86	3,270	86	0.00%	0.00%	No Change	No Change
			PM	3,408	41	3,408	41	0.00%	0.00%		

4.6.6 In both the 2025 and 2030 scenarios, the effect of the Proposed Development is forecast to be **minor adverse** on the following links:

- Link 1: Broad Street.
- Link 2: B4267 Leckwith Road, northeast of Sloper Road/Broad Street.
- Link 3: Sloper Road.
- Link 4: B4267 Leckwith Road, between Sloper Road/Broad Street and Lawrenny Avenue.
- Link 6: B4267 Leckwith Road, between Lawrenny Avenue and Ffordd Fred Keenor.
- Link 8: B4267 Leckwith Road, between Ffordd Fred Keenor and Brian Clarke Way/CISC.
- Link 11: B4267 Leckwith Road, between Brian Clarke Way/CISC and Leckwith Interchange.
- Link 15: B4267 Leckwith Road, between Leckwith Interchange and Proposed Site Access.
- Link 18: B4267 Leckwith Road, between Proposed Site Access and Pen-y-Turnpike Road.
- Link 19: Pen-y-Turnpike Road.
- Link 20: B4267 Leckwith Road, southeast of Pen-y-Turnpike Road.
- Link 22: UHL.
- Link 23: B4267 Penlan Road, north of Merrie Harrier.
- Link 26: B4267 Redlands Road, south of Merrie Harrier.
- Link 28: A4055 Barry Road, between Merrie Harrier and Barons Court.
- Link 29: A4160 Penarth Road, northwest of Barons Court.
- Link 30: A4160 Cogan Hill, southeast of Barons Court.

4.6.7 The effect of the Proposed Development on all other links is forecast to be **negligible** or **no change**. Therefore, the effects are considered to be **not significant**.

Further Mitigation

4.6.8 No significant effects are identified and therefore no further mitigation is required.

Future Monitoring

4.6.9 No additional monitoring is required as a result of the Proposed Development.

Accidents/Disasters

4.6.10 The operational phase will give rise to an increase in traffic on the study area network. With an increase in traffic comes an increase in the risk of accidents. However, the level of increase in traffic has been determined through assessments to be of such a level that there will be no discernible increase in risk. The access arrangements and internal layout will comply with standards to minimise risk.

Potential Changes to the Assessment as a Result of Climate Change

4.6.11 The significance of effects is likely to remain as reported and no further assessments are considered necessary.

4.7 Assessment of Cumulative Effects

4.7.1 The TA **(Appendix 4.1)** that forms the basis of the assessment in this chapter has accounted for traffic growth forecasts and committed development sites (i.e. sites that are allocated in the LDPs for both the VoG and CCC, and sites that have been granted planning permission). At the time of writing, there are no development sites in the vicinity that are considered as 'cumulative' that have not already been taken account of in the assessment. No assessment of cumulative effects is therefore considered to be required.

4.8 Inter-relationships

4.8.1 The impact on the access links in terms of noise/vibration and dust/air quality are discussed in Chapters 10 (Noise and Vibration) and 11 (Air Quality) of this ES.

4.9 Summary of Effects

4.9.1 During the construction phase, the effects of the Proposed Development will be **minor adverse**. The effects will be **medium-term** and are confirmed to be **not significant**.

4.9.2 During the operation phase, the effects of the Proposed Development will range from **no change** to **minor adverse**. The effects will be **long-term** and are confirmed to be **not significant**.

4.10 References

- City and County of Cardiff (no date) Local Transport Plan 2015-2020. Cardiff, City and County of Cardiff.
- City and County of Cardiff (2016) Local Development Plan 2006-2026. Cardiff, City and County of Cardiff.
- City and County of Cardiff (2017) Residential Design Guidance Supplementary Planning Guidance. Cardiff, City and County of Cardiff.
- City and County of Cardiff (2018) Managing Transportation Impacts (Incorporating Parking Standards) Supplementary Planning Guidance. Cardiff, City and County of Cardiff.
- Chartered Institution of Highways and Transportation (2010) Manual for Streets 2. London, Chartered Institution of Highways and Transportation.
- Department for Transport (2007) Manual for Streets. London, Department for Transport.
- Institution for Highways and Transportation (1999) Guidelines for Planning for Public Transport in Developments. London, Institution for Highways and Transportation.
- Institution for Highways and Transportation (2000) Guidelines for Providing for Journeys on Foot. London, Institution for Highways and Transportation.
- Institute of Environmental Assessment and Management (1993) Guidelines for the Environmental Assessment of Road Traffic. Lincoln, Institute of Environmental Assessment and Management.
- Vale of Glamorgan (no date) Local Transport Plan 2015-2030. Barry, Vale of Glamorgan.
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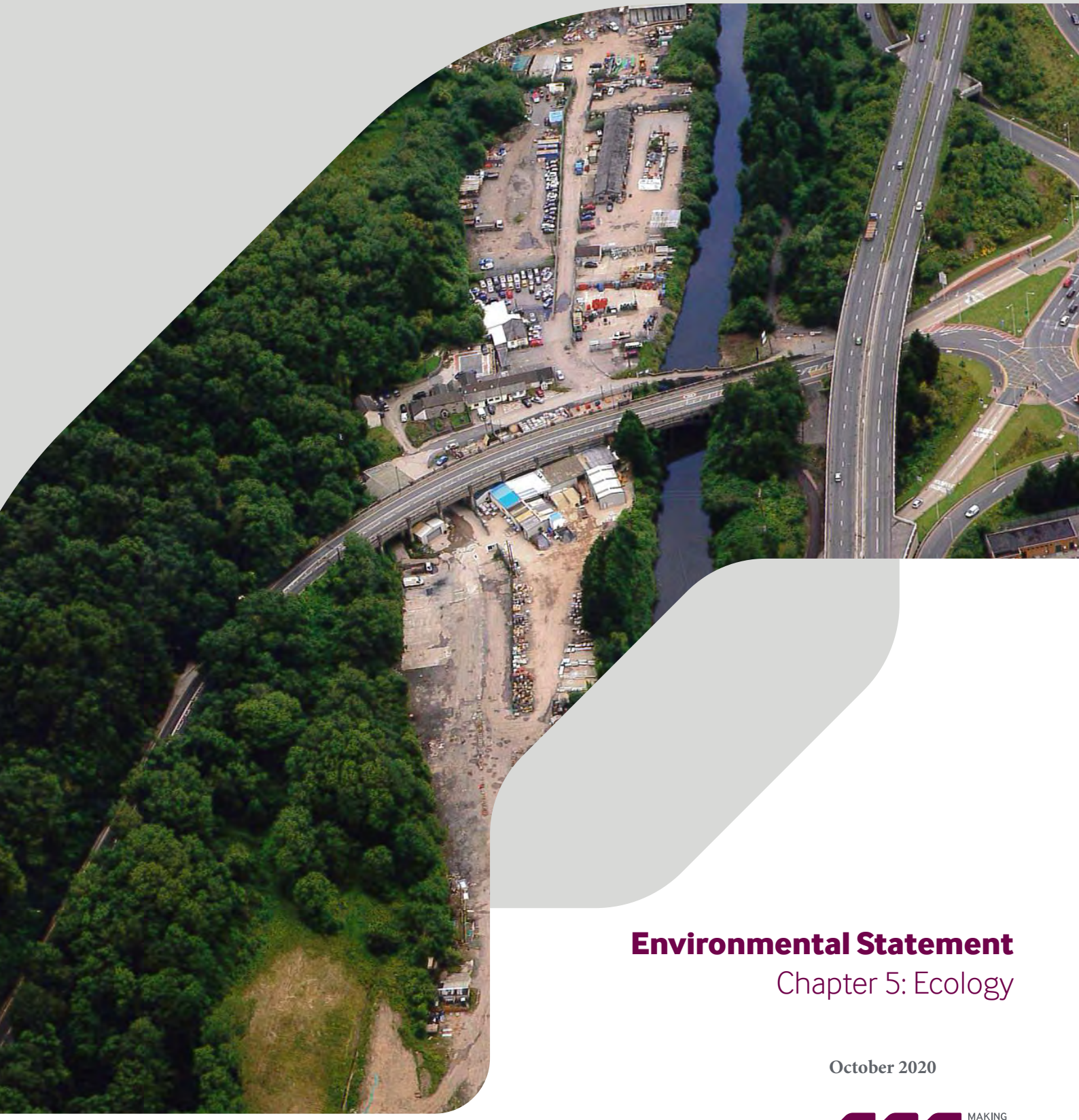
- Vale of Glamorgan (2019) Parking Standards Supplementary Planning Guidance. Barry, Vale of Glamorgan.
- Welsh Government (2007) Technical Advice Note 18: Transport. Cardiff, Welsh Government.

- Welsh Government (2008) Wales Transport Strategy. Cardiff, Welsh Government.
- Welsh Government (2013) Active Travel (Wales) Act. Cardiff, Welsh Government.
- Welsh Government (2015) Wellbeing of Future Generations (Wales) Act. Cardiff, Welsh Government.
- Welsh Government (2018) Planning Policy Wales: Edition 10. Cardiff, Welsh Government.

Leckwith Quays

Leckwith Road, Cardiff



Environmental Statement

Chapter 5: Ecology

October 2020

MAKING COMPLEX EASY

Mr Phil Worthing

rpsgroup.com

5 ECOLOGY AND NATURE CONSERVATION

5.1 Introduction

5.1.1 This chapter provides an Ecology Statement, the assessment has been prepared in accordance with the published Ecological Impact Assessment (EcIA) Guidelines (CIEEM, 2018).

5.1.2 An Ecology Assessment supports the chapter, which is included in the Appendices. The Assessment provides the outcomes of a preliminary ecological appraisal and targeted protected species surveys to date.

5.2 Assessment Methodology

Planning Policy Context

5.2.1 The following identifies the relevant planning policy background, guidance and legislation, the context of which the currently proposed development has been considered in light of. The following outlined policies, legislation and guidance have been used to inform and guide the surveys, mitigation and compensation measures advised and undertaken.

Key Planning policies

5.2.2 Planning Policy Wales Edition 10 (Welsh Government, 2018) summarises land use planning policy and provides a framework for the preparation of the Local Planning Authorities' development plans. A suite of Technical Advice Notes (TAN) accompany this. Of note, TAN 5 – Nature Conservation and Planning, advises and addresses key legislation, planning and development with regard to nature conservation, biodiversity and geological conservation.

5.2.3 Owing to the site spanning two counties, two local Development Plans are relevant to the current application: The Cardiff Local Development Plan and the Vale of Glamorgan Local Development Plan.

5.2.4 The Vale of Glamorgan Adopted Local Development Plan 2011-2026, which was formally adopted by the Council on 28 June 2017, within which the following policies are of relevance: Policy MG21 – Sites of Importance for Nature Conservation, Regionally Important Geological and Geomorphological Sites and Priority Habitats and Species Policy; MD9 – Promoting Biodiversity. The supplementary planning guidance: Biodiversity and Development is also of relevance to the determination of this application.

5.2.5 The Cardiff Local Development Plan, which was formally adopted on the 28th January 2016 contains the following relevant policies: EN1: Countryside protection; EN2: Conversion, extension and replacement buildings in the countryside; EN3: Landscape Protection; EN4: River Corridors; EN5: Designated sites; EN6 Ecological networks and features of importance for biodiversity; EN7: Priority Habitats and Species; EN8: Trees, Woodland and Hedgerows.

Relevant Guidance

Legislation

5.2.6 The following lists relevant legislation, the details of which can be found at Appendix 5.1:

- Conservation of Habitats and Species Regulations (2017);
- Wildlife and Countryside Act (1981);
- Protection of Badgers Act (1992);

- Environment (Wales) Act (2016);
- Well-being of Future Generations (Wales) Act (2015); and
- Countryside and Rights of Way Act (2000).

5.2.7 The following details the specific legislation and protections afforded to specific protected species that are a considered relevant to the site:

Best Practice Guidance and Other Information Sources

5.2.8 The following list details the relevant guidance to the survey, mitigation and reporting of the ecological features relevant to the site:

- Andrews, H (2018) Bat Roosts in Trees: A guide to identification and assessment for tree-care and ecology professionals. Pelagic Publishing, Exeter.
- Bat Conservation Trust (BCT 2018) Bats and Artificial Lighting in the UK Guidance Note. Bats and the built environment series. Bat Conservation Trust, London.
- Bibby, C J, Burgess, N D. Hill, D A & Mustoe, S H (2000) Bird Census Techniques, 2nd Edition. Academic Press, London.
- Bright, P, Morris, P & Mitchell-Jones, A (2006) The Dormouse Conservation Handbook (2nd Edition). English Nature, Peterborough.
- Bat Conservation Trust (BCT 2016) Bat Surveys – Good Practice Guidelines. 3rd edition. Bat Conservation Trust, London.
- Chartered Institute of Ecology & Environmental Assessment (CIEEM 2018) Guidelines for Ecological Impact Assessment in the United Kingdom & Ireland: Terrestrial, Freshwater & Coastal. CIEEM, Winchester.
- Chartered Institute of Ecology & Environmental Assessment (CIEEM 2013) Guidelines for Preliminary Ecological Appraisal. CIEEM, Winchester.
- Chartered Institute of Ecology & Environmental Assessment (CIEEM 2018) Guidelines for Ecological Impact Assessment in the UK and Ireland. CIEEM, Winchester.
- English Nature (EN 2004) Reptiles: Guidelines for Developers. English Nature. Peterborough.
- Froglife (1999b) Surveying for (Great Crested) Newt Conservation. Froglife Advice Sheet No. 11. Froglife, Halesworth.
- Froglife (1999) Reptile Survey: An Introduction to Planning, Conducting and Interpreting Surveys for Snake and Lizard Conservation. Froglife Advice Sheet No. 10. Froglife, Halesworth.
- Gent, T & Gibson, S (Eds) (1998) Herpetofauna Workers' Manual. Joint Nature Conservation Committee, Peterborough.
- Harris, S, Cresswell, P & Jefferies, D J (1988) Surveying Badgers. Mammal Society Occasional Publication 9.
- English Nature (EN 1995) Badgers: Guidelines for Developers. EN, Peterborough.
- Joint Nature Conservation Committee (JNCC 2007) Handbook for Phase 1 Habitat Survey: a Technique for Environmental Audit. NCC Peterborough.
- Mitchell-Jones, A J (2004) Bat Mitigation Guidelines. English Nature, Peterborough.

- Mitchell-Jones, A J & McLeish, A (2004) The Bat Worker's Manual (3rd Edition). Joint Nature Conservation Committee, Peterborough
- Nature Conservancy Council (NCC 1989) *Guidelines for the Selection of Biological SSSIs*. NCC Peterborough.
- Strachan, R & Jefferies, D J (1996) *Otter Survey of England, 1991-1994*. The Vincent Wildlife Trust, London.
- Wray, S, Wells, D, Long, E & Mitchel-Jones, T (2010) Valuing bats in Ecological Impact Assessment. In Practice 70: 23-25.
- Wales Biodiversity Partnership (WBP 2016a) *Section 7: List of the Habitats of Principal Importance for the Purpose of Maintaining and Enhancing Biodiversity in Wales* (Interim). Wales Biodiversity Partnership/ Welsh Government.
- Wales Biodiversity Partnership (WBP 2016b) *Section 7: List of the Living Organisms of Principal Importance for the Purpose of Maintaining and Enhancing Biodiversity in Wales* (Interim). Wales Biodiversity Partnership/ Welsh Government.

Study Area

5.2.9 The study area comprises the land proposed for the new development area, already described. This currently encompasses the Leckwith road roundabout, a section of the river Ely, the adjacent Leckwith quays industrial site and woodland further south of this. The site straddles two county boroughs: Cardiff and the Vale of Glamorgan. A desk study was undertaken seeking all biological records within a 2km radius of the site.

Baseline Methodology

5.2.10 The assessment has been prepared in accordance with the published Ecological Impact Assessment (EcIA) guidelines (CIEEM, 2018). This guidance sets out the EcIA process detailing the methodology to follow in undertaking EcIA for terrestrial, freshwater and coastal environments in the United Kingdom. Data generated from the desk study, Extended Phase 1 Habitat survey and subsequent detailed protected species surveys, were undertaken as follows, to establish the baseline condition.

The Zone of Influence

5.2.11 The zone of influence is considered largely confined to the site boundary, although adjacent habitats and sites could be subject to increased disturbance caused by increased visitor pressure and predation by pets. Where possible and where access was permitted further adjacent woodland areas to the south of the site were subject to survey for breeding birds, badger and dormouse.

Figure 5.1: Zone of Influence Map

Desk study

5.2.12 An ecological desk study was undertaken with the South East Wales Biological Records Centre (SEWBReC) to establish designated sites and protected/notable species within 2km of the site.

5.2.13 Previous surveys of the wider Leckwith quays site were also undertaken by DCE in 2013 incorporating further land and buildings to the far west of the site (that lie outside of, but adjacent to the current site boundary). The results of these are referred to where relevant.

Ecological Surveys

5.2.14 An Extended Phase 1 Habitat survey was undertaken in accordance with the JNCC (2016) survey methodology on the 19th June 2019 to establish the habitats present within the site boundary and determine further detailed protected species surveys considered necessary.

5.2.15 The following targeted protected species surveys were undertaken in accordance with the relevant, current best practice guidance. For detailed methodologies please refer to the guidance text specified:

- Dormouse nest tube surveys using at least 50 tubes and nut searches were made on a monthly basis between April and September (11th April 2019, 29th April 2019, 29th May 2019, 16th June 2019, 18th July 2019, 28th August 2019, 24th September 2019) in accordance with the methodologies set out by Bright and Mitchell-Jones (2006);
- GCN presence/absence surveys utilising bottle trapping, lamping, and netting techniques made on four visits between April and June (12th April 2019, 25th April 2019, 30th April 2019, 06th June 2019) in accordance with the methodologies set out by Froglife (1999). Egg searching was not adopted as a methodology in this circumstance owing to the lack of accessible vegetation;

- Boat based and bank side surveys along the river Ely for otter searching for evidence of use by otter including spraints, holts, anal jelly among other field signs were undertaken in accordance with the methodologies set out by Strachan and Jeffries (1996) (Undertaken on the 17th April 2019 (boat based),15th January and 14th September 2020 (bank based));
- Bat surveys including: building inspections, viaduct inspection and flight surveys (for built structures), and ground based tree assessment surveys to look for any evidence of use by bats and characterise roosts where possible, all of which were undertaken in accordance with BCT good practice guidance (2016) (surveys undertaken on the following dates: 1st July 2019, 2nd July 2019, 3rd July 2019, 29th August 2019, 13th September 2019, 18th September 2019, 25th September 2019, 15th January 2020); and 21st August – 8th September 2020;
- Breeding bird surveys were undertaken in accordance with methodologies set out by Bibby *et al* (2000) (Surveys undertaken on the following dates: 12th April, 24th April and 27th May).

Consultation

5.2.16 The below table summarises consultations with stakeholders or consultees (such as local planning authority) relating to ecological matters and how issues raised have been addressed.

Table 5.1: Consultation Responses Relevant to this Chapter

	tee and Issues Raised	here Addressed
Date	**Consultee and Issues Raised**	**How/ Where Addressed**
5th December 2019	Vale of Glamorgan Local Planning Authority: A full assessment of the potential of the site to support protected species is required.	A desk study, Extended Phase 1 Habitat survey of the site followed by a number of targeted protected species surveys has been completed.
2nd February 2020	Cardiff Local Planning Authority: "*The Council's ecologist advises that the Environmental Statement needs to consider impacts upon otters, nesting birds, foraging and commuting bats, and the riverine habitats of the River Ely SINC*." Environmental statements should demonstrate how the Impacts on ecosystems have been assessed. ES should include sufficient information to enable determination of environmental impacts on protected species and notified features of designated sites. Habitat surveys should accord with the NCC Phase 1 survey guidelines. Targeted protected species surveys should be undertaken in compliance with current best practice guidance, any deviations should be fully justified in the ES. Recommend the developer consults the local authorities' ecologist on the scope of work and contact local records centres, etc.	Impacts on otter, nesting birds, bats and riverine habitats have been fully considered herein. Impacts on ecosystems have been assessed implicitly throughout the assessment in light of the NRW state of nature report guidance. Surveys have been undertaken in accordance with current best practice guidance and any deviations have been explained within the chapter. A desk study with the local records centre has been undertaken.

Assessment Criteria and Assignment of Significance

5.2.17 In accordance with current CIEEM (2018) guidance, only the effect on important ecological features (IEFs) as defined by the guidance and expert judgment are considered in the impact assessment. IEFs are species and habitats (receptors) present within the zone of influence of the

proposed development that are considered to be of at least site importance, that will be impacted by the proposed development. Consideration is also given to legally protected species.

5.2.18 The value of sites, populations of species, species assemblages and habitats were evaluated in terms of both 'biodiversity conservation' value and legal status.

5.2.19 For the purpose of this assessment, sites, species populations, species assemblages and habitats were valued using the following geographical scale:

- International;
- United Kingdom;
- National;
- Regional;
- County;
- District;
- Local; and
- Less than local, within the zone of influence only (Site).

5.2.20 Established systems and selection criteria are used in the valuing of site significance (e.g. SSSIs are of national importance, SINC are of county importance). For anything of less than district level value professional judgement has been used.

5.2.21 Having identified the ecologically important features likely to be affected by the development the following characteristics are used to determine significance:

- Positive or negative;
- Extent;
- Magnitude;
- Duration;
- Reversibility; and
- Timing and frequency.

5.2.22 Significance is assessed as Adverse, Beneficial or Not Significant on the integrity of an IEF and / or the conservation status of IEFs within a given geographical area.

Cumulative Effects

5.2.23 Cumulative impacts have also been considered whereby impacts resulting from the proposal in the context of other known proposed developments in the area. The scope of the cumulative assessment has been limited to within ~1 km of the site as the predicted effects are localised and generally occur within this distance from the proposed development site.

5.2.24 The cumulative assessment includes the following, where information is available:

- Approved but uncompleted projects;
- Consented but not yet implemented permissions; and
- Sites included / allocated in development plans / documents.

5.2.25 A search of the Cardiff and Vale of Glamorgan planning portals was completed (between 27th February and 13th March 2020) to obtain this information.

Receptor Value

5.2.26 The value of the receptors has been rated according to the following definitions:

Table 5.2: Definitions of Sensitivity or Value

Sensitivity	Descriptors
Very High International (European)	Very high importance and rarity, international scale and very limited potential for substitution. Habitats: Internationally designated sites (or candidate sites) or areas that would meet the published selection criteria for such a designation. An area of Annex I (Habitats Directive) listed habitat type, which is essential to maintain the viability of a larger whole. Species: Any regularly occurring nationally significant population or number of internationally important species, or a regularly occurring significant population of threatened or rare in the UK (i.e. a UK Red Data Book species).
High National (UK)	High importance and rarity, national scale, and limited potential for substitution. Habitats: A nationally designated site, or an area, which would meet the published selection criteria for such a site. Species: Any regularly occurring population or number of internationally / nationally important species of significance at the county or district level. Any regularly occurring population of a nationally important species, threatened or rare in the region or county (listed under Section 7 of the (Environment (Wales) Act 2016).
Medium Regional and County	High or medium importance and rarity, regional scale, limited potential for substitution. Habitats: Designated sites of county level importance e.g. SINCs and LNR or areas of land that meet the SINC selection criteria or areas of habitat identified in LBAP. Species: A regularly occurring, locally significant population of a species listed as nationally scarce and/or a regularly occurring, locally significant population / number of a regionally important species. Sites maintaining populations of internationally / nationally important species that are not threatened or rare in the region or county. Species: Any regularly occurring, locally significant population of a species listed in a LBAP due to regional rarity or localisation. A regularly occurring, locally significant population of a county/district important species. Sites supporting populations of internationally / nationally / regionally important species that are not threatened or rare in the region or county and not integral to maintaining those populations.
Low Local and Site	Low or medium importance and rarity, local scale. Habitats: Areas of habitat that appreciably enrich the local habitat resource (e.g. species-rich hedgerows, ponds). Sites that retain other elements of semi-natural vegetation that, due to their size, quality or the wide distribution within the local area, are not considered for the above classifications. This also includes areas of modified and/or managed vegetation of low species diversity and/or low value habitat to species of nature conservation interest. Species: Populations / assemblages of species that enrich the biodiversity resource at the local context. Sites supporting populations of species of county / district significance but that are not threatened or rare in the region or county context, and that are not integral to maintaining populations. This also includes common and/or widespread species.
Negligible	Very low importance and rarity, local scale.

5.2.27 With respect to breeding birds the below table has been used to inform identification of bird species IEFs. Birds identified as species of nature conservation concern (e.g. amber or red listed in Eaton et al, 2015 and/ or Jonstone and Bladwell 2016), along with Biodiversity action plan species and schedule one listed species were given special consideration as IEFs.

Table 5.3: Birds of Conservation Concern Criteria

Birds of Conservation Concern Criteria	Criteria
Red List Criteria	Globally threatened Historical population decline in UK during 1800-1995 Severe (> or = 50%) decline in UK breeding population over last 25 years Severe (> or = 50%) contraction of UK breeding range over last 25 years
Amber List Criteria	Historical population decline during 1800–1995, but recovering; population size has more than doubled over last 25 years Moderate (25-49%) decline in UK breeding population over last 25 years Moderate (25-49%) contraction of UK breeding range over last 25 years Moderate (25-49%) decline in UK non-breeding population over last 25 years Species with unfavourable conservation status in Europe (SPEC = Species of European Conservation Concern) Five-year mean of 1–300 breeding pairs in UK > or =50% of UK breeding population in 10 or fewer Sites, but not rare breeders > or =50% of UK non-breeding population in 10 or fewer Sites > or =20% of European breeding population in UK > or =20% of NW European (wildfowl), East Atlantic Flyway (waders) or European (others) non-breeding populations in UK
Green List Criteria	No identified threat to the population's status

5.2.28 With respect to roosting bats, survey data has been evaluated in light of the below detailed criteria as set out by Wray et al (2010):

Table 5.4: Bat Roost Evaluation Criteria

Geographic frame of reference	Roost Types
District, local, parish	Feeding perches (Common species) Individual bats (Common species) Small numbers of non-breeding bats (common species) Mating sites (common species)
County	Maternity sites (common species) Small numbers of hibernating bats (common and rarer species) Feeding perches (rarer/rarest species) Individual bats (rarer/rarest species) Small numbers of non-breeding bats (rarer/rarest species)
Regional	Mating sites (rarer/rarest species) including well used swarming sites Maternity sites (Rarer species) Hibernation sites (Rarest species) Significant hibernation sites for rarer/rarest species or all species assemblages

National/UK	Maternity sites (rarest species) Sites meeting SSSI guidelines
International	SAC sites

Magnitude of Impact

5.2.29 Assessment of the magnitude of an impact on an IEF is quantified where possible and assessed using professional judgement through which each IEF is attributed to one of the four following classes of magnitude as defined in Table 5.5. Impacts can be permanent, temporary, direct, and indirect and can be cumulative, these factors are used to assess magnitude.

Table 5.5: Definitions of Magnitude

Magnitude	Descriptors
High	Permanent or long term impact such as loss of resource and/or quality and integrity of a site, habitat, species assemblage or community, population or group; severe damage to key characteristics, features or elements (Adverse).
	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Moderate	A permanent or long term reversible impact, such as loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse).
	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Low	Short term, reversible impacts such as some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse).
	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse).
	Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).
No change	No loss or alteration of habitats, features or species; no observable impact in either direction.

Significance of Effects

5.2.30 This method for determining ecological significance utilised in this assessment follow CIEEM (2018) guidelines for ecological impact assessment, the current industry best practise approach.

Significance is assessed as:

Adverse;

Beneficial; or

Not Significant, on the integrity of an IEF and / or the conservation status of IEFs within a given geographical area.

5.2.31 Effects occur at different spatial scales and as such where significant ecological effects are predicted, the relevant spatial scale is also provided. In some situations, an effect may not be significant at the level at which the IEF has been valued but may still be significant at smaller geographical scales.

5.2.32 Where an effect below the assigned threshold level (i.e. Site level) has been predicted, this has been scoped out of the assessment and is not considered any further throughout the remainder of the impact assessment, unless there are legal implications associated with the effect.

5.2.33 In considering the integrity and conservation status of the IEF it is considered whether any ecosystem processes would be removed, altered or disturbed. Any potential effects on the structure and function of component habitats and the effect on population size and viability of component species were all considered. For species and habitats of principal importance significance of effects is considered in the context of conservation status of each species or habitat and their recent population trajectories, where known.

5.2.34 In determining the significance of a potential effect, the above factors and the value of the receptor, magnitude of the potential impact, and the duration of the impact have been considered.

5.2.35 The significance of the impacts has been assessed for each IEF for both the construction and operational phases of the proposed development separately.

5.2.36 The assessment of residual effects has utilised a matrix like approach suggested by Box et al (2017). This categorises residual impacts as per the below table.

Table 5.6 Box et al Categories of significant residual effects

Geographical scale at which the residual effect assessed as being significant following CIEEM EcIA guidelines	Category of significant residual effects
International, European, national or regional	Major
Regional, metropolitan, county, vice-county or other local authority-wide area	Moderate
Local	Minor

5.2.37 Effects on ecosystems have been implicitly considered within the assessment of IEFs through the construction and operational phases. They have been considered in light of guidance provided by NRW state of Nature report.

Limitations of the Assessment

5.2.38 A number of constraints on the current survey effort were encountered and are listed below with details of how limitations have been addressed:

5.2.39 Dormouse surveys were impacted by vandalism of the deployed nest tubes. A total of ninety-six tubes were originally deployed, approximately half of these were subject to vandalism therefore reducing the number of tubes to 50 throughout the survey period. The vandalism was prevalent in the habitats adjacent to the site. The tubes deployed in the on-site woodland to the south of the site were not subject to any vandalism and a total of 50 tubes were maintained throughout the duration (in accordance with current guidance), as a result the vandalism is not considered to have imposed a major constraint on the survey results or the assessment.

5.2.40 The bat surveys were constrained to some extent by limited internal access during the building inspections, with access to some of the buildings being unavailable, others had health and safety concerns that limited extensive searching and/or entering of loft interiors. Therefore, it was not possible to carry out internal site inspections for a number of the buildings, however any such buildings were subject to two emergence/re-entry surveys to address this limitation.

5.2.41 The tree surveys for bats were constrained by the following factors: Extensive ivy obscuring the view of many trees on site and extensive dense scrub limiting close access to some groups of trees. Ground based surveys are always constrained by the physical ability to view the tree,

therefore only potential features on the visible parts of the tree are recorded and any features present on the upward facing side of branches will not be recorded.

5.2.42 The previous report (DCE 2014) recommended that reptile refugia surveys should be carried out on sections of the site with potential to support common reptiles. However, it was not possible to leave refugia mats out, due to the industrial and heavily used nature of the site. Therefore, presence of common reptiles has been assumed based on suitable habitat availability for the purposes of this assessment.

5.3 Baseline Environment

Desk Study

5.3.1 The following results were returned in the desk study (For full results please refer to the DCE (2020) report at the Appendix 5.2):

Designated sites

Statutory sites

5.3.2 The site does not contain any statutory sites of conservation interest however three statutory sites exist in the local vicinity as detailed below.

5.3.3 The Cwm Cydfin, Leckwith Site of Special Scientific Interest (SSSI) lies just under 1km to the south-east of the site. This site is designated for an area of mixed deciduous woodland and rich ground flora adjacent to saltings of the River Ely in a valley overlying Triassic Marls and Rhaetic rocks which are locally exposed in cliffs beside a tidal creek. Cwm Cydfin SSSI is set within the larger Leckwith Woods complex which also contains the woodlands which extend past and around the proposed development site. This site is valued to be of High sensitivity.

5.3.4 Approximately 2km downstream from the site the River Ely enters Cardiff Bay, which forms part of the Severn Estuary. The Severn Estuary itself is a very highly designated site, being both a 'Special Protection Area' (SPA), a 'Special Area of Conservation' (SAC), a Ramsar Site and a SSSI. The Severn Estuary is designated for international importance for the breeding, feeding, wintering and migration of rare and vulnerable species of birds, a number of fish and lamprey species, reef and sandbank habitats. The Severn Estuary as such is considered to be of very high sensitivity.

5.3.5 The upper reaches of the River Ely are also designated as a SSSI in the section which stretches from Miskin almost to St Fagans, but this is approximately 5km away from the site. In addition to supporting rare plants such as monkshood (*Aconitum napellus*) and various uncommon birds such as kingfisher, the River Ely is notable in supporting a flourishing population of otter and various migratory salmonids and other fish of conservation interest, and a wide range of uncommon aquatic plants and invertebrates. As such the River Ely SSSI is considered to be of High sensitivity.

Non-Statutory sites

5.3.6 The site contains two non-statutory designated SINC sites: The River Ely and Factory Wood. A further four designated SINCs occur in the study area. Part of the Factory Wood Site of Importance for Nature Conservation (SINC No. 188) occurs within the site boundary. This SINC, which is designated by the Vale of Glamorgan Council, is very extensive extending well outside the proposed development area to the south and south-west and containing the Cwm Cydfin SSSI. The SINC is designated as an extensive area of broadleaved woodland, comprising a mixture of ancient semi-natural woodland, replanted ancient woodland and secondary broadleaf woodland. As a site of county value it is considered to be of Medium sensitivity.

5.3.7 The River Ely, which runs to the north-east of the site, is also designated as a SINC due to its importance for migratory fish, otters, wildfowl and bankside vegetation and forms a major wildlife corridor. As a site of county value it is considered to be of medium sensitivity.

5.3.8 Other SINCs occur within about 1km of the site. These include the West Hill Wood SINC (VGC SINC No. 187) and the Canton Common Ditch SINC, about 300m to the north-east. The Leckwith Woods Viaduct SINC lies about 250m to the north of the site, and is designated for supporting a roost of the rare and protected lesser horseshoe bat. The Leckwith Pond & Marsh SINC lies on the east side of the river, about 1.25km to the south-east of the site. The latter three sites are all designated by Cardiff Council. Given the distance of other SINCs in the area from the site, no pathways of interactions are considered likely to occur and therefore these SINCs are not considered any further within this document.

5.3.9 The great majority of the Leckwith Woods complex, including the sections of Leckwith Wood and Factory Wood which lie immediately adjacent to or fall within the site, are recorded as 'Ancient Semi-Natural Woodlands' (ASNW). Any area of ASNW automatically qualifies as a SINC according to the Guidelines for the Selection of Wildlife Sites in South Wales (WBP 2008) and is therefore covered by any SINC related policy. As a site of county value it is considered to be of medium sensitivity.

Fauna

Bats

5.3.9 SEWBReC data (Ref: 0189-683) identified the closest bat record as two pipistrelles seen foraging during the daytime over the Ely river within the site. In terms of roosts, a lesser horseshoe bat roost is recorded at the Leckwith Woods Viaduct SINC site, which lies immediately to the north of the site just beyond the northernmost site boundary. Additionally, records of maternity roosts of brown long eared bat, common and soprano pipistrelle are recorded less than 300m from the site. There are also foraging records in the general vicinity for both common and soprano pipistrelle, lesser horseshoe bat and several other unspecified bat species.

5.3.10 Surveys by DCE in 2013 found 5-6 common pipistrelle bats roosting in Building 2. A single common pipistrelle roosting in Building 4 and a single brown long-eared roosting in building 8. Significant foraging and commuting activity was detected across the site by soprano pipistrelle and occasional common pipistrelle. Amongst the pipistrelle calls there were also several passes by Myotis species and Nathusius' pipistrelle.

Dormouse

5.3.11 The SEWBReC data search returned no records for this species within 1km of the site, although the NBN Gateway shows that there are some records in the wider vicinity.

Otter

5.3.12 The SEWBReC data search yielded records of this species in the immediate vicinity of the site, including a record of spraint under 'Leckwith Bridge' (ie near the site entrance) in 2002. Otter is known to range along the River Ely, having been recorded on numerous occasions in the last decade or so, and presumably passes through the section of the river which runs alongside the site with some frequency.

Badger

5.3.13 The SEWBReC data search returned a record of a badger latrine within the Leckwith Woods, parts of which extend into the site, although the latrine record falls outside of the site boundary.

Other mammals

5.3.14 Harvest mouse and polecat, both Priority Species of the UK BAP and its Welsh equivalent, have been recorded in the vicinity. The habitats of the site, including the remaining semi-natural habitats, are not considered suitable for the former but the latter could possibly occur. European hedgehog, also a Priority Species, has also been recorded in the vicinity and a dead individual of this species was seen on the site in the 2013 survey inside one of the buildings.

Birds

5.3.15 There are nearby records for pied wagtail, black headed gull, dunnock and song thrush and many records from the surrounding area (SEWBReC data, Ref: 0189-683). In particular there are numerous records for barn owl, a Schedule 1 bird in the vicinity. However, there are no suitable nesting sites on the site itself for this species and foraging activity is more likely to occur in the open countryside to the south and west than on this site.

5.3.16 During surveys undertaken by DCE in 2013 common bird species were heard calling on the site. These included long-tailed tit, blackbird, robin and goldfinch in the adjacent woodland canopy. Kingfisher, a Schedule 1 species, was seen flying along the River Ely during one site visit and was assumed to be nesting nearby – steep sections of riverbank alongside the site could potentially be suitable for this species.

Reptiles

5.3.17 Records of reptiles are fairly limited in the area, with only a few records of slow-worm and grass snake occurring within 1km of the site and many of these records are historic (SEWBReC data, Ref: 0189-683). Grass snake records were returned for the Leckwith Woods which border the site and extend within it. This species is primarily associated with freshwater habitats, so might be expected to occur on the site in the riverside and pond habitats, for example. Slow-worm commonly occurs in rough grassland habitats, and so might also be expected to occur.

Amphibians

5.3.18 Common frog and smooth newt are both recorded from the Canton Common Ditch SINC, which lies approximately 250m to the north-west of the site. These species, together with common toad, are also recorded from other locations near the site. There do not, however, appear to be any records for the rare and specially protected great crested newt from anywhere within 1km of the site.

Invertebrates

5.3.19 Comparatively few notable invertebrate species have been recorded in the vicinity of the site (SEWBReC data, Ref: 0189-683) although the River Ely and its catchment are known to provide habitats for a wide range of aquatic and riparian species, including dragonflies and damselflies, some of which are of rare or restricted occurrence. The adjacent ancient semi-natural woodlands also have records of a wide range of characteristic species, including some rare and notable species. The probability that any protected, rare or especially notable species occur or are particularly dependant on the site itself is currently considered to be low, however, although not impossible. There are old records (<1916) of the Red Data Book horsetail weevil (Grypus equiseti) from the Leckwith Woods, for example, and it is not inconceivable that this poorly-studied species could still occur in the stands of great horsetail which occur in the south of the site, for example, but if so this species would almost certainly not be confined to the site. A small number of records for marsh fritillary were returned from over 1km from the site, all these records are historic, and the site does not support suitable habitat nor any devil's bit scabious, to support this species. Therefore, it is considered highly unlikely that marsh fritillary occurs on the site.

Ecology Surveys

5.3.20 The following surveys were undertaken by DCE in 2019 and 2020:

- Extended Phase 1 habitat survey – 19th June 2019.
- Otter survey – 17th April 2019 (boat based) and 15th January and 14th September 2020 (bank based).
- Breeding bird surveys - 12th April 2019, 24th April 2019 and 27th May 2019.
- Bat building and viaduct inspections and flight surveys – 1st July 2019, 2nd July 2019, 3rd July 2019, 29th August 2019, 13th September 2019, 18th September 2019, 25th September 2019, 15th January 2020.
- GCN pond surveys – 12th April 2019, 25th April 2019, 30th April 2019, 06th June 2019.
- Dormouse surveys – 11th April 2019, 29th April 2019, 29th May 2019, 16th June 2019, 18th July 2019, 28th August 2019, 24th September 2019.
- Ground based tree assessments for bats – 15th January 2020 and 21st August – 8th September 2020.
- Badger survey – 29th March 2019.

Extended Phase 1 Habitat survey

5.3.21 The extended Phase 1 habitat survey found a number of protected habitats within the site including: broad leaved woodland, pond, and river corridor. Additionally, it was found that the site as a whole supports sufficient botanical indicators to be qualify as a SINC under the selection criteria for Post Industrial Land. See below for habitats and descriptions.

Invasive Non-Native Plant Species

5.3.22 There are some large stands of Japanese knotweed (*Fallopia japonica*) in various locations around the site. There is also Himalayan balsam (*Impatiens glandulifera*) on the site. Both of these species are listed on Schedule 9 of the Wildlife and Countryside Act.

5.3.23 Buddleia (*Buddleja davidii*) and Himalayan honeysuckle (*Leycesteria formosa*) are also present extensively on the site. Although not currently subject to any statutory regulation, these non-native species are highly invasive on disturbed ground and can spread into native habitats (e.g. scrub, woodland, grassland) at the expense of native species.

Riparian Woodland

5.3.24 To the north-west of the development boundary, alongside the Ely trail, lies an area of riparian woodland (Approx. 0.2ha area). Significant stretches of this habitat occur further off site, along the north east river edge and further north and south of the site along the River Ely. Tree species within this area include field maple (*Acer campestre*), ash (*Fraxinus excelsior*), sycamore (*Acer pseudoplatanus*), hawthorn (*Crataegus monogyna*), birch (*Betula sp.*), hazel (*Corylus avellana*) and elder (*Sambucus nigra*). Clambering woody species, such as ivy (*Hedera helix*), dog rose (*Rosa canina*) and wild clematis (*Clematis vitalba*) are frequent in this area. Species among the ground flora include cleavers (*Galium aparine*), herb-Robert (*Geranium robertianum*), dog's mercury (*Mercurialis perennis*), wood avens (*Geum urbanum*) and pendulous sedge (*Carex pendula*).

Broad-leaved Woodland

5.3.25 Constituting the south-west boundary of the site, lies an extensive area of deciduous broad-leaved woodland (Approx 1.85ha). Extensive woodland occurs immediately offsite, with approximately 17ha occurring immediately beyond the south western site boundary and extending further north

and south beyond the boundaries of the site. Tree species dominating the canopy comprise sycamore and ash. The understory shrub layer consists of hazel, elder, hawthorn, blackthorn (*Prunus spinosa*), field maple and dogwood (*Cornus sanguinea*), while woody-climbing species such as bramble (*Rubus fruticosus agg.*), dog rose, honeysuckle (*Lonicera periclymenum*), black bryony (*Tamus communis*) wild clematis and ivy are found throughout the woodland area.

Dense Scrub

5.3.26 Within the site, situated along the River Ely lies a narrow strip of vegetation dominated by dense scrub, with species such as buddleia, alder *(Alnus glutinosa*), grey willow (*Salix cinerea*), goat willow (*Salix caprea*) comprising the community. Scrub also occurs in locations close to the on site woodland edge (Approximately 0.55ha total coverage).

Ephemeral / Short Perennial Vegetation

5.3.27 To the centre of the site, lies an area (Approx 0.15ha) of short perennial / ephemeral vegetation. Vegetative ground cover within this area is very sparse, with grasses such as cock's foot (*Dactylis glomerata*), creeping bent (*Agrostis stolonifera*), soft brome (*Bromus hordeaceus*) and crested dog's tail (*Cynosurus cristatus*) only occasionally found. Forbs, such as common spotted orchid (), purple toadflax (*Linaria purpurea*), yellow wort (Blackstonia perfoliata), perforate St. John's wort (*Hypericum perforatum*), black medick (*Medicago lupulina*), red valerian (*Centranthus ruber*), white clover (*Trifolium repens*), willowherb (*Epilobium* sp.), ribwort plantain (*Plantago lanceolata*), selfheal (*Prunella vulgaris*), ragwort (*Senecio jacobaea*), oxeye daisy (*Leucanthemum vulgare*), common knapweed (*Centaurea nigra*), glaucous sedge (Carex *flacca*), tufted vetch (*Viccia cracca*) and common bird's-foot trefoil (*Lotus corniculatus*), comprise the species present within this area.

Tall Ruderal / Neutral Grassland Mosaic

5.3.28 Situated within the south of the site lie a number of small areas of mixed habitat, (Approx 0.05ha total coverage) comprising a mosaic of damp neutral grassland and tall ruderal vegetation. Species within the damp regions include soft rush (*Juncus effusus*) and hard rush (*Juncus inflexus*). Grassland dominates the vegetation in this area, with soft brome, crested dog's tail, common bent (*Agrostis capillaris*), creeping bent, Yorkshire fog (*Holcus lanatus*), glaucous sedge and grey sedge (*Carex divulsa*). Forbs within the grassland include common vetch (*Vicia sativa*), white clover, meadow buttercup *(Ranunculus acris*), creeping buttercup (*Ranunculus repens*), common knapweed, fleabane, selfheal, silverweed (*Potentilla anserina*), red clover (*Trifolium pratense*), common bird's-foot trefoil and germander speedwell. Interspersed throughout, and dominating in certain areas, lie areas of tall ruderal vegetation, with species such as greater willow herb (*Epilobium hirsutum*), creeping thistle (*Cirsium arvense*), teasel (*Dipsacus fullonum*), field horsetail (*Equisetum arvense*), comfrey and colt's foot (*Tussilago farfara*).

Standing Water Bodies

5.3.29 Within the northern portion of the site, within the premises of a residential dwelling (Building 3), lies a man-made pond of approximately 10m^2 surface area. Species present within the pond consist of ornamental cultivars, with extensive duckweed (Lemna minor) growth across the surface. The pond is situated within a concrete steep-sloped basin, with hardstanding surrounding the entire perimeter.

River Ely

5.3.30 A stretch of (approximately) 550m long section of the River Ely flows through the site from north-west to south-east. Dense common reed vegetation line regions of the watercourse, while the majority is bordered by dense scrub and riparian woodland.

Hardstanding & Buildings

5.3.31 Hardstanding areas occur across the majority (Approx. 2 ha of hardstanding across site) of the northern section of the site; this area consists of industrial business units, office units, residential dwellings and associated infrastructure. Surface materials range from tarmac, paving, ballast, gravel and bare earth.

Fauna Survey Results

Bats

5.3.32 Internal inspections were possible for only some of the buildings on site, see DCE (2020) for full details. The other buildings of the site were therefore assessed from the exterior only. The results of the inspection are as set out in Table 5.7 below:

Table 5.7: Building Inspection Results

Building Number	Bat Potential
1	Moderate to high potential
2	Confirmed bat roost
3	Confirmed bat roost
4	Confirmed bat roost
5	Low potential
6	Confirmed bat roost
7	Negligible potential
8	Confirmed bat roost
9	Moderate potential
10	Moderate potential
13	Moderate potential
14	Moderate potential

5.3.33 Two flight surveys were undertaken for each building except for building 5 where it was considered that this building was low potential and therefore received one flight survey and building 7 which had negligible potential and therefore no flight surveys were considered necessary. Results of the flight surveys are set out in the below table 5.8. For full details please refer to the DCE (2020) report.

Table 5.8: Bat Flight Survey Results

Building Number		Dusk/ Dawn	Number of surveyors	Results
Viaduct	01/07/2019	Dusk	7	Significant soprano pipistrelle activity over the river and a possible emergence under the viaduct. Foot bridge possible roosting place.
Viaduct	13/09/2019	Dawn	7	A lot of soprano pipistrelle activity and some common pipistrelle and noctule activity – no emergence

1	25/09/2019	Dusk	2	Common and soprano pipistrelle activity heard – no emergence
1	03/07/2019	Dusk	2	Foraging and commuting pipistrelles – no emergence
2	03/07/2019	Dusk	3	Noctule and pipistrelles flying over – no emergence
2	25/09/2019	Dusk	3	Soprano pipistrelle activity – one possible soprano pipistrelle emergence from western elevation
3	03/07/2019	Dusk	2	Pipistrelle and noctule heard – one emergence from gable end at 21:46 – unknown species (no echolocation)
3	18/09/2019	Dusk	2	Pipistrelles and noctule commuting – no emergence
4	03/07/2019	Dusk	3	Pipistrelle and noctule activity – one possible soprano pipistrelle emergence from north east elevation from under board above rolling door at 22:28.
4	18/09/2019	Dusk	3	Pipistrelles and noctule commuting – no emergence
5	18/09/2019	Dusk	1	Pipistrelles commuting – no emergence
6	18/09/2019	Dusk	6	Pipistrelles and noctule commuting – no emergence
6	29/08/2019	dawn	6	Soprano and noctule activity heard – no re entry
8	29/08/2019	dawn	2	1 brown long eared bat using the building throughout the survey. Night roost and possible day roost.
8	18/09/2019	Dusk	2	One brown long eared bat emerged from doorway at 19:47 and two likely pipistrelles emerged from door lintel on southern elevation at 20:09 (no echolocation to confirm species ID).
9	01/07/2019	Dusk	1	Foraging and commuting pipistrelles – no emergence
9	03/07/2019	Dusk	1	Pipistrelles commuting – no emergence
10	03/07/2019	Dusk	2	Noctule and pipistrelles heard – no emergence
10	25/09/2019	Dusk	2	Soprano pipistrelle commuting activity – no emergence
13	25/09/2019	Dusk	2	Soprano pipistrelle emerged from gable end (western elevation) at 18:58. Common pipistrelle and noctule detected.
13	29/08/2019	dawn	2	Soprano pipistrelle activity and one soprano entered building at gable end apex (western elevation) at 05:46.
14	29/08/2019	dawn	4	Pipistrelle activity heard. One soprano pipistrelle entered building under gap of corrugated metal roof at 06:04. Second soprano pipistrelle bat possibly entered under fascia.
14	25/09/2019	Dusk	4	Soprano pipistrelle emerged from open garage on northern elevation at 19:29. A soprano pipistrelle emerged from ridge at 19:26.

5.3.34 An initial ground based visual inspection of all trees on site was undertaken on the 15th January 2020.The area of woodland likely to be affected by the development, including trees within 5m of the development boundary was marked out on the ground in August 2020. These trees were surveyed in detail from the ground between 21st August and 8th September 2020. Many of the trees in the woodland have extensive thick stemmed ivy that could be used as a feature by bats or could be obscuring other potential features. One hundred and eighty mature/ semi-mature woodland trees are likely to be affected by the proposed development. Seven trees are assessed as having moderate potential to support roosting bats.

Dormouse

5.3.35 Targeted surveys for dormouse found no evidence or field signs of dormouse (mice in situ, nests or chewed nuts) during any survey visit, therefore it is considered likely that dormouse are absent from the site.

Otter

5.3.36 Evidence of otter was found during the boat-based survey, this included anal jelly and a possible otter spraint close to the overpass that runs through the centre of the site. Some footprints were found in silty mud bank habitats, as well as an otter slide 400m north of the overpass, outside of the site boundary. No evidence of holts were found during the surveys; however, the use of the site by otter for nesting cannot be ruled out entirely.

Badger

5.3.37 During the badger survey, evidence of badger was found off site but close to the site boundary in the southern portion of the site. A main sett was found with evidence of recent usage including seven used entranceways, fresh spoil, latrines and snuffle pits.

Birds

5.3.38 Breeding bird surveys undertaken in 2019 found evidence of a range of common, as well as less common species likely to be nesting on the site including a number of priority species / species of conservation concern, such as house sparrow, dunnock, song thrush, bullfinch and willow warbler. Kingfisher was observed on the River Ely. It is possible that this species could nest on the riverbank within the site boundary.

Reptiles

5.3.39 Common reptile species are difficult to detect in the field without recourse to targeted Phase 2 survey methods. Due to the nature of the site being a highly disturbed working industrial estate, surveys would be difficult to carry out for reptiles. Reliance was therefore placed on the subjective assessment of the habitats of the site with respect to their potential as dispersal, foraging and hibernating grounds for common reptiles, based on previous experience and on published information. Based on the habitats present and the available corridors of connectivity to suitable habitat in the wider region it is considered reasonable to assume that low numbers of reptiles use the site.

Amphibians

5.3.40 The site supports at one pond which was subject to targeted survey for GCN. Palmate and small numbers of smooth newt were detected but no GCN were recorded on any survey event. It is therefore considered that great crested newts are likely absent.

Ecosystem Services

5.3.40 The site is considered to provide the following ecosystem services relevant to the ecology of the site;

- Genetic resources, genes and genetic information provided by the flora and fauna diversity of the site;
- Pollination;
- Habitat;
- Nutrient cycling (including carbon sink); and
- Water cycling.

5.3.42 The following table sets out the IEFs and their sensitivity:

Receptor	Sensitivity of receptor
Severn Estuary SPA	Very high
Severn Estuary SAC	Very High
Cwm Cydfin SSSI	High
River Ely SSSI	High
River Ely SINC	Medium
Factory Wood SINC	Medium
Post Industrial Land SINC quality habitat	Medium
Riparian Woodland	Medium
Broad-leaved Woodland	Medium
Tall Ruderal / Neutral Grassland Mosaic	Low
Pond	Low
Bats	Medium
Badger	Low
Otter	Medium
Reptiles	Low
Birds	Medium
Invertebrates	Negligible

Future Baseline Conditions

5.3.41 Global warming is projected to increase by a further degree within the next two decades. However, global temperatures could rise to 4°C above preindustrial levels by the end of the next century with summer maximum temperatures rising by up to 10°C in some parts of the United Kingdom.

Winters are predicted to become wetter and summers drier with more severe weather events. Sea levels have been rising as a result of global warming over the past century and are predicted to continue to rise.

5.3.42 The woodland may be at risk from pests and disease (such as Ash dieback) and the continued risk of newly introduced tree diseases and pests that may be brought into the UK in the future. Large parts of the site form hardstanding that would unlikely be affected by any global warming projections. However, given the site's proximity to the coast, along with other predicted factors (predicted sea level rise, increase in wetter winters, storm prevalence and extreme weather events) it is considered that low lying habitats of the site, could become wetter which may have the effect of transitioning habitats within the site over time (See Chapter 7: Flooding and Hydrology).

5.3.43 Species ranges are anticipated, and in some cases already demonstrated, to be moving towards a more northerly distribution and to higher elevations Grabherr et al (1994); IPCC (1998); Parmesan (1996); Parmesan et al (1999) and Thomas and Lennon (1999). These results of global warming could see species assemblages and composition change within the site.

5.4 Mitigation Measures Adopted as Part of the Project

Designated Sites

River Ely SINC

Mitigation

5.4.1 The wooded banks of the river Ely are to be retained and will act as a buffer to ensure the continued use and protection of the habitat as a corridor for wildlife.

5.4.2 Appropriate pollution control measures will be implemented during construction and post development to prevent possible pollution events with buffers of 8m to be maintained. Any lighting strategy for the site is to be carefully reviewed in liaison with an ecologist to ensure that the river is not subject to lighting, particularly at night.

5.4.3 Retained habitats will be suitably fenced off to prevent any accidental damage or degradation during construction. Materials storage, mixing areas, refuelling areas, haul routes and site compounds etc should not be located adjacent to any such habitats.

Compensation

5.4.4 No compensation measures proposed.

Enhancement

5.4.5 No enhancement measures proposed.

Factory Wood and Leckwith Wood SINC

Mitigation

5.4.6 Minimal woodland is to be removed from the SINCs, and as much woodland habitat will be retained within the site as possible.

5.4.7 All retained habitats will be fenced off during construction to ensure no accidental damage or degradation of these areas occur.

5.4.8 Any dead wood from areas to be lost will be retained and placed in new wooded corridors to be created within the developed site to preserve saproxylic insect fauna and fungal associations.

5.4.9 Retained habitats will be suitably fenced off to prevent any accidental damage or degradation during construction. Materials storage, mixing areas, refuelling areas, haul routes and site compounds etc should not be located adjacent to any such habitats.

Compensation

5.4.10 Where woodland areas and/or individual trees are to be lost, an equivalent sized area/ number of trees will be replaced using native broadleaved species of local provenance in keeping with the species assemblage currently found in the woodland.

Enhancement

5.4.11 A habitat management plan of retained woodland areas (and other habitats) within the site will be drawn up to ensure the continued habitat quality and enhancement of these areas into the future.

Post Industrial Land SINC quality habitat

Mitigation

5.4.12 The post-industrial land SINC is to be lost to the development. Parcels of land spread throughout the site although when considered in their entirety meet criteria for consideration as a SINC, the individual parcels that form this are of relatively low quality habitat. Owing to the spread nature of the parcels and the extent of the development it is not considered possible to mitigate on a like for like basis within the developed site. Therefore, an alternative strategy has been devised to offset the loss of this habitat (See below Enhancement).

Compensation

5.4.13 No compensation.

Enhancement

5.4.14 To offset the loss of post-industrial land SINC quality habitat supported within the site, new areas of high quality wetland habitat of high ecological value will be created surrounding the two sustainable drainage basins within the newly developed site. This will be created using native species which are indigenous to the locality, using planting stock which is of local or at least UK provenance.

Other designated sites

5.4.15 Designated sites on the river located downstream of the site have potential to be impacted by pollution, this will be mitigated by suitable pollution measure controls and an 8m buffer between the site and the river to be maintained through construction and operational phases. The development is largely confined to the site boundary and therefore it is not considered that any other designated sites within the vicinity, other than those mentioned above are likely to be impacted by the development.

Habitats

Invasive Non-native species

5.4.16 Specialist advice and detailed method statements for eradicating and controlling the listed invasive species within the site during the construction and operational phases will be drawn up and agreed with the Local Planning Authority ecologists.

Broadleaved Woodland

Mitigation

5.4.17 The new development seeks to cause the least possible encroachment into the Leckwith and Factory Woods where they abut and run into the site. 180 mature/ semi-mature trees will be lost largely along the woodland edge to the new development along with an area where the new viaduct will be built.

5.4.18 Retained woodland and other trees and scrub should be treated in accordance with the British Standard BS 5837 (2012) *Guidance on the Treatment of Trees in Relation to Design, Demolition & Construction*.

Compensation

5.4.19 New wooded areas of equivalent extent as the area to be lost are to be created throughout the site including a wooded corridor through the centre of the new development, connecting the woodland to the river. Plantings will be exclusively of native species which are indigenous to the region, planted in a naturalistic pattern.

5.4.20 Where the Leckwith Road Viaduct is realigned, part of the existing road corridor that is contiguous with the woodland will be restored to semi-natural woodland, as above.

Enhancement

5.4.21 A habitat management plan for semi natural habitats of the site will be created and agreed with the local authority ecologist so as to safeguard and enhance these habitats over time.

Pond Loss

Mitigation

5.4.22 The pond is to be lost to the development.

Compensation

5.4.23 To compensate the loss of the pond (Approx. area: 10m^2) two new permanent water features in the form of sustainable drainage basins will be created of at least the same surface area, along with suitable wetland habitat creation surrounding these basins as detailed above.

Enhancement

5.4.24 The pond is to be replaced by two basins, the surrounding area of which will be planted and managed with native wetland species to enhance this area for wildlife.

Buildings

5.4.25 The buildings on site are considered to be of ecological value owing to supporting several bat roosts. Mitigation for this loss is detailed in the species section below.

Species

Bats

Mitigation

5.4.26 Before any works commence a derogation licence will be sought from NRW. The licence will involve the compilation of a detailed method statement the details of which are likely to comprise the following mitigation measures:

- Works to the buildings are to be undertaken following the delivery of a toolbox talk to all on site contractors and the erection of temporary mitigation features which are likely to comprise tree mounted bat boxes.
- The exterior features will be stripped under supervision by an ecologist at the earliest opportunity in the demolition programme.
- Demolition works will be timed to avoid sensitive times for bats ie works will be undertaken in the spring and/or autumn months.

5.4.27 Seven trees within the development site are assessed as having moderate potential to support roosting bats; further surveys are required on these trees, including an aerial survey by a bat licenced ecologist. Should any bats be found, a licence from NRW will be required before any tree works can commence along with further mitigation for the loss of roosts. Checks immediately prior to felling, soft felling, stripping of ivy prior to felling or ecological supervision is advised for a large number of trees with low potential for bat roosts.

5.4.28 As mentioned previously no lighting of the river corridor or woodland will occur and the lighting plan for the developed site will be designed in liaison with an ecologist and meet current BCT guidance.

Compensation

5.4.29 Some loss of foraging area will occur however new wooded corridors and water features within the site will compensate for this loss.

5.4.30 The bat licence process for the loss of roosts will require permanent bat roost features to be incorporated into the new building suitable for the species and numbers of bats present on the site. These features will provide compensation for the loss of bat roosts in buildings.

Enhancement

5.4.31 In accordance with the Vale of Glamorgan and Cardiff SPGs a scheme of bats boxes will be devised, dependent on the final number of dwellings, which will go over and above the licencing requirements therefore providing roosting enhancement across the site.

Nesting Birds

Mitigation

5.4.32 Any clearance of suitable bird nesting habitat will take place outside of the bird nesting season (March – August inclusive). If this is not possible a check or supervision of the activity by an ecologist will be undertaken.

5.4.33 The vegetation along the riverbank and significant portions of the woodland are to be retained within the development and fenced off during the construction phase to avoid any accidental damage.

Compensation

5.4.34 Compensatory habitats to be created including water features and wooded corridors will provide foraging and nesting opportunities for birds and compensate the loss of some suitable habitats.

Enhancement

5.4.35 A scheme of bird boxes will be implemented within the newly developed site which will provide additional nesting opportunity for synanthropic bird species within the new development.

Otter

Mitigation

5.4.36 There will be no illumination of the river Ely to prevent any disturbance of otter during construction and operational phases. There will be no night working during the construction phase and any trenches or excavations will be covered at night to prevent any animas such as otter from falling and becoming trapped. The wooded riverbank habitats will be retained as a buffer and fenced off during the works to avoid any possible disturbance of otter or damage to any potential resting places.

Compensation

5.4.37 No compensation.

Enhancement

5.4.38 No enhancement.

Badger

Mitigation

5.4.39 No earthworks or tree felling in the vicinity of the badger sett will take place between December and June. Mitigation for badger will be subject to discussion with NRW but will likely be satisfied through buffering and retention of the woodland habitats around the sett.

5.4.40 Any trenches or excavations will be covered at night to prevent any animals such as badger from falling and becoming trapped.

Compensation

5.4.41 Compensatory wooded habitats will be created to provide a corridor between the site and the River Ely and as such provide compensation for the foraging and commuting habitat lost to the development.

Enhancement

5.4.42 No enhancement.

Reptiles

Mitigation

5.4.43 A detailed method statement is to be drawn up to protect reptiles during the works. This will be subject to agreement with the LPA but is likely to involve timing constraints, a toolbox talk to onsite contractors, staged vegetation clearance and supervised dismantling and removal of hibernacula. A suitable receptor site will need to be agreed to move any reptiles to during this process.

Compensation

5.4.44 Some compensatory habitats for reptiles will be provided in the creation of wooded corridors to compensate the loss of some woodland areas.

Enhancement

5.4.45 Habitat creation (wetland areas) as previously mentioned will provide additional habitat for reptiles such as grass snake, to use post development. Once a suitable on-site receptor site is identified a number of enhancements may be undertaken such as the creation of brash piles and hibernacula in order to increase its value for use by reptiles.

Great Crested Newt

Mitigation and Compensation

5.4.46 Great crested newt is considered likely absent from the site and therefore no mitigation or compensation is required.

Enhancement

5.4.47 A new permanent water feature is to be created within the site that can be used by amphibian populations in the future, including GCN should they move onto the site.

Dormouse

Mitigation and Compensation

5.4.48 Dormouse are considered likely absent from the site and therefore no mitigation or compensation is required.

Enhancement

5.4.49 No enhancement proposed.

Invertebrates

Mitigation

5.4.50 Woodland and riverine habitats of the site are to be largely retained and therefore will continue to provide habitat for invertebrate assemblages. Dead wood from the woodland areas to be lost will be retained and placed in new wooded corridor habitats, created to maintain saproxylic insect communities.

Compensation

5.4.51 Habitat creation of new permanent water features forming part of the sustainable drainage will mitigate the loss of pond habitats used by invertebrates. Equally habitat creation of new wooded areas within the site (to compensate the loss of some woodland area removal) will compensate the loss of these areas.

Enhancement

5.4.52 Habitat creation to offset the loss of post industrial land SINC will provide enhanced high quality wetland habitat opportunities for invertebrates.

5.5 Assessment of Construction Effects

5.5.1 The assessment of impacts is based on potential impacts in the absence of mitigation on ecological receptors evaluated as being of Site level or above only.

The potential impact pathways of the site preparation/demolition and construction phases of the proposed development on the IEFs are as follows:

• Loss of established habitat assemblages;

• Habitat loss, fragmentation, degradation, pollution, damage and disturbance;

• Direct mortality and / or injury of notable and protected species;

• Indirect disturbance / mortality and / or injury to notable and protected species;

• Direct loss and indirect damage and disturbance to designated sites; and

• Loss, damage and disturbance of priority habitats.

The effects of such impacts are listed for each IEF below.

IEF	Activity	Characterisation of unmitigated impact on the feature	Magnitude	Effect in the absence of mitigation	Significance
Protected Sites					
Severn Estuary SPA *IEF of International importance/ Very High sensitivity*	No viable pathway of interaction	N/A	N/A	N/A	Not significant
Severn Estuary SAC *IEF of International importance/ Very High sensitivity*	No viable pathway of interaction	N/A	N/A	N/A	Not significant
Cwm Cydfin SSSI *IEF of national importance/ High sensitivity*	Pollution	Potential for short term impacts to water quality and bankside woodland habitats that form part of the SSSI	Low	Short term negative impact at the national level Reversible	Significant Adverse effect at the national scale
River Ely SSSI *IEF of National Importance/ High sensitivity*	Pollution	Potential for short term impacts to water quality and bankside woodland habitats that form part of the SSSI	Low	Short term negative impact at the national level Reversible	Significant Adverse effect at the national scale
River Ely SINC *IEF of county importance/ Medium sensitivity*	Pollution	Potential for short term impacts to water quality through pollution (sediment, hydrocarbons etc) could result in death/ movement away from the area by aquatic wildlife reducing use of the	Low	Short term negative effect on SSSI habitat features. Possible reduction in population size on interest features. Significant negative effect at the County scale.	Significant Adverse effect at the county scale

		habitat and its function as a wildlife corridor		Possibly reversible as construction is only for one season.	
	Accidental spread of Invasive non-native species	Accidental spread during construction through inappropriate working methods	Moderate	Medium term negative effect on SINC habitat features. Significant negative effect at the county scale. Possibly reversible with appropriate treatment.	
Factory wood SINC *IEF of county importance/ medium sensitivity*	Habitat loss	Loss of some SINC quality woodland habitat.	Moderate	Irreversible long term net loss of SINC habitat. Impact restricted to construction phase. Significant negative effect at the County scale	Significant adverse effect at the County scale
		Potential for accidental damage during construction. Could result in loss or degradation of small areas (<1ha) of SINC quality habitat	Moderate	Irreversible long term net loss of SINC habitat. Impact restricted to construction phase. Significant negative effect at the County scale	
Post Industrial Land SINC quality habitat *IEF of county importance/ medium sensitivity*	Habitat loss	Total loss of SINC quality habitat	High	Irreversible long term net loss of SINC habitat. Impact restricted to construction phase.	Significant adverse effect at the County scale
Habitats					
Riparian Woodland *IEF of local importance/ medium sensitivity*	Pollution	Potential for deposition of atmospheric construction pollutants (dust) in site boundary areas and near vicinity. Leading to suppression and degradation of habitat quality.	Low	Short term negative effect at local scale	Significant adverse effect at the local scale
	Habitat loss	accidental damage during construction	Moderate	Irreversible long term net loss of habitat. Impact restricted to construction phase.	

Broad-leaved Woodland *IEF of local importance/ medium sensitivity*	Habitat loss during site clearance	Loss of some areas of woodland (<1.85ha) and potential for further degradation/damage during construction and site clearance operations	Moderate	Irreversible long term net loss of habitat Impact restricted to construction Significant negative effect at the local scale	Significant adverse effect at the local scale
Tall Ruderal / Neutral Grassland Mosaic *IEF of local importance/ low sensitivity*	Loss of habitat	Complete loss of habitat during site clearance (0.05ha)	High	Irreversible long term net loss of habitat. Impact restricted to construction phase. Significant negative effect at the local scale	Significant adverse effect at the local scale
Pond *IEF of local importance/ low sensitivity*	Loss of habitat	Complete loss of habitat through site preparation	High	Irreversible long term net loss of habitat Impact restricted to construction phase Significant negative effect at local scale	Significant adverse effect at the local scale
Species/ Species Groups					
Bats *IEF of county importance/ Medium sensitivity*	Habitat loss - Roosts	All buildings within the development boundary are to be demolished to facilitate the new development. This includes the loss of 6 buildings confirmed to support bat roosts equating to 6 soprano pipistrelle roosts used by individuals or small numbers (max count: 2 bats), 1 unknown bat species roost and 1 brown long eared bat roost (used for both day and night roosting).	High	Long term, direct and irreversible loss of roost spaces	Significant adverse effect at the county level.
		Potential loss of tree roosts. Requires further survey for full	High	Long term, direct and irreversible loss of roost spaces	Likely significant Potential for adverse

		impact assessment. Based on known tree roosting species returned in the desk study and those considered likely to occur in the area, trees may support whiskered bat, Daubenton's bat, all pipistrelle species, noctule, and Natterer's bat.			effects at the National level
	Habitat loss/ severance/ degradation – Commuting and foraging	Loss of some woodland area, pond etc potential foraging habitat. Potential degradation to River Ely SINC corridor	High	Long term, direct loss of foraging and commuting habitat Significant negative impact likely at county level	Likely significant Potential for adverse effects at the county level
	Killing and injury	Unmitigated, impacts could include direct and irreversible death or injury to bats during demolition	High	Long term, direct and irreversible loss of individuals	Significant Potential for adverse effects at multiple levels depending on species
Otter *IEF of site importance/Medium sensitivity* *Legislative protected species*	Habitat loss/severance / Degradation. Loss of resting places	Potential degradation to River Ely SINC corridor and associated riverbank habitats.	High	Medium/long term, direct loss of commuting/foraging habitat and potential resting places.	Significant Adverse impacts at the county level
	Killing and injury	Unmitigated impacts could include direct death or injury to otter during site clearance .works	High	Long term, direct and irreversible loss of individuals	
Reptiles *IEF of site importance/low sensitivity*	Habitat loss	Removal of grassland, scrub, woodland habitats.	High	Medium/long term direct loss of foraging, commuting and sheltering habitats	Significant Adverse impacts at site level

Legislative protected species	Killing and injury	Unmitigated impacts could include direct death and injury during site clearance works.	High	Long term, direct and irreversible loss of individuals	Significant Adverse impacts at site level. Only common reptile species considered likely to occur on site.
Birds *IEF of site importance (possibly higher)/medium sensitivity*	Habitat loss	Removal of woodland, scrub, bankside habitats used for nesting, foraging and commuting	High	long term direct loss of foraging, commuting and nesting habitats	Significant Adverse impacts at the site level.
Legislative protected species	Killing and Injury	Unmitigated impacts could include direct death and injury during site clearance works.	High	Long term, direct and irreversible loss of individuals	Significant Adverse impacts at the site level
	Disturbance of nesting birds	Unmitigated impacts could result in nest desertion, damage to nest/eggs, clutch failure	High	Long term, direct and irreversible loss of individuals	Significant Adverse impacts at the site level
Invertebrates *IEF of site importance/ negligible sensitivity*	Habitat loss	Removal of habitats including some woodland, grassland, ruderal, pond etc will result in loss or reduced of species assemblages associated with these habitats	High	Medium/Long term, direct and irreversible loss of habitat	Not Significant above the site level. Widespread and common species assemblages expected to occur

Further Mitigation

5.5.5 No further mitigation above that as already described in the Mitigation section is proposed.

Future Monitoring

5.5.6 Monitoring during and after the construction phase will be necessary due to the licencing conditions that are likely to be incurred during the bat and possible badger licence process to NRW. Supervision of sensitive works including, but not limited to, supervision of soft stripping of external features of building prior to demolition, checking any tree features for bats prior to removal. Checks mitigation has been installed correctly and adequately during the construction process. Pre-construction checks and ongoing checks of badger sett and otter habitat throughout construction will likely be required. Post development monitoring will be required as part of the bat licence application, the exact details of which will be subject to agreement with NRW. Monitoring is

likely to involve a single flight survey of the new bat mitigation features between May and August of the first year following completion of the development.

Accidents and/or Disasters

5.5.7 Accidents and disasters that could realistically occur include:

- Flooding events; and
- Sea level rise

5.5.8 Mitigation to avoid any such disaster occurring include the following:

- Appropriate flood and sea defences (See Chapter 7: Flooding and Hydrology).

5.6 Assessment of Operational Effects

5.6.1 The assessment of impacts is based on potential impacts in the absence of mitigation on ecological receptors evaluated as being of Site level or above only. The potential impacts of the operational phase of the proposed development on the IEFs are as follows:

- Increased artificial light at night;
- Increased human presence and household pets;
- Pollution from human activity and littering; and
- Fencing within and around the newly developed site.

IEF	Activity	Characterisation of unmitigated impact on the feature	Magnitude	Effect in the absence of mitigation	Significance
Protected Sites					
Severn Estuary SPA *IEF of International importance/ Very High sensitivity*	No viable pathway of interaction	N/A	N/A	N/A	Not significant
Severn Estuary SAC *IEF of International importance/ Very High sensitivity*	No viable pathway of interaction	N/A	N/A	N/A	Not significant
Cwm Cydfin SSSI *IEF of national importance/ High sensitivity*	Pollution	Potential for medium/long term impacts to water quality (through litter and increased boat traffic) and bankside woodland habitats that form part of the SSSI through littering	Low	Long term negative impact at the local level Pollution and littering likely to be localised	Significant Adverse effect at the local scale
River Ely SSSI *IEF of national importance/High sensitivity*	Pollution	Potential for medium/long term impacts to water quality (through litter and increased	Low	Long term negative impact at the local level	Significant Adverse effect at the local scale

		boat traffic) and bankside woodland habitats that form part of the SSSI through littering		Pollution and littering likely to be localised	
River Ely SINC *IEF of county importance/ Medium sensitivity*	Pollution and littering	Potential for medium/long term impacts to water quality through pollution (increased boat traffic and littering) could result in reduced use by some wildlife thereby reducing function as a wildlife corridor	Low	Medium/long term negative effect on SSSI habitat features. Significant negative effect at the local scale. Possibly reversible.	Significant adverse effect at the local scale
	Accidental spread of Invasive non-native species	Natural spread during operational phase could occur if not controlled decreasing retained and surrounding habitat value.	Moderate	Medium/long term negative effect on SSSI habitat features. Significant negative effect at the national scale. Possibly reversible with appropriate treatment.	
Factory wood SINC *IEF of county importance/ medium sensitivity*	Lighting	Potential for SINC habitats and adjoining habitats to be lit up at night. Likely to sever commuting routes and reduce habitat use by wildlife.	Moderate	Reversible long term effect on SINC habitat use by wildlife. Significant negative effect at the County scale	Significant adverse effect at the County scale
	Increased human/domestic pets	Degradation of woodland habitat and woodland flora through increased human presence and littering. Compaction of soil through increased human pressure. Decrease use by wildlife due to increased disturbance by humans and domestic pets (and direct killing of wildlife by domestic pets).	Moderate	Reversible long term degradation of SINC habitat. Significant negative effect at the County scale Irreversible	

Habitats					
Riparian Woodland *IEF of local importance/ medium sensitivity*	Pollution/litter	Degradation of habitat quality.	Moderate	Long term negative effect at local scale. Reversible	Significant adverse effect at the local scale
	Increased human pressure and domestic pets	Degradation of habitat quality, decrease in woodland flora and compaction of soil through increased human use. Decrease use by wildlife due to increased disturbance by humans and domestic pets (and direct killing of wildlife by domestic pets).	Moderate	Long term negative effect at local scale. Possibly reversible	
	Lighting	Decrease in use by wildlife, potential to sever commute routes and reduce foraging resource available to wildlife.	Moderate	Long term negative effect at local scale. Reversible	
Broad-leaved Woodland *IEF of local importance/medium sensitivity*	Pollution/litter	Degradation of habitat quality.	Moderate	Long term negative effect at local scale. Reversible	Significant Adverse effect at the local scale
	Increased human pressure and domestic pets	Degradation of habitat quality, decrease in woodland flora and compaction of soil through increased human use. Decrease use by wildlife due to increased disturbance by humans and domestic pets (and direct killing of wildlife by domestic pets).	Moderate	Long term negative effect at local scale. Possibly reversible	

	Lighting	Decrease in use by wildlife, potential to sever commute routes and reduce foraging resource available to wildlife.	Moderate	Long term negative effect at local scale. Reversible	
Wetland Habitat Creation	Habitat creation	Creation of two swales / ponds (one to be at least 10m^2 surface area) and associated native species planting	Moderate	Long term positive effect at local/ county scale. Reversible	Significant beneficial impact at the local scale.
Species/ Species Groups					
Bats *IEF of county importance/ medium sensitivity*	Lighting	Lighting installation across the site unmitigated could result in the illumination of key bat habitats such as the river and woodland areas negatively effecting bats species ability to forage and commute	Moderate	Long term negative effect reversible	Significant Adverse effect likely at the county level.
	Domestic pet pressure	Direct predation by domestic cats.	High	Long term, direct and irreversible loss of bats	Significant Adverse effects at the local level
Otter *IEF of site importance/medium sensitivity* *Legislative protected species*	Pollution and litter	Potential degradation to River Ely SINC corridor and associated riverbank habitats through littering and increased boat traffic.	Moderate	long term, negative effects. Reversible	Significant Adverse impacts at the local level

	Increased human and domestic pet disturbance	Potential for disturbance of otter by increased human presence and domestic pets resulting in degradation of bank habitats.	Moderate	Long term, negative effects. Possibly reversible	
	Lighting	Illumination of river habitats could sever commuting routes and limit foraging ability of otter.	Moderate	Long term, negative effect. Possibly reversible	
Reptiles *IEF of site importance/ low sensitivity* *Legislative protected species*	Increased human and domestic pet presence	Increased human presence could result in degradation of remaining habitats (woodland and woodland edge habitats) and increased disturbance of reptiles limiting their ability to bask.	Moderate	Long term, negative effects. Possibly reversible	Significant Adverse effects at site level
Birds *IEF of site importance (possibly higher)/ medium sensitivity* *Legislative protected species*	Increased human and domestic pet presence	Increased predation risk from domestic cats could result in direct killing and injury.	High	long term negative effect. Irreversible	Significant Adverse impacts at the site level.
Invertebrates *IEF of site importance/ negligible sensitivity*	No viable pathway of interaction	N/A	N/A	N/A	Not Significant

Further Mitigation

5.6.7 No further mitigation or compensation above that already outlined in the mitigation section of this chapter is considered to be likely to be required.

Future Monitoring

5.6.8 Ongoing monitoring of retained habitats will form part of a habitat management plan to ensure the continued quality and integrity of retained habitats of the site.

Accidents/Disasters

5.6.9 Accidents and disasters that could realistically occur include:

- Flooding events; and
- Sea level rise

5.6.10 Mitigation to avoid any such disaster occurring include appropriate flood and sea defences (See chapter 7: Flooding and Hydrology)

Potential Changes to the Assessment as a Result of Climate Change

5.6.11 It is not considered likely that future changes in baseline conditions would change any of the assessments for the operational phase.

5.7 Assessment of Residual Effects

5.7.1 An assessment on the residual effects following mitigation measures of each individual IEF is provided in table 5.9 below. Where direct like-for-like mitigation is not possible and an adverse effect is predicted, the necessary compensatory measures to offset the effect have been listed.

Table 5.9: Residual Effects

Residual Effects	Importance of feature	Magnitude of effects	Significance with mitigation (Box et al 2017)	Mitigation/Compensation/Off-setting Measures
Severn Estuary SPA	Very high	Neutral	Neutral	
Severn Estuary SAC	Very High	Neutral	Neutral	
Cwm Cydfin SSSI	High	Negligible	Neutral	Pollution protection measures
River Ely SSSI	High	Negligible	Neutral	Pollution protection measures
River Ely SINC	Medium	Negligible	Neutral	Retained, buffered and maintained as a dark corridor.
Factory Wood SINC	Medium	Medium	Minor adverse	Minor adverse owing to impacts of increased disturbance by increased human and domestic pet presence
Post Industrial Land SINC quality habitat	Medium	High	Major adverse	Enhancement provided (high quality wetland areas) to offset this
High Quality Wetland Habitats	Medium	High	Major beneficial	Enhancement habitat creation to off set above post industrial habitat loss
Riparian Woodland	Medium	Low	Minor adverse	Minor adverse owing to impacts of increased disturbance by increased human and domestic pet presence
Broad-leaved Woodland	Medium	Low	Minor adverse	Minor adverse owing to impacts of increased disturbance by

				increased human and domestic pet presence
Pond	Low	High	Moderate beneficial	Mitigation and enhancement with replacement of two basins and associated wetland habitat
Ephemeral / Short Perennial Vegetation	Low	Moderate	Minor adverse	Enhancement provided: wetland habitat, to offset loss
Tall Ruderal / Neutral Grassland Mosaic	Low	Moderate	Minor adverse	Enhancement provided: wetland habitat, to offset loss
Invasive Non-Native species spread	-	-	Moderate beneficial	Invasive species removal and treatment will result in beneficial effects for retained on site habitats
Bats	Medium	Negligible	Neutral	Roosts loss will be mitigated like for like. Habitat loss will be mitigated through creation of lost habitats (woodland) of an equivalent area. Enhancement features such as the wetland areas will offset loss of other potential habitats such as scrub. New commuting routes connecting the river and woodland will be created with green spaces through the site.
Badger	Low	Negligible	Neutral	Derogation licence may be required to allow proposed development works
Otter	Medium	Negligible	Neutral	Riverbanks to be retained and buffered and river to remain dark corridor.
Reptiles	Low	Negligible	Neutral	Mitigation through staged clearance during construction stages. Loss of some habitat mitigated through equivalent areas to be created such as woodland and offset with wetland area enhancement.
Birds	Medium	Negligible	Neutral	Mitigation through timing constraints, and replacement of nesting opportunities within new builds. Habitat loss mitigated through creation of equivalent areas (woodland) and creation of new habitats as enhancement (wetland area).
Invertebrates	Negligible	Negligible	Neutral	-

5.8 Assessment of Cumulative Effects

5.8.1 A search was made using the Vale of Glamorgan and Cardiff county council planning portals for other applications in the vicinity. The Cardiff and Vale of Glamorgan Local Development Plans were also explored to determine housing allocations in the vicinity that may have cumulative effects in the context of this project.

5.8.2 Large numbers of applications were returned, the large majority of which the applications related to signage, and small scale alterations to single dwellings such as extensions and loft conversion works and small residential developments (less than ten dwellings).

5.8.3 Due to the number of these smaller projects cumulative effects are considered here. The volume of small application relating to signage and single dwelling alterations may have cumulative effects in respect of synanthropic bird species and roosting bats should any of these applications impact bat roosts in buildings which is likely given the context close to the river Ely and nearby woodland habitats.

5.8.4 Other projects that have been specifically considered are detailed at Appendix 5.3.

5.8.5 A number of previous applications concerning the Leckwith quays site and immediately adjacent buildings/land are considered unlikely to have a cumulative impact given the activities proposed in previous applications (change of use/small scale alterations/historic).

5.8.6 An application for 40 dwellings on a previously cleared part of the Factory wood SINC at Land North of Leckwith Road, Llandough exists. Given mitigation proposed to compensate habitat loss at these two sites it is not considered that there should be any negative cumulative effects resulting from the construction phase. However, owing to the resulting increased human and domestic pet presence that is likely to occur from both developments, it is likely that there will be some negative cumulative effects resulting from the operational phase.

5.8.7 The local development plans were also consulted to assess potential cumulative effects that may ensue from significant housing commitments in the surrounding area.

Cardiff Local Development Plan

5.8.8 Several significant areas in close proximity to the site are proposed for significant housing commitments over 500 dwellings – this includes the following sites: Land on Sanatorium road, Dumballs road and Bay Pointe.

5.8.9 Detailed ecological information for these sites is not available, however from aerials these sites do not appear to support woodland. It is possible that they could support industrial land and grassland areas and in the case of Dumballs road riparian habitats and therefore negative cumulative effects cannot be entirely ruled out in respect of these habitat types. Equally the nature of protected species supported within the sites is unknown, and these sites may have potential to support protected species such as bats and nesting birds and in the case of the Dumballs road site immediately abutting the River Taff, potentially otter. Given the legal requirements inherent with the presence of protected species on any development site, it is considered that any future development should mitigate impacts to protected species and therefore no negative cumulative effects should be incurred.

Vale of Glamorgan Local Development Plan

5.8.10 In the Vale of Glamorgan Local development plan, several small parcels of land are allocated to housing development in the vicinity the closest of which are Land north of Leckwith road, Llandough, Land south of Llandough Hill and Llandough landings.

5.8.11 Detailed information on the ecological status is not available for most of these sites. Land north of Leckwith road, is a predominantly cleared site and will incur the loss of some scrub and installation

of a drainage feature through the neighbouring Factory Wood SINC. Habitat losses have been compensated and therefore no cumulative effects are predicted during the construction phase. However, the presence of a new development immediately adjacent to the SINC is likely to have some negative cumulative effects during the operational phases owing to increased human presence in the woodland along with the increased pressure of domestic pets that is likely to occur.

5.8.12 Land south of Llandough hill and Llandough landings both appear to support woodland habitats from aerial photographs, to varying extents. Llandough landings appears from aerials to comprise largely woodland and riparian woodland habitats. It is therefore considered that negative cumulative impacts could arise through the development of these allocated sites. Development of the Llandough landings site may also have adverse impacts on the river Ely. Equally impacts to protected species such as otter, birds and bats could occur, however in light of mitigation there should be neutral cumulative effects to protected species.

5.9 Inter-relationships

5.9.1 There are inter relationships between ecology, landscape, climate change, flooding and hydrology, air quality and noise and vibration topics.

5.10 Summary of Effects

5.10.1 The below table summarises the potential effects during construction and operational phases in the absence of mitigation and the residual effects following mitigation proposed, concluded in this assessment:

Table 5.10: Summary of Likely Environmental Effects on ecology in absence of mitigation

Receptor	tivity of receptor	ription of impact	itude of impact	ificance of effect	nificant / Not significant	Notes
Severn Estuary SPA	Very high	No pathway of interaction	Neutral	NA	Not significant	
Severn Estuary SAC	Very High	No pathway of interaction	Neutral	NA	Not significant	
Cwm Cydfin SSSI	High	Pollution	Medium	Moderate adverse	Significant	Reversible
River Ely SSSI	High	Pollution	Medium	Moderate adverse	Significant	Reversible
River Ely SINC	Medium	Pollution of river, habitat loss (bankside habitats)	High High	Major adverse Major adverse	Significant	Reversible
Factory Wood SINC	Medium	Habitat loss (woodland removal) Habitat disturbance/damage	High Medium	Major adverse Moderate adverse	Significant Significant	Irreversible Reversible
Post Industrial Land SINC quality habitat	Medium	Habitat loss (vegetation removal)	High	Major adverse	Significant	Irreversible
Riparian Woodland	Medium	Habitat loss, Habitat disturbance/damage	Medium Medium	Major adverse Moderate adverse	Significant Significant	Irreversible Reversible
Broad-leaved Woodland	Medium	Habitat loss, Habitat disturbance	High Medium	Major adverse Moderate adverse	Significant Significant	Irreversible Reversable
Tall Ruderal / Neutral Grassland Mosaic	Low	Habitat loss	Medium	Moderate adverse	Significant	Irreversible
Pond	Low	Habitat loss	Medium	Major adverse	Significant	Irreversible
Bats	Medium	Habitat loss, potential killing, disturbance	High High Low	Major adverse Major adverse Minor adverse	Significant Significant Not significant	Irreversible Irreversible Irreversible

		injury, loss of roost places	Medium Medium	Moderate adverse Moderate adverse	Not significant Significant	Reversible Irreversible
Badger			Medium	Major adverse	Not Significant	Irreversible
	Low	Habitat loss (woodland removal), Possible sett damage, destruction, disturbance	Medium Medium Medium Low	Moderate adverse Moderate adverse Moderate adverse Minor adverse	Not significant Not significant Not significant Not significant	Irreversible Irreversible Irreversible Irreversible
Otter	Medium	Habitat loss, killing, injury, disturbance and removal/ damage to resting places	High High Low High	Major adverse Major adverse Minor adverse Major adverse	Significant Significant Not significant Significant	Irreversible Irreversible Irreversible Irreversible
Reptiles	Low	Habitat loss, Accidental killing, injury	High High	Major adverse Major adverse	Significant Significant	Irreversible Irreversible
Birds	Medium	Habitat loss, disturbance of nesting birds, Accidental killing and injury	High Low High	Major adverse Minor adverse Major adverse	Significant Not significant Significant	Irreversible Irreversible Irreversible
Invertebrates	Negligible	Habitat loss	Low	Minor adverse	Not Significant	Irreversible
Operational						
Severn Estuary SPA	Very high	No pathway of interaction	Neutral	NA	Not significant	
Severn Estuary SAC	Very High	No pathway of interaction	Neutral	NA	Not significant	
Cwm Cydfin SSSI	High	Pollution	Medium	Moderate adverse	Significant	Reversible
River Ely SSSI	High	Pollution	Medium	Moderate adverse	Significant	Reversible

River Ely SINC	Medium	Pollution	Medium	Moderate adverse	Significant	Reversible
Riparian Woodland	Medium	Pollution, lighting, increased human pressure and pets leading to habitat degradation	Medium Medium Medium	Moderate adverse Moderate adverse Moderate adverse	Significant Significant Significant	Reversible Reversible Reversible
Broad-leaved Woodland	Medium	Pollution, lighting, increased human pressure and pets leading to habitat degradation	Medium Medium Medium	Moderate adverse Moderate adverse Moderate adverse	Significant Significant Significant	Reversible Reversible Reversible
Bats	Medium	Lighting, increased human pressure and pets leading to negative impacts for protected species	High Medium	Major adverse Moderate adverse	Significant Significant	Reversible Reversible
Badger	Low	Lighting, increased human pressure and pets leading to negative impacts for protected species	Medium Medium	Moderate adverse Moderate adverse	Not Significant Not significant	Reversible Reversible
Otter	Medium	Lighting, increased human pressure and pets leading to negative impacts for protected species	High Medium	Major adverse Moderate adverse	Significant Significant	Reversible Reversible
Birds	Medium	Increased human pressure and pets leading to negative impacts for protected species Lighting may impact nocturnal species	High High	Moderate adverse Moderate adverse	Significant Significant	Reversible Reversible

Table 5.11: Summary of Residual Effects

Residual Effects	mportance of feature	gnitude (of impact after mitigation)	nificance with mitigation
Severn Estuary SPA	Very high	No pathway of interaction	Neutral
Severn Estuary SAC	Very High	No pathway of interaction	Neutral
Cwm Cydfin SSSI	High	Negligible	Neutral
River Ely SSSI	High	Negligible	Neutral
River Ely SINC	Medium	Negligible	Neutral
Factory Wood SINC	Medium	Low	Minor adverse
Post Industrial Land SINC quality habitat	Medium	High	Major adverse
High quality Wetland Habitat	Medium	High	Major Beneficial (to off-set above)
Riparian Woodland	Medium	Low	Minor adverse
Broad-leaved Woodland	Medium	Low	Minor adverse
Pond	Low	High	Moderate beneficial
Ephemeral / Short Perennial Vegetation	Low	Moderate	Minor adverse
Tall Ruderal / Neutral Grassland Mosaic	Low	Moderate	Minor adverse
Invasive Non Native species spread	-	-	Moderate beneficial
Bats	Medium	Negligible	Neutral
Badger	Low	Negligible	Neutral
Otter	Medium	Negligible	Neutral
Reptiles	Low	Negligible	Neutral

Birds	Medium	Negligible	Neutral
Invertebrates	Negligible	Negligible	Neutral

5.10.2 In summary, in the absence of mitigation, there are many significant adverse effects on IEFs present within the site and zone of influence during the construction and operational phases. Effects on protected species are considered readily amenable to mitigation and it is anticipated that with the mitigation as recommended, adverse effects on protected species should be neutralised. Effects on habitats can be neutralised or offset through a mixture of mitigation, compensation and enhancement measures proposed.

5.10.3 Some minor adverse residual effects are likely, predominantly arising from increased human and domestic pet pressure within the site and zone of influence. Where major adverse residual effects are predicted, these are considered to be sufficiently off-set by enhancement measures that will create major beneficial effects.

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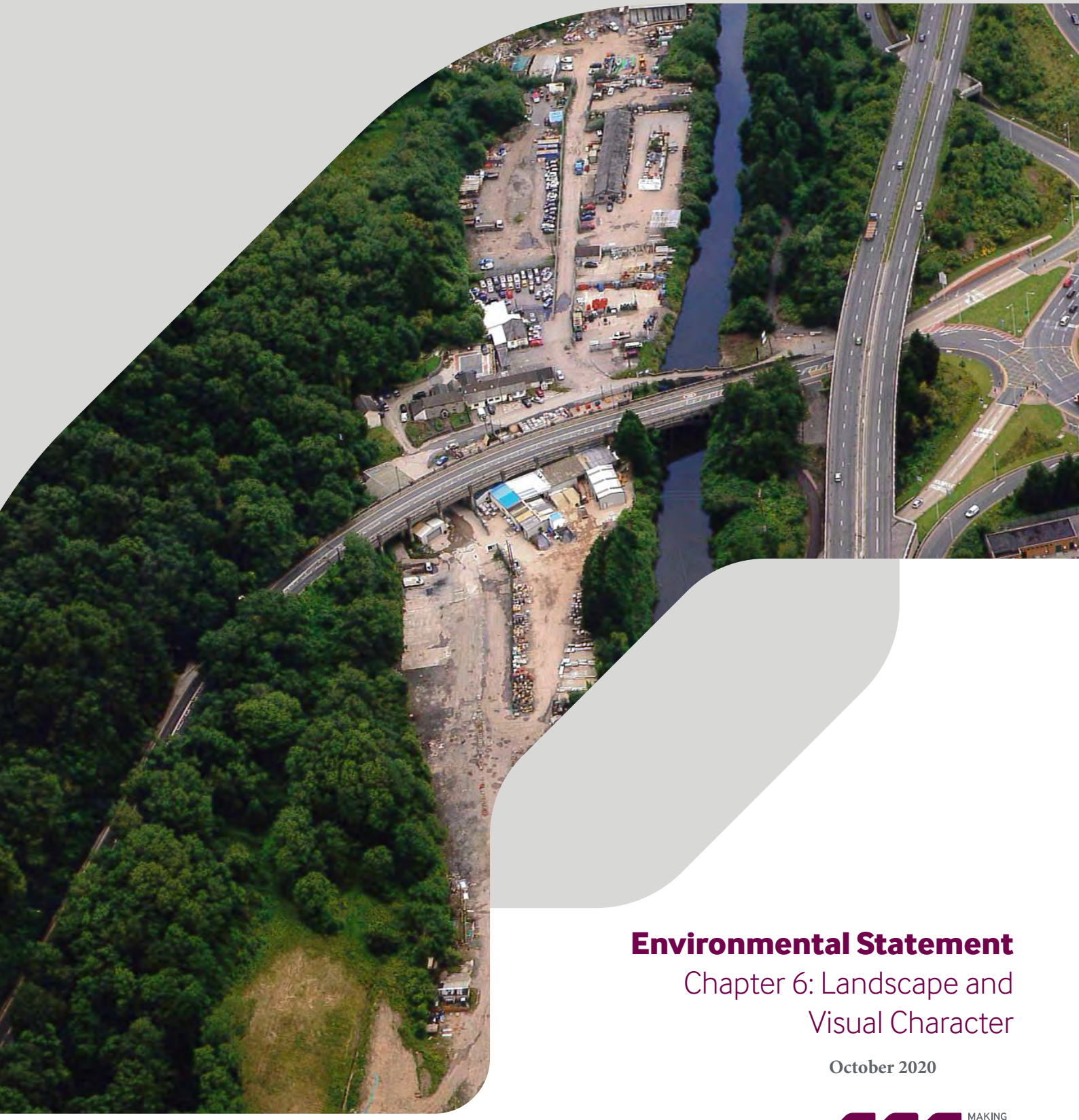
Leckwith Quays

Leckwith Road, Cardiff



Environmental Statement

Chapter 6: Landscape and Visual Character

October 2020

MAKING COMPLEX EASY

Mr Phil Worthing

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6 LANDSCAPE AND VISUAL IMPACT ASSESSMENT

6.1 Introduction

6.1.1 This chapter about Landscape and Visual Impact Assessment relates to the likely landscape and visual effects of the Proposed Development. It follows the established methodology produced by the Landscape Institute and the Institute of Environmental Management and Assessment entitled Guidelines for Landscape and Visual Impact Assessment, 2013.

6.1.2 The guidelines state: *'Landscape and visual impact assessment (LVIA) is a tool used to identify and assess the significance of and the effects of change resulting from development on both landscape as an environmental resource in its own right and on people's view and visual amenity'*.

6.1.3 Due to the mixed rural/urban nature of the Assessment Site (**Figure 6.1: Location Plan**) and Study Area, the assessment has been approached as a Landscape and Visual Impact Assessment. However the use of the term 'townscape' is used to describe a combination of urban areas, public realm, green spaces and water channels, both within and beyond the Assessment Site. For the purposes of this assessment, the terms landscape and townscape are interchangeable e.g. landscape character assessment can be applied to the assessment of landscape character within rural, urban or coastal areas. Each landscape is assessed in its unique setting.

6.1.4 The purpose of this chapter is to assess the significance of, and the effects of, change resulting from the Proposed Development, on both the landscape as an environmental resource in its own right, and on people's view and visual amenity. As a technical process, it has an important contribution to make to the achievement of sustainable development. Professional judgement plays a key part in the process as the authors must rely on qualitative judgements as to significance and impact. The report is written from an independent stance, addressing both positive and negative aspects of the scheme, where applicable. This chapter should be cross-referenced with the built heritage and ecology chapters of the ES, and the separate arboricultural assessment that accompanies the planning application submission.

6.1.5 The guidance states that landscape and visual impact should be assessed separately because they have different methodologies, so they are dealt with separately within this chapter.

Chapter Structure

6.1.6 This chapter is divided into the following sections. The chapter first considers matters relevant to the chapter as a whole, and then moves on to consider landscape, followed by visual impact.

- Methodology and Assessment criteria
- A summary of relevant legislation, policy and regulations
- Baseline conditions
- Identification of likely effects and evaluation and assessment of identified effects
- Identification of likely cumulative effects
- Mitigation measures envisaged to avoid, reduce and, if possible, remedy adverse effects

- Statement of residual effects
- Conclusion

6.2 Assessment Methodology

Planning Policy Context

6.2.1 The following section is a summary of legislation, policy and standards relevant to landscape and visual issues which have been considered during this assessment.

European Policy

Table 6.1: European Planning Policy Guidance

Legislation	Relevant Key Provisions
Council of Europe (2000) European Landscape Convention	• It defines landscape as '*An area as perceived by people, whose character is the result of the action and interaction of natural and/or human factors*' • Highlights the importance of developing landscape policies dedicated to the protection, management and creation of landscapes • It also confirms the importance of all landscapes from the most attractive to the most degraded.

National Policy

Table 6.2: National Planning Policy Guidance

Legislation	Relevant Key Provisions
Welsh Government (2018) Planning Policy Wales 10	• All the landscapes of Wales are valued for their intrinsic contribution to a sense of place • SLAs are non-statutory designations that define local areas of high landscape importance, which may be unique, exceptional or distinctive to the area • Development proposals must support the conservation of biodiversity, ensure statutorily and non-statutorily designated sites are properly protected and managed and safeguard protected and priority species • Development should not cause any significant loss of habitats or populations of species, locally or nationally and must provide a net benefit for biodiversity • Non-statutory designations carry less weight than statutory designations, however they should be given adequate protection in development plans • Ancient woodland and semi-natural woodlands and individual ancient, veteran and heritage trees are

	irreplaceable natural resources, and have significant landscape, biodiversity and cultural value. Such trees and woodlands should be afforded protection from development which would result in their loss or deterioration unless there are significant and clearly defined public benefits
Welsh Assembly Government (2009) Technical Advice Note 5 – Nature Conservation and Planning	The town and country planning system in Wales should: • work to achieve nature conservation objectives through a partnership between local planning authorities, CCW, the Environment Agency Wales, voluntary organisations, developers, landowners and other key stakeholders • integrate nature conservation into all planning decisions looking for development to deliver social, economic and environmental objectives together • look for development to provide a net benefit for biodiversity conservation
Welsh Government (2016) Technical Advice Note 12 - Design	• Good design will almost always be dependent on working within the natural constraints and the historic character of the landscape and this should be the starting point from which the design of development evolves. The aim should be to achieve good design solutions which maximise the natural landscape assets and minimise environmental impact on the landscape. It is particularly important that proposals to amend or create new landscape are not considered as an afterthought and that the long-term impact of development on the landscape is fully understood

Local Policy

Table 6.3 Local Planning Policy Guidance

Policy	Key Provisions
Vale of Glamorgan – Local Development Plan 2011 – 2026 (June 2017)	Sets out the framework for the future development of the county borough
SP10 – Built and Natural Environment	• Development proposals must preserve and where appropriate enhance the rich and diverse built environment and heritage of the Vale of Glamorgan including: o The architectural and/or historic qualities of building or conservation areas, including locally listed buildings o Special Landscape Areas o Sites designated for their local, national and European nature conservation importance
MG17 – Special Landscape Areas	• Within Special Landscape Areas development proposals will be permitted only where it is demonstrated they would cause no unacceptable harm to the important landscape character of the area

MG20 – Nationally Protected Sites and Species	• Development likely to have an adverse effect either directly or indirectly on the conservation value of a Site of Special Scientific Interest will only be permitted where it is demonstrated that: o There is no suitable alternative o It can be demonstrated that the benefits of development clearly outweigh the special interest of the site o Appropriate compensatory measures are secured o The proposals contribute to the protection, enhancement or positive management of the site
MG21 – Sites of Importance for Nature Conservation, Regionally Important Geological and Geomorphological Sites and Priority Habitats and Species	• Development proposals likely to have an adverse impact on Sites of Importance for Nature Conservation (SINC) or priority habitats and species will only be permitted where it can be demonstrated that: o The need for development clearly outweighs the nature conservation value of the site o Adverse impacts on nature conservation and geological features can be avoided o Appropriate and proportionate mitigation and compensation measures can be provided o The development conserves and where possible enhances biodiversity interests
MD8 – Historic Environment	• Development proposals must protect the qualities of the built and historic environment of the Vale of Glamorgan • For listed and locally listed buildings, development proposals must preserve or enhance the building, its setting and any features of significance it processes
MD9 – Promoting Biodiversity	• New development proposals are required to conserve and where appropriate enhance biodiversity interests unless it can be demonstrated that: o The need for the development clearly outweighs the biodiversity value of the site, and o The impacts of the development can be significantly mitigated and acceptably managed through appropriate future management regimes
Cardiff Local Development Plan 2006 – 2026 (January 2016)	Sets out the framework for the future development of the city
KP18: Natural resources	• In the interests of the long-term sustainable development of Cardiff, development proposals must take full account of the need to minimise impacts on the city's natural resources and minimise pollution, in particular remediating land contamination through the redevelopment of contaminated sites
EN3: Landscape Protection	• Development will not be permitted that would cause unacceptable harm to the character and quality of the landscape and setting of the city • Particular priority will be given to protecting, managing and enhancing the character and quality of the Ely Valley Special Landscape Area • A landscape assessment and landscaping scheme will be required for significant development proposals
EN4: River Corridors	• The Natural Heritage, character and other key features of Cardiff's river corridors will be protected, promoted and enhanced, together with facilitating sustainable access and recreation.

EN5: Designated Sites	• Development will not be permitted that would cause unacceptable harm to sites of international or national nature conservation importance. • Development proposals that would affect locally designated sites of nature conservation and geological importance should maintain or enhance the nature conservation and/or geological importance of the designation. Where this is not the case and the need for the development outweighs the conservation importance of the site, it should be demonstrated that there is no satisfactory alternative location for the development which avoids nature conservation impacts, and compensation measures designed to ensure that there is no reduction in the overall nature conservation value of the area or feature.

Relevant Guidance

Table 6.4 Guidance

Guidance	Key Provisions
European landscape Convention	The first international convention to focus specifically on landscape. The convention highlights the need to develop policies dedicated to the protection, management and planning of landscape. *'Landscape means an area, as perceived by people, who character is the result of the action and interaction of natural and/or human factors'*
Landscape Institute and Institute of Environmental Management and Assessment, 2013	Guidelines for writing Landscape and Visual Impact Assessment reports, third edition (GLVIA 3)
Landscape Institute, 2011	Advice Note 01/11: Photography and Photomontage in Landscape and Visual Impact Assessment

6.2.2 The methodology follows the standard GLVIA approach of assessing changes against the baseline conditions. The GLVIA3 guidelines state that: *"Landscape and visual impact assessment (LVIA), is a tool used to identify and assess the significance of and the effects of change resulting from development on both landscape as an environmental resource in its own right and on people's views and visual amenity."* There are thus two components of a LVIA:

1. Assessment of landscape effects; assessing effects on the landscape as a resource in its own right; and
2. Assessment of visual effects: assessing effects on specific views and on the general visual amenity experienced by people.

Study Area

6.2.3 The site boundary and extent of the study area are shown in **Figure 6.1: Location Plan**

6.2.4 The GLVIA3 guidelines advise that the study area for landscape assessment needs to cover "*the site itself and the full extent of the wider landscape context around it which the proposed development may influence in a significant manner."*

6.2.5 The study area for this report has been selected giving consideration to the scale and nature of the Proposed Development, as well as the topography, vegetation cover and built form of the surrounding landscape. A 2km extent of study area has been determined as suitable. The report considers that the site is within National Landscape Character Area (NLCA) **No.35 Cardiff, Barry and Newport**, but also has a relationship with **NCLA 35 Vale of Glamorgan**, which the site abuts, and with the wider landscape. However, it is our professional opinion that, beyond this distance, development of this nature and scale would be barely perceptible to the human eye and impacts would have diminished to negligible.

Baseline Methodology

6.2.6 The landscape and visual assessment was carried out using a combination of desk-based and field study, and included the following:

- An overview of statutory plans and other data regarding landscape designations and planning policies for the landscape
- A field appraisal and inspection of the study area
- An assessment of the landscape character and quality of the study area, together with the sensitivity of the landscape to change – with reference to landscape character assessments including LANDMAP
- An analysis to determine the visibility of the application area from surrounding areas to identify key viewpoints from publicly accessible areas
- Identification and assessment of the potential landscape and visual effects of the development proposals, in terms of their magnitude and significance
- The preparation of mitigation proposals determined during the course of the assessment, with the aim of avoiding or reducing potential adverse landscape and visual effects
- Assessments of the significance of any residual impacts after mitigation measures have taken effect.

Landscape Baseline

6.2.7 The baseline studies provide an understanding of the landscape in the area to be affected, its constituent elements, character, condition and perceived value (landscape receptors). The landscape in the study area has been described using a combination of desk-based study and site survey. Physical landscape elements such as topography and vegetation have been examined, in addition to landscape character and its perceptual qualities.

6.2.8 Identification of the sensitivity of the landscape receptor may also form part of the baseline, which may include evaluation of landscape value and quality or condition.

6.2.9 Information on landscape elements such as topography and vegetation has been gathered from a combination of desk-based study and field observation and analysis.

6.2.10 Landscape Character Assessment (LCA) is the process by which landscape character is appraised and subdivided into homogenous units. It requires consideration of:

- The context or setting of the area and its relationship to the wider landscape
- The topography

- Relationship to urban form
- The grain of the built form and its relationship to historic patterns
- The layout and scale of the buildings, density of development and building types, including architectural qualities, period and materials
- Patterns of land use, both past and present
- The contribution to the landscape of water bodies
- The nature and location of vegetation
- Access and connectivity including streets and footways
- The historic landscape.

Visual Baseline

6.2.11 The visual baseline includes an understanding of the area in which the development might be visible, the people who may experience views (visual receptors) and the nature of the views. Baseline visual receptors have been identified using a combination of desk-based study and site survey.

6.2.12 The assessment considers different types of effects including direct effects, indirect effects, short, medium and long-term effects, temporary and permanent effects, as well as positive and negative effects of the development. From these, a series of representative, illustrative and specific viewpoints can be established.

6.2.13 Viewpoints were selected to represent groups of receptors within sight of the assessment area. Potential viewpoints were mapped based on desk-top research (analysis of the topographic data to assess the Zone of Theoretical Visibility (ZTV), followed up by field observations to verify a Zone of Visual Influence (ZVI). A series of viewpoints were proposed which represent different types of receptors and key views to the site.

6.2.14 Viewpoints may include:

- Public viewpoints, including areas of land and buildings providing public access;
- Transport routes where there may be views from public or private vehicles, or from cyclists or pedestrians;
- Views from high points overlooking the site;
- Views protected by local authorities, such as from bridges; and
- Linear views.

6.2.15 Viewpoints should consider:

- Representative viewpoints selected to represent the experience of different types of visual receptor where larger numbers of viewpoints cannot be included and where the significant effects are unlikely to differ.
- Specific viewpoints, chosen because they are key and sometimes promoted viewpoints within the landscape, including specific local visitor attractions, viewpoints in areas of noteworthy visual and recreational amenity, or viewpoints with particular cultural landscape associations.
- The selection should consider public access, potential number and sensitivity of viewers who may be affected, the viewing direction, distance and elevation, the nature of the

viewing experience, the view type and the potential for cumulative views in conjunction with other developments.

6.2.16 Views that have been considered and rejected may be noted, along with reasons why the view was not deemed relevant.

Photography and Imaging

6.2.17 Photographs illustrating views from each viewpoint were taken using a Nikon D40 digital camera set to the equivalent of a 50mm focal length (35mm digital). Where viewpoints consisted of more than one frame, the frames were merged together using Photoshop Photomerge.

6.2.18 One set of photographs were taken on Thursday 27th June 2019, when the weather was fine and dry. Trees were in full leaf, which has been taken account during the assessment, where relevant. A second set was taken on Wednesday 27th November 2019 the weather had been wet in the morning but was overcast and dry when the photographs by the time taken. Trees had lost the majority of their leaf cover.

Consultation

Table 6.5 Consultation Responses Relevant to this Chapter

Date	Consultee and Issues Raised	Where Addressed
8th August 2019	Planning Officer - Vale of Glamorgan Council Suggested possible locations for viewpoints	Photographs taken from the suggested points

Assessment Criteria and Assignment of Significance

Landscape Value

6.2.19 This is the relative value attached to different landscapes by society. The value placed on a particular landscape may vary for different individuals within that society and value can be applied to whole landscapes, elements within it, and particular aesthetic and perceptual dimensions that it provides.

6.2.20 Landscapes are valued at community, national or international levels, noting that undesignated landscapes (local or national) are not necessarily without value and may contain valued elements.

6.2.21 The baseline records value through a review of the existing landscape designations. Areas of undesignated landscape may also be assessed through a combination of desk and site based study to examine a range of factors including landscape quality (condition), scenic quality, rarity, representativeness, conservation interests, recreation value, perceptual aspects and associations. A broad definition of landscape value is described below.

Table 6.6 Landscape Value Definition

Landscape Value Scale	Definition
Very high	Nationally/internationally designated/valued countryside and landscape features such as World Heritage Site Strong/distinctive landscape characteristics Absence of landscape detractors
High	Locally designated/valued countryside (e.g. AONB, Areas of High Landscape Value, and Regional Scenic Areas) and landscape features Many distinctive landscape characteristics Very few landscape detractors Is predominantly characterised by landscape components that are rare and distinctive and/or listed A nationally significant historic or cultural resource A distinctive place of national tourism Is designated as a Conservation Area, Registered Park and Garden or public open space, a character which is rare in the assessment area
Medium	Undesignated countryside and landscape features Some distinctive landscape characteristics Few landscape detractors A character which is common within the assessment area. Located within green belt, Metropolitan Open Land or a regional park Considered a distinctive component of the local character, experienced by a large proportion of the city's population A public, semi-public, or private open space that serves the local community and residents A residential area, likely to be valued by the local community
Low	Undesignated countryside and landscape features Few distinctive landscape characteristics Presence of landscape detractors A character that is common within the assessment area Designated open space within the local authority local plan Experienced by a large proportion of the city's population
Negligible	Undesignated countryside and landscape features Absence of distinctive landscape characteristics Despoiled/degraded by the presence of many landscape detractors A commercial, industrial or disused area that has limited landscape value to the local community or residents

Landscape receptor sensitivity

6.2.22 Landscape sensitivity is a measure of the value of a particular landscape, combined with its susceptibility to change. This is defined by GLVIA as "the ability of a defined landscape or visual receptor to accommodate the specific proposed development without undue negative consequences" (p158). A degree of professional judgement is applied in arriving at the susceptibility of landscape receptors.

6.2.23 Landscape sensitivity identifies the vulnerability to change of each landscape unit through the introduction of the new features, or the loss of existing valued features such as vegetation.

6.2.24 GLVIA defines the sensitivity of a landscape as varying with a combination of:

- The existing land use, pattern and scale of the landscape/townscape;
- The value placed on the landscape; and
- The scope for mitigation, which would be in character with the existing landscape.

6.2.25 The assessment has applied these descriptors to the study area landscape using a criteria range of Very High, High, Medium Low and Very Low. Table 2 provides an indication of the criteria by which the overall sensitivity of a landscape receptor is judged and considers both value and susceptibility to change.

Table 6.7: Susceptibility to change of landscape receptors criteria

Visual Receptor Sensitivity Scale	Criteria
Very high	Strong/distinctive landscape elements/aesthetic/perceptual aspects; absence of landscape detractors; landscape receptors in excellent condition Landscapes with clear and widely recognised cultural value Landscapes with a high level of tranquillity
High	Many distinctive landscape elements/aesthetic, perceptual aspects; very few landscape detractors; landscape has a low capacity for change as a result of potential changes to defining character
Medium	Some distinctive landscape elements/aesthetic/perceptual aspects; few landscape detractors; landscape receptors in fair condition Landscape is able to accommodate some change as a result
Low	Few distinctive landscape elements – aesthetic/perceptual aspects; presence of landscape detractors; landscape receptors in poor condition. Landscape is able to accommodate large amounts of change without changing these characteristics fundamentally
Very low	Absence of distinctive landscape elements/aesthetic/perceptual aspects; presence of many landscape detractors; landscape receptors in very poor condition. As such landscape is able to accommodate considerable change

Visual Receptor Sensitivity

6.2.26 When determining the sensitivity of a visual receptor the following parameters are considered:

- Location and context of the viewpoint;
- Expectations and occupation/activity of the receptor;
- Importance and value of the view; and
- Degree of exposure to the view, e.g. permanence versus transience, full versus partial.

6.2.27 Below is an indication of the criteria by which the overall sensitivity of a visual receptor is judged.

Table 6.8 Visual Receptor Sensitivity Criteria

Visual Receptor Sensitivity Scale	Criteria
Very high	Designated view (which may be from a recognised heritage asset or other important viewpoint) or where views of the surroundings are an important contributor to the experience Key promoted viewpoint e.g. interpretative signs. References in literature and art and/or guidebooks and tourist maps. Protected view recognised in planning policy designation Examples may include views from national public rights of way e.g. National Trails and nationally designated countryside/landscape features with public access which people might visit purely to experience the view e.g. AONB, and visitors to heritage assets of national importance
High	Receptors with a high interest in the visual environment that contains none or little of the Proposed Development type. High or clear value but may not be formally recognised e.g. framed view of high scenic value; or destination hill summits. It may also be inferred that the view is likely to have value e.g. to local residents Examples may include views from recreational receptors where there is some appreciation of the landscape e.g. golf and fishing; local public rights of way, access land and National Trust land, also panoramic viewpoints market on maps, road routes promoted in tourist guides for their scenic value
Medium	View is not promoted or recorded in any published sources and may be typical of the views experienced from a given receptor. Receptors with a moderate interest in the visual environment that contains some views of the Proposed Development type or 'permanent receptors' with a high interest in a visual environment which is dominated by open and often close views of the Proposed Development type. Examples include pedestrians, recreational motorists on minor roads through rural or scenic areas, and people taking part in outdoor sport.
Low	Views of clearly lesser value than similar views experienced from nearby visual receptors that may be more accessible. Receptors with passing or momentary interest in a visual environment or 'transient receptors' with a high/moderate interest in a visual environment which is dominated by open and often close views of the development type. Examples include commuting motorists (motorways/A roads) and users or rail routes, and people at their place of work (where the place of work may be in a sensitive location). Also views from commercial buildings where views of the surrounding landscape may have some limited importance
Negligible	Views affected by many landscape detractors and unlikely to be valued Examples may include people at their place of work, indoor, recreational or leisure facilities or other locations where views of the wider landscape have little or no importance

Assessment of likely significant landscape and visual effects

6.2.28 Predicted effects have been identified at, or for, each receptor and the magnitude of the identified landscape and visual changes evaluated by professional judgement. The significance of these effects has been determined by the inter-relationship of the nature of the effect (magnitude) and the nature of the receptor (sensitivity).

Landscape assessment

6.2.29 Landscape assessment identifies the likely scale and nature of change to individual landscape elements and characteristics, and any consequential effects on character resulting from the proposed developments. Components of the landscape which have been examined in this assessment are:

- Physical characteristics such as topography and vegetation;
- Landscape character and perceptual characteristics; and
- Landscape value.

Magnitude of landscape impact

6.2.30 The next step in the process uses experience-based judgement to identify the nature of the potential effect (magnitude) that would result from the identified landscape impact. The magnitude of the impact is the degree of change experienced by a receptor. This requires judgement on a combination of factors such as:

- Size and scale of the identified change, including geographical extent (site-wide, local, regional, international scale);
- Duration: short (1-5 years), medium (10-20 years), or long-term (20 years plus);
- Temporary or permanent;
- Reversibility;
- Direct or indirect;
- Single or cumulative; and
- Beneficial or adverse.

Nature of effect

6.2.31 Effects can be adverse (negative), beneficial (positive) or neutral. The landscape effects will be considered against the landscape baseline, which includes published landscape strategies or policies if they exist. Changes involving the addition of large scale man-made objects are typically considered to be adverse as they are not usually actively promoted as part of published landscape strategies. Accordingly, in the assessment landscape effects as a result of these aspects of the Proposed Development will be assumed to be adverse, unless otherwise stated.

Table 6.9 Landscape Magnitude of Impact Definition

Magnitude of Change Scale	Definition
High	Notable loss or alteration to one of more key characteristics of components of the baseline condition. Addition of elements that are prominent and may conflict with the key characteristics of the existing landscape.
Medium	Partial loss of or alteration to one or more key characteristics or components of the landscape character area Addition of new features or landscape components that may be prominent or evident, but are largely in character with the landscape character area.

Low	Minor loss or alterations to one or more characteristics or components of the landscape character area Loss or addition of features in the wider setting of the landscape character area.
Negligible	Very limited loss or alteration of characteristic or landscape components of the landscape character area or setting of surrounding landscape character areas. Addition of new features or landscape components that are relatively inconspicuous and largely in character with the existing landscape character area or setting of surrounding character areas.
No change	There is no noticeable loss or alternation of key elements, features or characteristics of the baseline.

Significance of landscape effects

6.2.32 The significance of the predicted landscape effects is evaluated using a matrix assessment of receptor sensitivity and magnitude, which ranges from Substantial, through Major, Moderate, and Minor to Negligible. The criteria for significance is shown in the Table below which is adapted from the guidance set out in GLVIA3, alongside professional judgement.

Table 6.10 Significance of landscape effects criteria

Significance of Landscape Effects	Description
Major Adverse	The proposals will be at a complete variance with the scale, landform, pattern or character of the landscape and/or would diminish or destroy the integrity of characteristic features and their settings.
Moderate Adverse	The proposals would be at odds with the scale, landform, pattern or character of the landscape and/or would cause a noticeable diminution of the integrity of characteristic features and their settings.
Minor Adverse	The proposals will not quite fit into the scale, landform, pattern or character of the landscape and/or would cause a perceptible diminution of the integrity of characteristic features of their settings.
Negligible Adverse	The proposals will create a barely perceptible diminution of the integrity of characteristic features and their settings.
No change	The proposals will not cause any change to the scale, landform, pattern or character of the landscape.
Negligible beneficial	The proposals will provide a barely perceptible enhancement of the integrity of characteristic features and their settings.
Minor beneficial	The proposals will achieve a degree of fit with the scale, landform, pattern or character of the landscape and make a minor contribution to enhancing the character, sense of place or integrity of the landscape.
Moderate beneficial	The proposals will fit well with the scale, landform, pattern or character of the landscape and will noticeably enhance the character, sense of place or integrity of the landscape.
Major beneficial	The proposals will fit very well with the scale, landform, pattern or character of the landscape and would restore the character, sense of place or scale of the landscape.

Visual assessment

Potential sources of visual impact

6.2.33 The visual assessment describes the changes to the existing views resulting from the Proposed Development. The visual assessment may include the construction phase and the operation phase, with visual impacts resulting from:

- Earthmoving operations, construction plant and traffic movements during construction;
- Signage and hoardings;
- Removal of existing structures and hard standings;
- The presence of new buildings and structures, hard standings and services;
- Proposed lighting, both temporary and permanent; and
- Permanent loss of landscape features.

Nature of visual impact

6.2.34 For each viewpoint an experience-based judgement of the nature of the predicted visual effects has been made and recorded as:

- Beneficial or adverse;
- Direct or indirect;
- Temporary or permanent;
- Short, medium or long-term;
- Local, regional, national or international; and
- Single or cumulative.

Magnitude of visual impact

6.2.35 The magnitude of the identified visual impact has been assessed for receptors using a structured analysis. The process uses the following magnitude indicators as adapted from GLVIA:

- Extent – the extent of the baseline view which would be occupied by the development: full (unobstructed by vegetation, topography or intervening structures) or partial (obstructed to some extend by vegetation, topography or structures) or glimpsed?
- Proportion – what proportion of the development would be visible: full (all), most (more than 75%), half (50%), small amount (less than 25%) or none?
- Contrast – how would the visible elements of the development relate to the remaining/adjoining features of the baseline landscape: high, medium, or low levels of contrast?
- Loss or addition of features – what landscape features in the view would be lost/changed as a result of the proposed development?

- Duration – temporary, permanent, intermittent, or continuous, e.g. transient (views which are normally viewed in motion from a car, or public transport) and seasonal (views which will be subject to seasonal leaf cover).
- Angle of view – direct (approximately head on), oblique (45 degrees to head on) or peripheral (greater than 45% ie on the edge of vision.
- Distance – whether the viewer would focus on the development due to its scale and proximity or whether it is a small, minor element. A short distance may be described as 1-100m, a medium distance 100 – 1000m and a long distance 1000m or more.

6.2.36 Using these indicators an experience-based judgement has been made for each visual receptor as to the degree of alteration in the baseline view that would result from the loss/change of baseline landscape elements and the introduction of the proposed developments. The degree of alteration and the criteria used are shown in the Table below.

Table 6.11 Visual magnitude of impact criteria

Magnitude of Change Scale	Criteria
High	The Proposed Development would be clearly and continuously noticeable and the view would be fundamentally altered by its presence. Addition of new features or components which would be clearly visible and out of character with the existing composition of the view
Medium	Partial loss of or alteration to one or more key characteristics of the view from a receptor. Addition of new features or landscape components that may be continuously highly visible, but are largely characteristic of the existing view from a receptor Changes are relatively short distance from a receptor but viewed as one of a series of components in the middle ground of the view Substantial change partially filtered by intervening vegetation and or built form, or view obliquely from the visual receptor The Proposed Development will form a new and recognisable element within the view, which is likely to be recognised by a receptor.
Low	Fairly small loss of or alterations to one or more characteristics of the view from a receptor Addition of new features or components that may be continuously or intermittently visible, but are largely characteristic of the existing view from a receptor Changes within the background of the view, viewed as one of a series of components in the wider panoramic view from a receptor. The Proposed Development will form a minor constituent of the view being partially visible or at sufficient distance to be a small component.
Very low	Very limited loss or alteration of inconspicuous characteristics of the view from a receptor Addition of new features or components that are largely inconspicuous and characteristic of the existing site when viewed from a receptor Changes within the background of the view, viewed as an inconspicuous element within the wider panoramic view from a receptor

	Change almost entirely obscured by intervening vegetation and/or built form. The Proposed Development will form a barely noticeable component of the view, and the view whilst slightly altered would be similar to the baseline situation.
No change	No noticeable loss or alteration of key elements, features or characteristics of the baseline.

Overall significance of visual effects

6.2.37 Determination of the level of an effect requires the application of professional judgement to weigh the findings of receptor sensitivity and magnitude of change. This approach is recommended by GLVIA as opposed to using an assessment matrix. The presence of any combination of factors may be considered when assessing the level of effect. This allows professional judgement to be used when determining the relative importance of different factors. Effects may be adverse or beneficial. Both the major and moderate categories are considered to be a significant effect.

6.2.38 Where visual effects are judged to be significant and adverse, proposals for preventing, avoiding, reducing or compensating for them should be described.

Table 6.12 Criteria for significance of visual effects

Visual Effects	Criteria	
Substantial	The changes would be at complete variance with the landscape character, would cause a complete change to the composition of the view, and/or would permanently diminish the integrity of a valued landscape or view and the ability to take in or enjoy the view.	The removal of substantial existing incongruous landscape or visual elements and the introduction or restoration of highly valued landscape elements or built form that would reinforce local landscape character and substantially improve landscape condition and amenity.
Major	Typically, the landscape or visual receptor has a high to medium sensitivity with the proposals representing a high to medium adverse magnitude of change to the view or landscape resource. Changes would result in a fundamental change to the landscape resource of visual amenity.	The removal of existing incongruous landscape or visual elements and the introduction or restoration of some valued landscape or visual elements would complement landscape character and improve landscape condition and improve the local visual amenity.
Moderate	The proposals would represent a material but non-fundamental change to the landscape resource or visual amenity. The proposals would affect the composition, the appreciation of landscape character or the ability to take in or enjoy the view.	The removal of some existing incongruous landscape elements and/or the introduction or restoration of some potentially valued landscape elements that reflect landscape character and result in some improvements to landscape condition and/or visual amenity.
Minor	The proposals would result in a perceptible change to the view, but which would not materially affect the composition, the appreciation of landscape	Some potential removal of incongruous landscape features or visual amenity, although more likely the existing landscape and/or resource is complemented by new

	character or the ability to take in or enjoy the view.	landscape features or built features compliant with the local landscape and published landscape character assessments. The proposals will create a discernible improvement in the existing view.
Negligible	There would be a detectable but non-material change to the landscape resource of visual amenity. The proposals will create a barely perceptible diminution of the integrity of characteristic features and their settings.	The proposals would result in minimal positive change to the landscape or visual resource, either through perceptual or physical change, and any change would not be readily apparent but would be coherent with ongoing change and progress, and coherent with published landscape character assessments.

Significance of Effects

Table 6.13 Assessment Matrix

Overall sensitivity	Overall magnitude of change				
	No Change	**Negligible**	**Low**	**Medium**	**High**
Negligible	No Change	Negligible	Negligible/Minor	Negligible/Minor	Minor
Low	No Change	Negligible/Minor	Negligible/Minor	Minor	Minor/Moderate
Medium	No Change	Negligible/Minor	Minor	Moderate	Moderate/Major
High	No Change	Minor	Minor/Moderate	Moderate/Major	Major/Substantial
Very High	No Change	Minor	Moderate/Major	Major/Substantial	Substantial

6.2.39 Each effect is described and evaluated individually through the integration of all the relevant factors and assessed as either **significant** or **not significant**. Those effects identified at a substantial, major/moderate or moderate level (shaded in grey) are generally considered significant and those effects assessed at a moderate/minor, minor, minor/negligible level are considered to be not significant. Where landscape effects are judged to be **significant and adverse**, proposals for preventing, reducing, of compensating for them may be described.

6.2.40 In general, significance is likely to be greater in mature, diverse landscapes with rare or distinctive features, and lesser in lower value, degraded landscapes with uniform, homogenous elements or characteristics.

Limitations of the assessment

6.2.41 The LVIA process is based upon a professional judgement of effects using a robust and fit for purpose methodology. It should be objective and quantify change as far as possible.

6.2.42 There is, however, an element of subjectivity which must rely upon qualitative assessments by landscape professionals. The subjective nature of the judgements is minimised by the presentation of a transparent assessment, supported by reasoned argument. Page 21 of GLVIA3 states: "*In all cases there is need for the judgements that are made to be reasonable and based on clear and transparent methods so that the reasoning applied at different stages can be traced and examined by others*." It is thus recognised that subjective judgement is

appropriate as long as the judgements are based on training and experience and can be supported by clear evidence and reasoned argument.

6.3 Baseline Conditions

Landscape Baseline

Site location and context

6.3.1 The site is primarily located on the western bank of the Ely River, 4.3 km northwest of Penarth on the eastern edge of the Vale of Glamorgan, Wales. A small part of the site lies east across the river within the Leckwith district of Cardiff's western periphery (**Figure 6.1: Location Plan**).

Planning designations

6.3.2 The site lies outside of any settlement development limit, which places it within a rural context, although it is currently used for commercial purposes. It sits between the river and the woodland but also has a relationship with the urban fringe of Cardiff, east of the river.

Landscape and cultural heritage designations

6.3.3 Within the study area are a number of sensitive areas in terms of landscape and cultural heritage terms, the various layers are described below. See **Figure 6.4: Landscape Designations**

National Designations

Sites of Special Scientific Interest (SSSI)

6.3.4 Cwm Cydfin, Leckwith is located approx. 500m south of the proposals site.

6.3.5 Designated in 1983 it is mixed woodland, with pendunculate oak ash, elm, field maple and hazel. The ground flora is varied and especially rich alongside the streams. Cwm Cydfyn SSSI is set within a larger complex of woodlands in the area, which add value to the site.

6.3.6 The site is currently managed to safeguard the special features of the woodland, the essential points of this strategy are:-

- Grazing is prohibited
- Removal of dead and decaying wood is prohibited
- Monitoring and removal, if deemed necessary, of invasive non-native tree species which could shade out other plants
- Some traditional woodland management, the occasional thinking and small scale feeling to create gaps in the woodland canopy.

Ancient Woodland Inventory

6.3.7 The site contains a small area of Ancient Semi-Natural Woodland (ASNW), Factory Wood abuts and overlays part of the southwest site boundary. Further north the site borders Leckwith Wood, another ASNW. These two woodlands form the majority of the backdrop to the site contributing considerably to its character. The southwest portion of the study area

includes a number of areas of Ancient Woodland, including Ancient Semi-Natural Woodland, Restored Ancient Woodland and Plantation on Ancient Woodland.

6.3.8 Ancient Semi-Natural Woodland – broadleaf woodlands comprising mainly native tree and shrub species which are believed to have been in existence for over 400 years. They have significant landscape, biodiversity and cultural value. As such trees and woodlands should be afforded protection from development which would result in their loss or deterioration unless there are significant and clearly defined public benefits, according to PPW 10

Scheduled Monument

6.3.9 Within the part of the site which crosses the River Ely is a bridge dating from the medieval period, this bridge is a Scheduled Monument. The bridge is of rubble stone construction with three arches, the two outer ones pointed with double arch rings, the centre one semi-circular and probably rebuilt. The carriageway measures about 2.75m wide with refuges above the pointed cutwaters. The two elevations are the same and the low parapet walls are topped by flat slabs.

6.3.10 Whilst medieval in origin, it was possibly partly reconstructed in the 17th century, with the central arch probably rebuilt in the 18th century. The bridge was by-passed in 1934. Leland recorded Leckwith Bridge as being 'soundly built of stone' in 1536.

Listed Buildings

6.3.11 The site itself contains only one listed structure, Old Leckwith Bridge. However, various listed buildings are located within the study area. None are within 1km of the site or have a direct view of the site and none are judge to be a receptor for impacts. Those closest are listed below:

Name	Grade	Distance from site at closest point (approx.)
Old Leckwith Bridge	II*	0km
Brynwell Farm including attached agricultural buildings	II	1.1km
Pound Cottage	II	1.8km
Former Cardiff and District Western District Sewerage Pumping Station.	II	1.3km
Gas Holder at British Gas Grangetown Works	II	1.4km
Parish Church of St Paul	II	1.7km
Grange Farm House	II	1.4km

6.3.12 Only the Old Leckwith Bridge is considered to have a direct bearing on the application, the others are excluded due to a lack of physical proximity and visual connection.

Historic Parks and Gardens

6.3.13 Statutory register of Historic Parks and Gardens in Wales comes into force later in 2019, replacing current non-statutory register. Two Parks overlap the very northern edge of the study area.

6.3.14 Victoria Park, Grade II - A small but intact Victorian public park retaining most of its original layout, some planting and Cardiff's first municipal bowling green. Also including a Grade II

listed building; Former drinking fountain canopy in rose garden of Victoria Park, designated as a fine piece of Victorian cast iron design and manufacture.

6.3.15 Thompson's Park, Grade II - A well-preserved Victorian urban public park. It retains much of its original layout and tree planting. The design also incorporates plantings that pre-date the park area. Thompson's Park has an unusual history. In contrast with most other Cardiff public parks, it was a privately owned and managed garden before being opened to the people of Cardiff by prominent local businessman, Charles Thompson.

Local Designations

Site of Importance for Nature Conservation

6.3.16 Sites of Importance for Nature Conservation, or SINCs (also known as Local Wildlife Sites) are wildlife rich areas, identified and selected for their local biodiversity value. Selection takes into consideration important, distinctive and threatened habitats and species. Local Wildlife Sites vary in size, shape and habitat type and can include wildlife rich ponds, heaths, wetlands and ancient woodlands and grasslands.

6.3.17 The site overlaps a small area of Factory Wood Site of Importance for Nature Conservation (SINC) and is bordered on virtually all side by others. To the west, in the Vale of Glamorgan by Leckwith Woods SINC and to the east, in Cardiff, the River Ely SINC. There are also many others within the wider study area, in the Vale of Glamorgan Coed y Ddylluan, West Hill Wood and Reservoir Wood and on the Cardiff side Leckwith Woods Viaduct, Canton Commons Ditch, Leckwith Ponds & Marsh and Grangemoor Park. Those overlapping or bordering the site are detailed below.

6.3.18 Factory Wood SINC is an extensive area of dry calcareous woodland occupying a series of steep slopes and stream valleys south east of the site. This native woodland is quite variable in nature but seems to be in reasonable condition. Ash standards dominate with extensive areas of neglected hazel coppice below. Well-developed woodland also supports much field maple, wych elm and dog's mercury. Much of the canopy is closed and the woodland floor supports abundant ivy. Some areas have been in-planted with non-native conifers and other introduced species (e.g. hornbeam) but these have not altered the woodland character too much. There are many informal paths from the road to the west going downhill and the woods appear to be well-used by local people for recreation.

6.3.19 Leckwith Woods SINC is a large area of calcareous deciduous woodland to the west and north of the site. This mixed native woodland is in reasonable condition, with a degree of variety on the plateau, slopes and around the brooks and an area of restored ancient woodland. The majority of the SINC is Ancient Semi Natural Woodland. Much of the canopy is closed, although two large swathes have been removed for the electricity transmission lines which drop down the hill and cross the valley here. There are some informal paths from the road and footpath to the south and the woods appear to be used by local people for recreation.

6.3.20 The River Ely SINC lies close to the majority of the site and in one area the site actually crosses it. The river here is a medium scale watercourse, flowing south east towards Cardiff Bay, forming the boundary between Cardiff and The Vale of Glamorgan. The river is important for migratory fish, otters, wildfowl and bankside vegetation and acts as a major wildlife corridor. Numerous important species have been recorded along the River Ely, including Bats, Otters, Palmate and Smooth Newts, Kingfishers and Barn Owls. Good access is available to the River Ely, particularly via the Ely Trail which is well-used by local people for recreation.

Special Landscape Area (SLA)

6.3.21 Cwrt-yr-ala Basin SLA 6 covers the majority of the site, all apart from the small area east of the river. The landscape designation is focused on the Cwrt-yr-ala valley, forming the headwaters of the Cadoxton Valley. There is a strong sense of place with streams, dammed ponds, wooded valley sides and pleasant settlement in the valley bottom. The farmland is generally well maintained but there are signs of urban fringe pressure on lanes. The enclosed topography in association with woodland creates a sense of enclosure and the steep sided valleys dominate the character of the landscape and habitats. Woodland is semi-natural and planted broadleaf. To the north and east a scarp slope acts as a western edge to Cardiff basin. The slope is dominated by broadleaf and mixed woodland giving way to riverside vegetation and limited commercial development. The exposed hillside rises steeply to overlook the flat land of Cardiff Bay and City. There are detractive views to Leckwith Industrial Estate and noise from the A48. The natural landscape has been significantly altered by urban expansion and, despite the SLA area itself having few settlements, it feels very settled due to the proximity to Cardiff. There is an extensive area of current and former parks of Cwrt-yr-ala House. Allotments, orchards and reservoirs/artificial lakes add to the character. There is an irregular fieldscape of small fields and two medieval settlements to the north of Dinas Powys and Barry. Smaller roads are hedgerowed and have a feeling of being tranquil and sheltered. The area offers attractive views but many are affected by inappropriate built form and hedgerows are gappy and poorly managed in places.

6.3.22 Relevant policy and management issues for the SLA are:-

- Promote Forestry Commission grant uptake to extend, plan and manage woodland compartments paying particular attention to those around the SSSI
- Manage woodland to maintain continuous tree cover, especially on the skyline
- Maintain hedgerows and as a strong visual framework and the rural qualities and vegetated nature of the valley.

Conservation Area (CA)

6.3.23 The Conway Road CA is approx. 1.6km from the site, towards the northern edge of the study area. The area is the legacy of Cardiff Freehold Land Society, one many in Britain, all representing part of an important campaign to enfranchise ordinary people. People who bought a plot of freehold land through the society and built a house with a minimum value of £150 gained the right to vote. While many societies succeeded in their aim of building houses and achieving voting rights for their owners, relatively few areas survive intact today. Conway Road CA is important for retaining many of the original buildings, their individual character being testimony to this unusual history as well as embodying a fundamental democratic principle. Features and elements which make the area worthy of designation include:-

- Larger plots might be sold for more substantial houses, in contrast to adjoining developments
- Houses built to a strict building line
- Uniformity and proportion in the width of houses
- A tree line avenue with gardens to front and back
- Two large planned corner plots framing the entrance to the area from the south
- A variety of architectural styles and materials
- Variety in building heights
- High quality architectural detailing and distinctive Building features
- High Quality or Unusual Materials in the Townscape

- Hierarchies of Public and Private Space
- High Quality Hard and Soft Landscaping

Geology

6.3.24 The underlying geology for the site is Mudstone and Limestone, where the river has eroded around Cock Hill a variety have been exposed over time.

6.3.25 The soil covering the majority of the site is clay to sandy loam, derived from marine/estuarine sand and silt. On the hillsides clayey/silty loam predominates derived from the underlying bedrock.

Hydrology

6.3.26 A watercourse, the River Ely, runs along the western boundary of the site, in a north-west to south-east direction.

6.3.27 A large artificial pond exists on the site, in the neglected former gardens associated with the residential buildings.

6.3.28 Ponds are categorised as 'Priority Habitats' under the Environment (Wales) Act 2016.

Topography

6.3.29 This brownfield site is linear in form, approximately 890m in length. The majority of the site lies is a strip between the River Ely and the Leckwith and Factory Woods. A smaller portion of the site extends east across the river and under the A4232 flyover and covers the junction with the same road's access roundabout.

6.3.30 The western section lies at the base of a wooded slope that forms the north-eastern side of Cock Hill. The site itself is reasonably flat while alongside the river but does rise up reasonably steeply as it comes into contact with the hill. This phenomena is more pronounced the further one travels from north to south along the length of the site.

6.3.31 The eastern site boundary parallel to the river, a few meters in from the western bank, is at approximately 7m AOD in the northern portion of the site. The land beside the river rises slightly along the length of the site so that at the southern extent it is at approx.12m AOD.

6.3.32 The northern portion of the site is relatively level but even here as site overlaps the base of the hill levels rise to approx. 15m AOD. As the site widens slightly to the south the proportion of level land against the river decreases and the height on the western boundary rises up to approx. 45m AOD.

Land Use and Cover

6.3.33 A more detail description of the existing site is provided in Chapter 2, but in short and of relevance to this chapter. **Figure 6.2: Aerial Location Plan** provides photographic coverage of the site and study area.

6.3.34 The site is a brownfield area, with majority of it currently under a mixture of reasonably typical peri-urban commercial uses, building supplies, scaffolders, demolition contractors and the like.

6.3.35 The site also incorporates several routes:-

- The B4267, Leckwith Road crosses the site, entering in the south west corner, heading northwards before rising up on a viaduct over the falling ground level and turning east to cross the river.
- The road over the medieval bridge leads to a number of informal access routes within the site.

6.3.36 The wider study area is reasonably diverse. Containing rural land, industrial estates and residential housing. Each type is constrained by a physical barrier the river, the railway or major roads.

6.3.37 To the south and west of the site the land is largely rural a mixture of woodlands and an irregular fieldscape of smaller fields. The other side of the River Ely is much more urban in nature. Leckwith itself displays typical edge of city land cover, those uses that require larger land areas, but rely on direct access by vehicles. Low rise commercial and industrial developments comprising the likes of out of town shopping, light industrial, vehicle sales and Cardiff City Stadium. Then the character changes once again as the railway is crossed to enter the domestic areas of Canton, Riverside and Grangetown on the periphery of Cardiff, Victorian era terraces of varying quality.

Vegetation

6.3.38 The amount of on-site vegetation is limited as the land is mainly taken up with hard standing associated with the commercial and industrial uses. Alongside the river are several large stands consisting of mixes of goat willow, ash, elm, buddleia, and sycamore with signs of Dutch elm disease and ash dieback, all of low quality and poor condition. There are also a couple of stands of cypresses, possibly planted for screening.

6.3.39 Towards the western side of the site are several groups of willows, sycamore, hazel, hawthorn, elm, ash and buddleia of poor to moderate condition showing signs of both Dutch elm disease and ash dieback. There are a number of standalone trees primarily ash but also elm, willow and a field maple. The ample is the only one in good condition, the rest are either in a moderate or poor condition, while a number are dead. Either from Dutch elm disease or ash dieback.

6.3.40 On the slopes of the hill are a couple of groups of sycamore, ash, hawthorn, hazel, alder and on the northern side of the B4267 some English oak. Again these groups are in a poor to moderate condition with signs of both Dutch elm disease and ash dieback.

Built Form

6.3.41 South of the B4267 viaduct are several industrial units, both walls and roofs constructed of corrugated metal. North of the raised road are a couple of two story houses constructed of stone, partly rendered and roofed with tiles. One has been extended in a very ad hoc manner partly pitched roof partly flat, some stone walls and a variety of different window sizes and types. In addition there are a number of small, low quality, single story buildings used for commercial purposes.

Access Roads and Paths

6.3.42 The commercial estate is a cul-de-sac with the only vehicle access, in and out, provided across the medieval bridge, which is Grade II* listed and a Scheduled Monument.

6.3.43 The B4267, Leckwith Road crosses the site, entering in the south west corner, heading northwards before rising up on a viaduct over the falling ground level and turning east to cross the river.

6.3.44 A Public Right of Way also crosses the site east west from the medieval bridge into the woodlands. It appears to be very little used.

6.3.45 The Ely Trail, a Sustran's foot and cycle path from Penarth to St. Fagans follows the route of the eponymous river on the opposite bank from the majority of the site.

Landscape Character

6.3.46 The Landscape Character of the site has been reviewed along with its landscape context using the most recent LANDMAP Visual and Sensory Aspect data (**Figure 6.6: Visual and Sensory Aspect Areas**). There are five aspects within the LANDMAP data, however the 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. A summary of the relevant LANDMAP information from the other four Aspects is illustrated in **Figure 6.7: Aspect Areas**. The following landscape character descriptions are taken direct from the LANDMAP Collector data produced as part of the LANDMAP study for this area.

6.3.47 LANDMAP, places the majority of the site within the Visual & Sensory Aspect Area *Southern Eley Valley* [VLFGLVS213]. As the name suggests this apart of the Eley valley. The summary description of the area follows:

6.3.48 *"This area is a steep north-east facing scarp slope, falling from around 115mAOD towards the Ely river at around 15mAOD with Cardiff beyond. The slope is dominated by broadleaf and mixed woodland giving way to riverside vegetation and limited commercial development by the river. The valley slope forms a distinctive edge to Cardiff and presents a strong topographical and vegetated landform highly visible from the city. Settlement is sparse consisting of one farm and a few dwellings. The B4267 bisects the area at its midpoint and runs along its boundary in the south-west section. The busy A4232 western Cardiff bypass forms the area's eastern boundary and is a major influence in reducing tranquillity. The woodland appears to be unmanaged in parts. Some detractors are present including derelict land, electricity lines cutting through the woodland, the A4232 and the commercial sites adjacent to the river's edge."*

6.3.49 LANDMAP classifies this Visual and Sensory Aspect Areas as 'High' value. The reasoning given for this is that:

6.3.50 *"The aspect area presents easily accessible attractive views to a wooded hillside, has maintained a high integrity with partial development to the base of the hillside, and possesses a strong character due to its strong topogrphical form and almost continuous vegetational cover. The aspect area possesses rare elements within the study area."*

6.3.51 The small portion of the site to the west of the river is within the Visual & Sensory Aspect Area *Cardiff West* [CRDFFVS038] this covers a large proportion of Cardiff east of the River Taff. The summary description of the area follows:

6.3.52 *The city west of the River Taff runs from Cardiff Bay across the coastal plain to the low hills on the edge of the Vale of Glamorgan and the scarp slope to the north. The area is mainly residential ranging from the well-heeled late Victorian streets of Pontcanna and dense terraced streets of Grangetown through to large 20th-century council estates in Ely and Caerau and privately owned estates in Fairwater and Radyr. The old core of Llandaff with its discreet and elegant spired cathedral, visible on the A48 road approaches, is a highlight. Also the Cathedral Road area with its well treed avenues and consistent pattern of Pennant stone and Bath stone houses has a strong positive and distinctive character. Commercial development with ubiquitous national retail outlets runs from Leckwith down to the Bay including Penarth Road. Cardiff City football stadium and the adjacent athletics stadium are the main noticeable structures in this area but have limited architectural merit compared to the structures in Cardiff to the east.*

6.3.53 This area does not have an evaluation.

6.3.54 The remaining four LANDMAP Aspects are detailed in **Figure 6.7: Aspect Areas**. The site lies within two Geology Landscape Aspects Areas *Penarth Flats* [VLFGLGL523] evaluated Low and *Penarth* [VLFGLGL238], which is evaluated Moderate. The site lies primarily within the Historic Landscape Aspect of *Leckwith and Cwm Cydfin* [VLFGLHL025] classified as woodland and which is evaluated Moderate but to the east of the River Ely the site straddles two more areas *Trelai Park* [CRDFFHL034] recreational land evaluated High and *Leckwith Moors* [CRDFFHL033], which is evaluated Moderate. For the Cultural Landscape Aspect the majority of the site lies within *Vale of Glamorgan Rural Landscape* [VLFGLCL039] which is evaluated High. The site, again, lies in two areas for the Landscape Habitat Aspect classification. Primarily *Leckwith-Dinas Powys Woodlands* [VLFGLLH988] which is evaluated as High and the small section of the site east of the river is within *Capital and Ferry Road Retail Parks* [CRDFFLH049] classified as industrial and evaluated Low.

Landscape Character of the Site

6.3.55 In accordance with GLVIA 3rd Edition [section 5.16], a detailed landscape survey of the site and its immediate setting has been carried out, in order to 'analyse to what extent the site and its immediate surroundings conform to or are different from the wider Landscape Character Assessments that exist'. We have made direct reference to the SLA 6 'Cwrt-yr-ala Basin', together with the underlying LANDMAP Visual and Sensory Aspect Area *Southern Eley Valley* [VLFGLVS213].

6.3.56 Review of the site and its immediate context suggests that the description – and therefore value – of the site is different from that described in the VS collector data above for the Aspect Area as a whole.

6.3.57 The Visual and Sensory Aspect Specialist (Collector Sheet dated 2004) states that the key qualities which contribute positively to the landscape character and High evaluation are the topography of the east facing scarp slope, strong sense of enclosure and the unity of tree cover provided by the woodland. All these elements are missing from the site.

6.3.58 The collector also details a number of negative influences or detractors on the area, including derelict land, electricity lines cutting through the woodland, the A4232 and the commercial sites adjacent to the river's edge. The site is predominantly a combination of these elements.

6.3.59 It is evident from both review of the LANDMAP data, and from our detailed site survey, that the landscape character of the site area is significantly different from the majority of the area as stated in the Collector Record for *Southern Eley Valley* [VLFGLVS213]. The key qualities have already been markedly compromised by the presence of so many negative influences within the site and the adjacent A4232 and built form and urban edge of Cardiff.

6.3.60 The site lies on the edge of, but within, SLA 6 'Cwrt-yr-ala Basin'. LANDMAP Guidance Note 1[Section 6 p.6-7] makes direct reference to SLAs that may include an area of landscape that does not contain the same high value of the majority of the SLA, as below:

6.3.61 *"In some SLAs, a coherent and defensible boundary for an SLA may encompass small parts of the local landscape that does not display the same high landscape importance. It is the prerogative of the local planning authority to make the decision to include areas of lower landscape importance as long as a clear and defensible justification is made, and can be made at an Inquiry, and they form a minority part of the SLA. Circumstances when this may occur may be:*

- To include an integral area of similar topography or land cover that could be enhanced
- A proportionately small area of active mineral or other workings that could be restored to a high *quality landscape*

- In some instances, there may be a part of the landscape that is significantly affected by existing or planned new development or is characterised by significant detractors or damage so that a case may be made to exclude the area from the SLA."

6.3.62 Review of *Southern Eley Valley* [VLFGLVS213] and the detailed site survey confirm that the landscape character of the site area is significantly different from the majority of the Visual and Sensory Aspect Area that the positive key qualities are already missing or negatively affected by the presence of the current use and built form and the adjacent road flyover.

Landscape Receptors

6.3.63 The following landscape elements have been identified as landscape receptors:

Receptor	Location/Receptor Type
1	Cwrt-yr-Ala basin SLA
2	Factory Wood SINC
3	Leckwith Woods SINC
4	River Ely SINC
5	Old Leckwith Bridge SM
6	Cwm Cydfin SSSI
7	Ancient Woodland
8	Artificial Pond
9	Vegetation
10	Topography

Visual Baseline

6.3.64 The study area comprises the raised ground of a dip and scarp slope to the south west and the lower flatter land of the Cardiff basin to the east and north. Some far reaching views from and on to the elevated lands forming the edge of the basin are possible.

6.3.65 The southern and western slopes of the river valley are highly vegetated. Even the narrow strip alongside the eastern bank of the river is well vegetated. This level of vegetation limits long views and contributes to a sense of enclosure.

6.3.66 Within the residential areas, although the building heights don't often get above 2 or 3 storeys, generally shorter roads and continuous building lines mean long views are limited. Within the recreational and commercial areas there is more open ground and longer views are possible.

6.3.67 The site, adjacent to the river, is at a lower level than much of the study area.

6.3.68 The topography of the site and study area, combined with the high level of vegetation and the raised A4232 mean that views into the site are extremely limited. No far-reaching views exist from the north south or west and only very limited views for the east where the site is barely discernible in the overall context of the far-reaching, extensive and panoramic views.

Principle features in the view

6.3.69 The wooded slopes of the valley are a prominent backdrop to the western side of the city of Cardiff. Especially in contrast to the flat, urban land to the east of the river.

6.3.70 Cardiff City Stadium is a reasonably prominent landmark, taller than much of the neighbouring built form and standing alone surrounded by car parks.

6.3.71 Various raised sections of the A4232 are also noticeable in views from the east looking west.

Schedule of viewpoints

Viewpoint	Location/Receptor Type	Description/Comments
1	Leckwith B4267, footway, looking south-west	View from the footway of the dual carriageway adjacent to Asda Leckwith
2	Leckwith Interchange, looking south-west	View from pedestrian footpath on interchange looking towards site across several lanes of carriageway and under the elevated A4232
3	Old Leckwith Bridge looking south-west	View from within the site on access route to current development
4	Ely Trail, looking west-southwest	View from footpath/cycle route on other side of the river from the majority of the site. North of Old Leckwith Bridge
5	Ely Trail, looking west-northwest	View from footpath/cycle route on other side of the river from the majority of the site. South of Old Leckwith Bridge
6	A4232, looking west	View from north bound carriageway of A4232
Viewpoints appraised but site found to be not visible		
Viewpoint	**Location/Receptor Type**	**Description/Comments**
A	Grangemoor Park, looking north-west	Elevated view from hilltop within public park, across commercial land towards the site
B	Canton, footbridge over railway looking south-west	Elevated view from footbridge within commercial edge to Canton
C	Cardiff Castle, roof of Norman Keep, looking south-west	Elevated view from heritage asset within Cardiff

6.3.72 The nine views assessed represent views from the north, east and south towards the site. Of these views two are medium distance (Views 1 and 2), and due to the contained nature of the site the rest are all short views from in or around the site.

6.3.73 Other views were checked and excluded from the assessment, either because the site could not be seen at all, because it was not perceptible to the naked eye in the context of the wider panoramic view, or because there was a better, more representative view. Views from private properties were also excluded, for reasons of inaccessibility and the current understanding that private residence do not have a legal right to a view.

6.3.74 The entire Study Area was scoured for available views. From the western side of the Ely there are no views due to the topography and heavy vegetation; the site is at the base of a wooded slope so not only are no views available from the other sides of the hill but also not from the slope itself due to the woodland. On the eastern side of the river the land is generally flat, at a similar elevation to the site. Views here are obscured by buildings, the A4232 and vegetation associated with the ring road and river. To the north, in areas where there are fewer buildings, there are longer views over the open land of the playing fields. However the

site is blocked from view by the A4232 and the vegetation around the road and river. To the east of this is Trelai Park here again the views are blocked by A4232 and the vegetation around the road and river and also by the topography.

6.3.75 A number of viewpoints along the Ely Trail were investigated but the only ones found were opposite the site and then only during the winter. Further away, along the trail to the north and south the riverside vegetation (on both sides) screens the views. When the vegetation is in leaf the site is effectively screened from the Ely Trail.

Future Baseline Conditions

Climate Change

6.3.76 With the current projections, global warming is projected to increase by a further degree within the next two decades. However, global temperatures could rise to 4°C above pre-industrial levels by the end of the century, and summer maximum temperatures could rise by up to 10°C in parts of England. Winters are predicted to become wetter, and summers drier, with more frequent and severe periods of summer drought and intense rainfall events.

6.3.77 Tree pests and diseases, both those present in the UK and those that may be introduced, are likely to remain a greater threat to woodlands in the immediate future than the direct effects of climate change.

6.3.78 Information and management are key to helping woodlands adapt, it is possible that the development could have a role to play her in creating suitable access paths and promoting positive perceptions of the woodlands.

Recreation and Tourism

6.3.79 This attractive rural edge to the Cardiff basin could come under pressure from the city's residents as a desire for outdoor recreational pursuits grows. Increasing popularity of the area with visitors is likely to bring continued pressure for infrastructure, it is better to plan and manage access to the woodlands at an early stage.

6.4 Mitigation Measures Adopted as Part of the Project

6.4.1 Various mitigation and enhancement measures have been designed into the development.

6.4.2 Mitigation measures are those measures proposed to prevent/avoid, reduce and where possible offset, remedy or compensate for any significant adverse landscape and visual effects. They are essentially proposed to reduce any adverse impacts of development and to ensure it integrates well with its surroundings.

6.4.3 Enhancement measures are subtly different as they seek to improve the landscape resource and the visual amenity of the Proposed Development site and its wider setting, over and above its baseline condition.

6.4.4 In the case of this Proposed Development, developing design proposals take guidance from planning policy and published landscape character assessments, as well as from a detailed knowledge of the site, its physical and visual context, and its landscape opportunities and constraints.

6.4.5 This site presents an opportunity for a strong landscape scheme. The positive landscape attributes of the site - i.e. the site's distinctive topography, the adjacent woodlands and the proximity of the river, have shaped the developing masterplan, alongside a consideration of constraints.

6.4.6 The landscape mitigation and enhancement measures associated with the current Proposed Development are set out below:

- Scale, density and layout of the development designed to be sympathetic with the local context
- Covered car park located under courtyard deck garden
- Maximum building height (5-storey) informed by the local topography, to avoid breaking the skyline in majority of views
- Wooded nature of surrounding slopes retained and extended with new tree planting, contributing to the local distinctiveness of the area
- River side vegetation retained and improved to ensure stability of banksides and existing habitats
- Riverside access promoted with new routes, but constrained with bankside platforms
- New pedestrian and cycle access into and around site
- Appropriately sensitive access into woods to facilitate recreational use and management
- Soft landscape areas managed for their biodiversity value.

6.5 Assessment of Construction Effects

6.5.1 This landscape and visual assessment follows the defined methodology of assessing receptor sensitivity against the magnitude of change, to identify a significance category for each identified effect at construction stage. The results are also gathered in the summary tables at the end of the document.

Landscape Effects

Receptor 1.

1. Cwrt-yr-Ala basin SLA		
	Assessment	**Significance**
Landscape value	The SLA is a landscape of local importance, with features which are rare locally, giving it a high value as landscape receptor.	High
Susceptibility of landscape receptor to change	The landscape has distinctive landscape elements most notably the woodlands which are in fair condition. It has a few landscape detractors, examples of which dominate the site, but overall it has a low capacity for change.	High
Sensitivity of landscape receptor	Combining a high landscape value with a high susceptibility to change suggests an overall high landscape sensitivity	High
Magnitude of landscape impact	The development proposals would result in the permanent loss of some trees from the woodland within the site, a direct impact on a key characteristic. However the loss is limited in scope and should only be felt at a very local level. There would also be the permanent removal of a current detractor, namely the commercial sites.	Medium

	During the construction phase there is likely to be disruption in the form of noise, vibration dust and additional vehicle movements resulting in temporary impact.	
Significance of construction landscape effects	During construction with a high sensitivity of landscape receptor and a medium magnitude of impact the significance is judged to be moderate.	**Moderate Adverse**

Receptor 2.

2. Factory Wood SINC		
	Assessment	**Significance**
Landscape value	The SINC is a landscape of local importance, with features which are locally limited, giving it a high value as landscape receptor	High
Susceptibility of landscape receptor to change	The receptor condition as a SINC is unassessed, but is noted as semi-natural ancient woodland possibly in decline due to lack of management. However it has strong aesthetic/perceptual aspects and detractors are very few. Overall it has a very low capacity for change.	Very high
Sensitivity of landscape receptor	Combining a high landscape value with a very high susceptibility to change suggests an overall landscape sensitivity that is high.	High
Magnitude of landscape impact	The development proposals would result in the permanent loss of some trees from the woodland within the site, a direct impact on a key characteristic. However the loss should be limited and only felt at a limited local level. During the construction phase there is likely to be disruption in the form of noise, vibration dust and additional vehicle movements resulting in temporary impact	Medium
Significance of construction landscape effects	During construction with a high sensitivity of landscape receptor and a medium magnitude of impact the significance is judged to be moderate.	**Moderate Adverse**

Receptor 3.

3. Leckwith Woods SINC		
	Assessment	**Significance**
Landscape value	The SINC is a landscape of local importance, with features which are locally limited, giving it a high value as landscape receptor	High
Susceptibility of landscape receptor to change	The receptor condition as a SINC is unassessed, but is noted as semi-natural ancient woodland possibly in decline due to lack of management. However it has strong aesthetic/perceptual aspects and detractors are very few. Overall it has a very low capacity for change.	Very high
Sensitivity of landscape receptor	Combining a high landscape value with a high susceptibility to change suggest an overall landscape sensitivity that is high	High

Magnitude of landscape impact	The development proposals would result in the permanent loss of some trees from the woodland within the site, a direct impact on a key characteristic. However the loss should be limited, and so to be felt only at the local level. During the construction phase there is likely to be disruption in the form of noise, vibration dust and additional vehicle movements resulting in temporary impact	Medium
Significance of construction landscape effects	During construction with a high sensitivity of landscape receptor and a medium magnitude of impact the significance is judged to be moderate.	**Moderate Adverse**

Receptor 4.

4. River Ely SINC		
	Assessment	**Significance**
Landscape value	The SINC is a landscape of local importance, with features which are limited locally, giving it a high value as landscape receptor	High
Susceptibility of landscape receptor to change	The receptor condition as a SINC is unassessed, but is noted as in good condition, reasonably unmodified and the water is not grossly polluted by long-term sources. It has reasonable aesthetic/perceptual aspects but detractors are numerous, along its length there are raised sections of carriageways and many low quality edge of town uses. Overall it has a medium capacity for change.	Medium
Sensitivity of landscape receptor	Combining a high landscape value with a medium susceptibility to change suggest an overall medium landscape sensitivity.	Medium
Magnitude of landscape impact	The proposals would see the removal of the commercial units which are currently a detractor of the receptor and allow for the removal of unsuitable non-native screening planting. During the construction phase there is likely to be disruption in the form of noise, vibration dust and additional vehicle movements resulting in temporary impact	Low
Significance of construction landscape effects	During construction with a medium sensitivity of landscape receptor and a medium magnitude of impact the significance is judged to be moderate.	**Moderate Adverse**

Receptor 5.

5. Old Leckwith Bridge – Scheduled Monument/Listed Structure		
	Assessment	**Significance**
Landscape value	The bridge is designated a Scheduled Monument and a Grade II* listed structure, which are national designation, giving it a high value as a landscape receptor.	Very High
Susceptibility of landscape	The bridge retains all the elements for which it was listed. However the setting and approach on both	Medium

receptor to change	sides of the river has been compromised by low quality, ad-hoc public realm and highway works including car parking and signage. It is also overshadowed by the A4232 and to a certain extent the B4267. The landscape receptor is judged to be in a fair condition and that it is able to accommodate some change.	
Sensitivity of landscape receptor	Combining a very high landscape value with a medium susceptibility to change suggest an overall high landscape sensitivity.	High
Magnitude of landscape impact	The development proposals would result in the cessation of vehicle traffic over the bridge and removal of the negative elements currently in the bridges setting. During the construction phase there is likely to be disruption in the form of noise, vibration dust and additional vehicle movements resulting in temporary impact.	Medium
Significance of construction landscape effects	During construction with a high sensitivity of landscape receptor and a medium magnitude of impact the significance is judged to be moderate.	**Moderate Adverse**

Receptor 6.

6. Cwm Cydfin SSSI		
	Assessment	**Significance**
Landscape value	Cwm Cydfin is designated a Site of Special Scientific Interest, which is a national designation, giving it a high value as a landscape receptor.	Very High
Susceptibility of landscape receptor to change	This is a semi-natural broadleaved woodland. The landscape receptor is judged to be in a good condition which means that it is able to accommodate little change.	High
Sensitivity of landscape receptor	Combining a very high landscape value with a high susceptibility to change suggest an overall high landscape sensitivity.	High
Magnitude of landscape impact	The development proposals would result in no direct change to the receptor, it could possibly contribute to an increase in pedestrian visitors however there is no formal Public Right of Way connecting the two planned in the proposals. During the construction phase there is likely to be disruption in the form of noise, vibration dust and additional vehicle movements resulting in temporary impact	Negligible
Significance of construction landscape effects	During construction with a high sensitivity of landscape receptor and a negligible magnitude of impact the significance is judged to be minor.	**Minor Adverse**

Receptor 7.

7. Ancient Woodland		
	Assessment	**Significance**
Landscape value	The majority of Factory and Leckwith Woods are recorded as Ancient Semi-Natural Woodland, which is a national designation, giving it a high value as a landscape receptor.	Very High
Susceptibility of landscape receptor to change	This is a semi-natural broadleaved woodland. The landscape receptor is judged to be in a reasonable condition although possibly in decline due to lack of management. However it has strong aesthetic/perceptual aspects and detractors are few. Overall it has a very low capacity for change.	Very High
Sensitivity of landscape receptor	Combining a very high landscape value with a very high susceptibility to change suggest an overall landscape sensitivity that is very high.	Very High
Magnitude of landscape impact	The development proposals would result in a permanent loss of some trees where the road is realigned for the new bridge and in the southern portion of the site when absolutely necessary for the proposed housing. During the construction phase there is likely to be disruption in the form of noise, vibration dust and additional vehicle movements resulting in temporary impact	Low
Significance of construction landscape effects	During construction with a landscape receptor of very high sensitivity of and a low magnitude of impact the significance is judged to be moderate.	**Moderate Adverse**

Receptor 8.

8. Artificial Pond		
	Assessment	**Significance**
Landscape value	The pond is located in the neglected former gardens within the curtilage of the residential dwellings. The pond is man-made, within a steep sided concrete basin, entirely surrounded by hardstanding. Ponds are listed as 'Priority Habitat'.	Low
Susceptibility of landscape receptor to change	The landscape receptor is judged to be in a poor condition which means that it is able to accommodate change.	Low
Sensitivity of landscape receptor	Combining a medium landscape value with a low susceptibility to change suggest the overall landscape sensitivity is low.	Low
Magnitude of landscape impact	The development proposals would result in a permanent loss of the artificial pond on site as the road is realigned, the new bridge installed and the proposed housing is built. During the construction phase there is likely to be disruption in the form of noise, vibration dust and	High

	additional vehicle movements resulting in temporary impacts	
Significance of construction landscape effects	During construction with a low sensitivity of landscape receptor and a high magnitude of impact the significance is judged to be minor	**Minor Adverse**

Receptor 9.

9. Vegetation		
	Assessment	**Significance**
Landscape value	The vegetation on site generally low quality, typical of an area dominated by light industrial and commercial uses. Even the riverside vegetation is only good in places, these positive groups will be retained. Contributing very little to the character of the site, none of the existing vegetation (aside from the few groups on the river bank) is considered particularly noteworthy.	Low
Susceptibility of landscape receptor to change	The landscape receptor is judged to be in a poor condition which means that it is able to accommodate change.	Low
Sensitivity of landscape receptor	Combining a low landscape value with a low susceptibility to change suggest the overall landscape sensitivity is low.	Low
Magnitude of landscape impact	The development proposals would result in a permanent loss of the majority of trees on site as the road is realigned, the new bridge installed and the proposed housing is built. During the construction phase there is likely to be disruption in the form of noise, vibration dust and additional vehicle movements resulting in temporary impacts	High
Significance of construction landscape effects	During construction with a low sensitivity of landscape receptor and a high magnitude of impact the significance is judged to be minor	**Minor Adverse**

Receptor 10.

10. Topography		
	Assessment	**Significance**
Landscape value	The topography of the site is unremarkable in that it is as would be expected, forming a level area adjacent to the river before starting to rise up at the base of the scarp slope to the west. However the topography around the site does contribute to the landscape character of the area.	Medium
Susceptibility of landscape receptor to change	Any medium to large scale change to the topography of the site would have an effect on the surrounding elements, river and wooded slope. The landscape receptor is judged to be able to accommodate little change.	High

Sensitivity of landscape receptor	Combining a medium landscape value with a high susceptibility to change suggest an overall landscape sensitivity of high.	High
Magnitude of landscape impact	During the construction phase there is likely to be disruption in the form of groundworks resulting in a temporary impact	Low
Significance of construction landscape effects	During construction with a high sensitivity of landscape receptor and a low magnitude of impact the significance is judged to be minor.	**Minor Adverse**

Résumé of Landscape Effects

6.5.2 Of the ten landscape receptors, six were judged to have a moderate or above effect at construction stage, which is considered significant. The remainder were minor, which are not significant effects.

Visual Effects

Viewpoint 1.

View 1: Leckwith B4267, footway, looking south-west		
	Assessment	**Significance**
Baseline Description	A medium distance view from the footway of B4267. This view is of the peri-urban landscape with the rural beyond as a backdrop. On the left of the foreground is Leckwith Asda and its associated municipal planting to the perimeter. In the centre of the view is the footway and left-hand three carriageways and central reservation of the six lane B4267. On the far right are the poplars planted along the highway edge. In the middle distance is the Leckwith interchange and beyond that the elevated section of the A4232. Glimpsed under this raised road are some of the buildings on site. Dominating the background of the view are the woodlands on the slopes of the Ely valley's western side.	
Value of View	A view from between an out of town retail centre and a large busy 'A' road. Area dominated by vehicles	Low
Susceptibility of visual receptors to change	Receptors in for this view are likely to be motorists commuting or visiting the out of town retail centre. The presence of the wooded slopes does however mean it has a slightly reduced sensitivity to change.	Medium
Sensitivity of receptor	The receptor is not considered to have a high sensitivity when considering the activities of the receptor and the potential to accept change in the view.	Low
Magnitude of visual impact	During construction there may be an increase on traffic and cranes visible on site resulting in a temporary impact.	Low
Significance of construction visual effects	The low sensitivity of the receptor and the low level of impact during construction would result in a minor visual effect	**Minor Adverse**

Viewpoint 2.

View 2: Leckwith Interchange, looking south-west		
	Assessment	**Significance**
Baseline Description	A short distance view from the pedestrian path, over the roundabout of the Leckwith Interchange. Across the foreground is the municipal planting of the Interchange. In the middle distance, running all the way across the view from right to left, is an elevated section of the A4232 and its associated screening planting. Beyond are the wooded slopes of the Ely valley. Seen between the piers of the raised road and is a small section of the site, the existing B4267 viaduct, a few of the existing buildings and the signage for the industrial estate on the site.	
Value of View	A view from an edge of town ring road interchange surrounded by busy multilane carriageways and commercial units. Area dominated by vehicles.	Low
Susceptibility of visual receptors to change	Receptors in for this view are likely to be motorists commuting or visiting the out of town retail centre or commercial units. The presence of the wooded slopes does however mean it has a reduced sensitivity to change.	Medium
Sensitivity of receptor	The receptor is not considered to have a high sensitivity when considering the activities of the receptor and the potential to accept change in the view.	Low
Magnitude of visual impact	During construction there may be an increase on traffic and with cranes and other construction paraphernalia visible on site resulting in a temporary impact.	Low
Significance of construction visual effects	The low sensitivity of the receptor and the low level of impact during construction would result in a minor visual effect	**Minor Adverse**

Viewpoint 3.

View 3: Old Leckwith Bridge looking south-west		
	Assessment	**Significance**
Baseline Description	A view from within the site on the access route of the current development. Taken from one of the refuges on the bridge this view shows the existing B4267 viaduct on the left hand side along with the low quality building and car parking of the commercial units. Also prominent in the foreground is the parapet of Old Leckwith Bridge, the security fencing around the commercial units, transmission lines and the planting on the river's edge. Above all, in the background, are Leckwith Woods.	
Value of View	The view is from a vehicle route, on a Scheduled Monument, into an industrial estate and beyond that is looking on to woodlands within an SLA.	High

Susceptibility of visual receptors to change	Typical receptors would be motorists heading into the industrial estate, with a low expectation of the view.	Low
Sensitivity of receptor	The receptor is not considered to have a high sensitivity when considering the activities of the receptor and the potential to accept change in the view.	Medium
Magnitude of visual impact	During construction stage this view will be full of a fluctuating building activity, hoardings, cranes, scaffolding and plant vehicles. Resulting in a temporary impact.	Medium
Significance of construction visual effects	The low sensitivity of the receptor would reduce the medium visual impacts to moderate.	**Moderate Adverse**

Viewpoint 4.

View 4: Ely Trail, looking west-southwest		
	Assessment	**Significance**
Baseline Description	This is the view from the Ely Trail, approximately 150m north of Old Leckwith Bridge, looking west-southwest towards the development site. The foreground shows the bankside vegetation that runs in a strip between the path and the river. This vegetation is comprised of trees of varying maturity, understorey and groundcover. Beyond and glimpsed below, is the river. On the other side of the watercourse is more bankside vegetation and then above this the upper portions of vehicles, materials and buildings of the commercial units currently on site. In the background are Leckwith Woods on the valley slopes.	
Value of View	This view is from a pedestrian/cycle route looking over the river to an SLA, however there is a busy, elevated, four lane highway on the other side of the path. The view through the vegetation is curtailed when the vegetation is in leaf	Medium
Susceptibility of visual receptors to change	Typical receptors might be pedestrians and cyclists using the path for commuting or recreation, dog walking etc. The numbers of users is likely to be greater during the summer months.	Medium
Sensitivity of receptor	With a medium value of view and a medium susceptibility of receptor, the sensitivity of the receptor would be medium.	Medium
Magnitude of visual impact	The development proposals would result in the removal of all the material related to the commercial activities. During construction stage the area now taken up with commercial units will be full of a fluctuating building activity, hoardings, cranes, scaffolding and plant vehicles. Resulting in a temporary impact. The woodland will still be visible on the slopes behind the site.	Medium
Significance of construction visual effects	The medium sensitivity of the receptor coupled with the medium visual impact would result in a moderate effect.	**Moderate Adverse**

Viewpoint 5.

View 5: Ely Trail, looking west-northwest		
	Assessment	**Significance**
Baseline Description	This is the view from the Ely Trail, approximately 300m south of Old Leckwith Bridge, looking west-northwest towards the development site. In the foreground is the bankside vegetation that runs in strip between the path and river. This vegetation is comprised of various shrubs, including buddleia, and understorey plants. To the right is the path and some street furniture, a bench and path signage. Beyond and just glimpsed is the river. On the other side of the watercourse is more bankside vegetation and then above this the upper portions of vehicles, materials and buildings of the commercial units. In the background are Factory and Leckwith Woods on the slopes.	
Value of View	This view is from a pedestrian/cycle route looking over the river to an SLA, however there is a busy, elevated, four lane highway on the other side of the path. The view through the vegetation is curtailed when the plants are in leaf	Medium
Susceptibility of visual receptors to change	Typical receptors might be pedestrians and cyclists using the path for commuting or recreation, dog walking etc. The numbers of users is likely to be greater during the summer months.	Medium
Sensitivity of receptor	With a medium value of view and a medium susceptibility of receptor, the sensitivity of the receptor would be medium.	Medium
Magnitude of visual impact	The development proposals would result in the removal of all the material related to the commercial activities. During construction stage the area now taken up with commercial units will be full of a fluctuating building activity, hoardings, cranes, scaffolding and plant vehicles. Resulting in a temporary impact. The woodland will still be visible on the slopes behind the site.	Medium
Significance of construction visual effects	The medium sensitivity of the receptor coupled with the medium visual impact would result in a moderate effect.	**Moderate Adverse**

Viewpoint 6.

Notes on this view

- View investigated at the request of Vale of Glamorgan local authority
- No pedestrian access available to ring road, let alone elevated section
- Photographs taken from moving car where attempted but proved too low quality to use
- Image used in analysis is from Google Earth, which provides a view elevated much higher than most passengers would be afforded.

View 6: A4232, looking west		
	Assessment	**Significance**
Baseline Description	This is the view from the A4232, approximately above the B4267, looking west over the development site. In the foreground is the road edge and safety fencing of the A4232. Through and beyond this is visible the development site. On the far left are trees which form part of the vegetation on the eastern bank of the Ely, then the B4267 viaduct as it drops in level to pass under the elevated section. In the centre portion of the site Old Leckwith Bridge is visible. Then on the far bank are the buildings and vehicles of the commercial units. The rest of the site is screened by resumption of the bankside trees. In the background are Factory and Leckwith Woods on the valley slopes.	
Value of View	This view is from a busy, elevated, four lane highway, on to a road and industrial estate, with a glimpse of a Scheduled Monument. However the woodland back is a reminder that the area is within an SLA.	Medium
Susceptibility of visual receptors to change	Typical receptors would be motorists, typically commuters and deliveries.	Low
Sensitivity of receptor	The receptor is not considered to have a high sensitivity when considering the activities of the receptor and the potential to accept change in the view.	Low
Magnitude of visual impact	The development proposals would result in the removal of all the material related to the commercial activities. During construction stage the area now taken up with commercial units will be full of a fluctuating building activity, hoardings, cranes, scaffolding and plant vehicles. Resulting in a temporary impact. The woodland will still be visible on the slopes behind the site.	Medium
Significance of construction visual effects	The medium sensitivity of the receptor coupled with the medium visual impact would result in a moderate effect.	**Moderate Adverse**

Résumé of Visual Effects

6.5.3 Of the six viewpoints, four were judged to have a moderate or above effect at construction stage, which is considered significant. The rest were minor, which are not significant effects.

Notes on the following views

- View investigated to ascertain whether the site would be visible from elevated positions from within the Cardiff basin.
- Found not to be so, but included here, without analysis, for information.

Viewpoint A.

View A: Grangemoor Park, looking north-west	
	Discription
Baseline Description	A panoramic long distance view from one of the rare elevated points within the Cardiff basin, the hill of Grangemoor Park a restored landfill site. Looking north-west, the view is a mix of rural and urban. In the foreground is the vegetation of the park then the large shed like commercial buildings of Leckwith Moors before the deep green of the wooded slopes on the far side of the Ely valley. Cardiff City Stadium is one landmark which draws the eye.
Visibility of Site	The site and the proposals will not be visible from this viewpoint. The adjacent raised section of the A4232 is not visible in the view, obscured by buildings and vegetation, the site lies just beyond.

Viewpoint B.

View B: Canton, footbridge over railway looking south-west	
	Description
Baseline Description	A panoramic long distance view from one of the few elevated points west of the River Ely. The view is from a footbridge over the railway line south of Waun-Gron Park station. In the foreground are the railway tracks and the low quality commercial land alongside them. In middle distance are the upper storeys of the new homes on the site of the former Arjo Wiggins Paper Mill. Beyond these are visible the wooded slopes of the Ely valley.
Visibility of Site	The site and the proposals will not be visible from this viewpoint. The raised section of the A4232 is not visible in the view, obscured by buildings and vegetation. The site lies just beyond.

Viewpoint C.

View C: Roof of the Norman Keep, Cardiff Castle, looking south-west	
	Description
Baseline Description	A panoramic long distance view from one of the few publicly accessible elevated points within Cardiff. The view is from the roof of the Norman Keep within Cardiff Castle. In the foreground is the vegetation of Bute park to the west of the castle. Then in the middle distance are the buildings of west Cardiff and beyond. Cardiff City Stadium can be seen as a landmark in the distance and past that the wooded slopes of the Ely valley act as a backdrop to the city.
Visibility of Site	The site and the proposals will not be visible from this viewpoint. The site is over 2.5km away well beyond the distance that the human eye would be able to pick up details on the scale of the proposals. The raised section of the A4232 is not visible in the view, obscured by buildings and vegetation, while the site lies just beyond.

6.6 Assessment of Operational Effects

6.6.1 This landscape and visual assessment follows the defined methodology of assessing receptor sensitivity against the magnitude of change, to identify a significance category for each identified effect. The results are also gathered in the summary tables at the end of the document.

Landscape Effects

Receptor 1.

1. Cwrt-yr-Ala basin SLA		
	Assessment	**Significance**
Landscape value	The SLA is a landscape of local importance, with features which are rare locally, giving it a high value as landscape receptor.	High
Susceptibility of landscape receptor to change	The landscape has distinctive landscape elements most notably the woodlands which are in fair condition. It has a few landscape detractors, examples of which dominate the site, but overall it has a low capacity for change.	High
Sensitivity of landscape receptor	Combining a high landscape value with a high susceptibility to change suggests an overall high landscape sensitivity	High
Magnitude of landscape impact	During the operation phase there would be more vegetation cover on site and it would be of a more appropriate nature. New tree planting would extend the woodland in to the site, connecting to the river. One road bridge would be replaced by another and the commercial units replaced by housing. This would result in greater integration of buildings with the natural environment and less vehicle traffic on site.	Low
Significance of construction landscape effects	During operation with a high sensitivity of landscape receptor and a medium magnitude of impact the significance is judged to be moderate.	**Moderate Beneficial**

Receptor 2.

2. Factory Wood SINC		
	Assessment	**Significance**
Landscape value	The SINC is a landscape of local importance, with features which are locally limited, giving it a high value as landscape receptor	High
Susceptibility of landscape receptor to change	The receptor condition as a SINC is unassessed, but is noted as semi-natural ancient woodland possibly in decline due to a lack of management. However it has strong aesthetic/perceptual aspects and detractors are very few. Overall it has a very low capacity for change.	Very high
Sensitivity of landscape receptor	Combining a high landscape value with a very high susceptibility to change suggests an overall landscape sensitivity that is high.	High

Magnitude of landscape impact	During the operation phase there will be a greater amount of vegetation on site and it will be more locally appropriate, designed to complement and work with the woodland and riverine vegetation. New tree planting would extend the woodland in to the site and connect to the river. One road bridge would be replaced by another slightly further away and the commercial units replaced by housing. This would result in greater integration of buildings with the natural environment and less vehicle traffic on site.	Medium
Significance of construction landscape effects	During operation with a high sensitivity of landscape receptor and a medium magnitude of impact the significance is judged to be moderate.	**Moderate Beneficial**

Receptor 3.

3. Leckwith Woods SINC		
	Assessment	**Significance**
Landscape value	The SINC is a landscape of local importance, with features which are locally limited, giving it a high value as landscape receptor	High
Susceptibility of landscape receptor to change	The receptor condition as a SINC is unassessed, but is noted as semi-natural ancient woodland possibly in decline due to a lack of management. However it has strong aesthetic/perceptual aspects and detractors are very few. Overall it has a very low capacity for change.	Very high
Sensitivity of landscape receptor	Combining a high landscape value with a high susceptibility to change suggest an overall landscape sensitivity that is high	High
Magnitude of landscape impact	During the operation phase there will be greater amount of vegetation on site and it will be of a more suitable nature, designed to complement and work with the woodland and riverine vegetation. New tree planting would extend the woodland in to the site and connect to the river. One road bridge would be replaced by another that rather than lying on the edge of the receptor nibbles away at the area. The commercial units would be replaced by housing. This would result in greater integration of buildings with the natural environment and less vehicle traffic on site.	Medium
Significance of construction landscape effects	During operation with a high sensitivity of landscape receptor and a medium magnitude of impact the significance is judged to be moderate.	**Moderate Beneficial**

Receptor 4.

4. River Ely SINC		
	Assessment	**Significance**
Landscape value	The SINC is a landscape of local importance, with features which are limited locally, giving it a high value as landscape receptor	High
Susceptibility of landscape receptor to change	The receptor condition as a SINC is unassessed, but is noted as in good condition, reasonably unmodified and the water is not grossly polluted by long-term sources. It has reasonable aesthetic/perceptual aspects but detractors are numerous, along its length there are raised sections of carriageways and many low quality edge of town uses. Overall it has a medium capacity for change.	Medium
Sensitivity of landscape receptor	Combining a high landscape value with a medium susceptibility to change suggest an overall medium landscape sensitivity.	Medium
Magnitude of landscape impact	The development proposals would result in the expansion and strengthening of the riverside vegetation within the site. While managing the vegetation for biodiversity and protecting the bank from erosion, the proposals would also encourage access to the river for people.	Medium
Significance of construction landscape effects	During operation with a medium sensitivity of landscape receptor and a medium magnitude of impact the significance is judged to be moderate.	**Moderate Beneficial**

Receptor 5.

5. Old Leckwith Bridge – Scheduled Monument		
	Assessment	**Significance**
Landscape value	The bridge is designated a Grade II* listed structure and a Scheduled Monument, which are national designation, giving it a high value as a landscape receptor.	Very High
Susceptibility of landscape receptor to change	The bridge retains all the elements for which it was listed. However the setting and approach on both sides of the river has been compromised by low quality, ad-hoc public realm and highway works including car parking and signage. The landscape receptor is judged to be in a fair condition and that it is able to accommodate some change.	Medium
Sensitivity of landscape receptor	Combining a high landscape value with a medium susceptibility to change suggest an overall high landscape sensitivity.	High
Magnitude of landscape impact	The development proposals would result in the cessation of vehicle traffic over the bridge, while promoting its use by pedestrians and cyclists. The proposals would also see the creation of a more sensitive setting for the monument.	Low
Significance of construction landscape effects	During operation with a high sensitivity of landscape receptor and a low magnitude of impact the significance is judged to be minor.	**Minor Beneficial**

Receptor 6.

6. Cwm Cydfin SSSI		
	Assessment	**Significance**
Landscape value	Cwm Cydfin is designated a Site of Special Scientific Interest, which is a national designation, giving it a high value as a landscape receptor.	Very High
Susceptibility of landscape receptor to change	This is a semi-natural broadleaved woodland. The landscape receptor is judged to be in a good condition which means that it is able to accommodate little change.	High
Sensitivity of landscape receptor	Combining a very high landscape value with a high susceptibility to change suggest an overall high landscape sensitivity.	High
Magnitude of landscape impact	The development proposals would result in no direct change to the receptor, it could possibly contribute to an increase in pedestrian visitors however there is no formal Public Right of Way connecting the two in the proposals. During the operation phase there would be no added disruption to the receptor.	No Change
Significance of construction landscape effects	During operation with a high sensitivity of landscape receptor and a negligible magnitude of impact there is judged to be no change.	**No Change**

Receptor 7.

7. Ancient Woodland		
	Assessment	**Significance**
Landscape value	The majority of Factory and Leckwith Woods are recorded as Ancient Semi-Natural Woodland, which is a national designation, giving it a very high value as a landscape receptor.	Very High
Susceptibility of landscape receptor to change	This is a semi-natural broadleaved woodland. The landscape receptor is judged to be in a reasonable condition possibly in decline due to a lack of management. However it has strong aesthetic/perceptual aspects and detractors are few. Overall it has a very low capacity for change.	Very High
Sensitivity of landscape receptor	Combining a very high landscape value with a very high susceptibility to change suggest an overall landscape sensitivity that is very high.	Very High
Magnitude of landscape impact	The development proposals would result in a quieter site with less vehicle traffic.	Negligible
Significance of construction landscape effects	During operation with a landscape receptor of very high sensitivity of and a very high magnitude of impact the significance is judged to be minor.	**Minor Beneficial**

Receptor 8.

8. Artificial Pond		
	Assessment	**Significance**
Landscape value	The pond is located in the neglected former gardens within the curtilage of the residential dwellings. The pond is man-made, within a steep sided concrete basin, entirely surrounded by hardstanding.	Low
Susceptibility of landscape receptor to change	The landscape receptor is judged to be in a poor condition which means that it is able to accommodate change.	Low
Sensitivity of landscape receptor	Combining a low landscape value with a low susceptibility to change suggest the overall landscape sensitivity is low.	Low
Magnitude of landscape impact	During the operation phase there will be street side swales. These will be valuable habitats and depending on the eventual management strategy some could replace the pond habitat.	High
Significance of construction landscape effects	During operation with a low sensitivity of landscape receptor and a high magnitude of impact the significance is judged to be moderate	**Moderate Beneficial**

Receptor 9.

9. Vegetation		
	Assessment	**Significance**
Landscape value	The vegetation on site generally low quality, typical of an area dominated by light industrial and commercial uses. Even the riverside vegetation is only good in places, these positive groups will be retained. Contributing very little to the character of the site, none of the existing vegetation (aside from the few groups on the river bank) is considered particularly noteworthy.	Low
Susceptibility of landscape receptor to change	The landscape receptor is judged to be in a poor condition which means that it is able to accommodate change.	Low
Sensitivity of landscape receptor	Combining a low landscape value with a low susceptibility to change suggest the overall landscape sensitivity is low.	Low
Magnitude of landscape impact	During the operation phase there will be a greater amount of vegetation on site and it will be of a more locally suitable, designed to complement and work with the woodland and riverine vegetation. New tree planting would extend the woodland in to the site and connect it to the river. Riverside vegetation will be improved and managed for greatest biodiversity.	High
Significance of construction	During operation with a low sensitivity of landscape receptor and a high magnitude of impact the significance is judged to be moderate	**Moderate Beneficial**

landscape effects		

Receptor 10.

10. Topography		
	Assessment	**Significance**
Landscape value	The topography of the site is unremarkable, forming a level area adjacent to the river before starting to rise up at the base of the scarp slope to the west. However the topography around the site does contribute to the landscape character of the area.	Medium
Susceptibility of landscape receptor to change	Any medium to large scale change to the topography of the site would have an effect on the surrounding elements, river and wooded slope. The landscape receptor is judged to be able to accommodate little change.	High
Sensitivity of landscape receptor	Combining a medium landscape value with a high susceptibility to change suggest an overall landscape sensitivity of high.	High
Magnitude of landscape impact	The development proposals would result in very little change over the majority of the site, only a small localised change around the new road junction where adjoining land will need to be raised.	Negligible
Significance of construction landscape effects	During operation with a high sensitivity of landscape receptor and a negligible magnitude of impact the significance is judged to be	**Minor Adverse**

Résumé of Landscape Effects

6.6.2 Of the nine landscape receptors, five were judged to have a moderate or above effect at operation stage, which is considered significant. The rest were minor or lower, which are not significant effects.

Visual Effects

Viewpoint 1.

View 1: Leckwith B4267, footway, looking south-west		
	Assessment	**Significance**
Baseline Description	A medium distance view from the footway of B4267. This view is of the peri-urban landscape with the rural beyond as a backdrop. On the left of the foreground is Leckwith Asda and its associated municipal planting to the perimeter. In the centre of the view is the footway and left-hand three carriageways and central reservation of the six lane B4267. On the far right are the poplars planted along the highway edge. In the middle distance is the Leckwith interchange and beyond that the elevated section of the A4232.	

	Glimpsed under this raised road are a few of the buildings on site. Dominating the background of the view are the woodlands on the slopes of the Ely valley's western side.	
Value of View	A view from between an out of town retail centre and a large busy 'A' road. Area dominated by vehicles	Low
Susceptibility of visual receptors to change	Receptors in for this view are likely to be motorists commuting or visiting the out of town retail centre. The presence of the wooded slopes does however mean it has a slightly reduced sensitivity to change.	Medium
Sensitivity of receptor	The receptor is not considered to have a high sensitivity when considering the activities of the receptor and the potential to accept change in the view.	Low
Magnitude of visual impact	In this limited view the Proposed Development would replace the current buildings on site with the new bridge and remove the signage and visual clutter from around the scheduled monument.	Low
Significance of construction visual effects	The low sensitivity of the receptor and the low level of impact during construction would result in a minor visual effect	**Minor Beneficial**

Viewpoint 2.

View 2: Leckwith Interchange, looking south-west		
	Assessment	**Significance**
Baseline Description	A short distance view from a pedestrian path on and over the roundabout of the Leckwith Interchange. Across the foreground is the municipal planting of the Interchange. In the middle distance is an elevated section of the A4232, and its associated screening planting, running all the way across the view from right to left. Beyond is the wooded slopes of the Ely valley. Seen between the piers of the raised road and is a small section of the site, the existing B4267 viaduct, a few of the existing buildings and the signage for the industrial estate on the site.	
Value of View	A view from an edge of town ring road interchange surrounded by busy multilane carriageways and commercial units. Area dominated by vehicles.	Low
Susceptibility of visual receptors to change	Receptors in for this view are likely to be motorists commuting or visiting the out of town retail centre or commercial units. The presence of the wooded slopes does however mean it has a reduced sensitivity to change.	Medium
Sensitivity of receptor	The receptor is not considered to have a high sensitivity when considering the activities of the receptor and the potential to accept change in the view.	Low
Magnitude of visual impact	The Proposed Development would replace the view of the current buildings on site with the new bridge and remove the signage and visual clutter from around the scheduled monument.	Low

Significance of construction visual effects	The low sensitivity of the receptor and the low level of impact during construction would result in a minor visual effect	**Minor Beneficial**

Viewpoint 3.

View 3: Old Leckwith Bridge looking south-west		
	Assessment	**Significance**
Baseline Description	A view from within the site on the access route of the current development. Taken from one of the refuges on the bridge this view shows the existing B4267 viaduct on the left hand side, the low quality building and car parking of the commercial units. Also prominent in the foreground is the parapet of Old Leckwith Bridge, the security fencing around the commercial units, transmission lines and the low level planting on the river's edge. Above, in the background, are Leckwith Woods.	
Value of View	The view is from a vehicle route, on a Scheduled Monument, into an industrial estate and beyond that is looking on to woodlands within an SLA.	High
Susceptibility of visual receptors to change	Typical receptors would be pedestrians or cyclists using the route for commuting or recreation.	Medium
Sensitivity of receptor	The receptor is considered to have a medium sensitivity when considering the activities of the receptor and the potential to accept change in the view.	Medium
Magnitude of visual impact	The Proposed Development would see the existing B4267 viaduct removed and its replacement built on the right of the medieval bridge in this view. The new road bridge would be slightly lower in the view as it crosses the bank of the river. On the left, replacing the viaduct would be the corner of housing Area 02. Here would be four storey housing, orientated to overlook the river. Behind, and to the right, of the new road bridge would be the corner of Area 01, of the new housing. Either side of an entrance to the deck garden courtyard would be five storey duplex housing. The riverside vegetation would be retained, improved and gaps filled. The woodland back drop would still be visible.	Medium
Significance of construction visual effects	The medium sensitivity of the receptor and the medium visual impacts result in a moderate.	**Moderate Adverse**

Viewpoint 4.

View 4: Ely Trail, looking west-southwest		
	Assessment	**Significance**
Baseline Description	This is the view from the Ely Trail, approximately 150m north of Old Leckwith Bridge, looking west-southwest towards the development site.	

	The foreground shows the bankside vegetation that runs in a strip between the path and the river. This vegetation is comprised of trees of varying maturity, understorey and groundcover. Beyond and glimpsed below, is the river. On the other side of the watercourse is more bankside vegetation and then above this the upper portions of vehicles, materials and buildings of the commercial units. In the background are Leckwith Woods on the valley slopes.	
Value of View	This view is from a pedestrian/cycle route looking over the river to an SLA, however there is a busy, elevated, four lane highway on the other side of the path. The view through the vegetation is curtailed when the vegetation is in leaf	Medium
Susceptibility of visual receptors to change	Typical receptors might be pedestrians and cyclists using the path for commuting or recreation, dog walking etc. The numbers of users is likely to be greater during the summer months.	Medium
Sensitivity of receptor	With a medium value of view and a medium susceptibility of receptor, the sensitivity of the receptor would be medium.	Medium
Magnitude of visual impact	In this view would be the houses and duplex apartments that form the eastern edge of Area 01. These are five storey units set back from the river bank. The current riverside vegetation would be retained and improved. Any gaps would be filled with suitable riverine species to maximise biodiversity and screening. This vegetation would obscure the lower portion of the housing and act to soften their impact on the view. The housing would be three storeys taller than the existing buildings on site, which means they will cover more of the woodland in this view, however the majority of it will still be visible. The housing will also be of substantially high quality that the present buildings.	Medium
Significance of construction visual effects	The medium sensitivity of the receptor coupled with the medium visual impact would result in a moderate effect.	**Moderate Adverse**

Viewpoint 5.

View 5: Ely Trail, looking west-northwest		
	Assessment	**Significance**
Baseline Description	This is the view from the Ely Trail, approximately 300m south of Old Leckwith Bridge, looking west-northwest towards the development site. In the foreground is the bankside vegetation that runs in strip a between the path and the river. This vegetation is comprised of various shrubs, including buddleia, and understorey plants. To the right is the path and some street furniture, a bench and path signage. Beyond and just glimpsed is the river. On the other side of the watercourse is more bankside vegetation and then above this the upper portions	

	of vehicles, materials and buildings of the commercial units. In the background are Factory and Leckwith Woods on the valley slopes.	
Value of View	This view is from a pedestrian/cycle route looking over the river to an SLA, however there is a busy, elevated, four lane highway on the other side of the path. The view through the p is curtailed when the plants are in leaf	Medium
Susceptibility of visual receptors to change	Typical receptors might be pedestrians and cyclists using the path for commuting or recreation, dog walking etc. The numbers of users is likely to be greater during the summer months.	Medium
Sensitivity of receptor	With a medium value of view and a medium susceptibility of receptor, the sensitivity of the receptor would be medium.	Medium
Magnitude of visual impact	In this view, above the vegetation on the near bank of the river, would be the houses that form the eastern edge of Area 02. These are four storey units set back from, but designed to engage with and overlook the river. The current riverside, on the far side in this view, vegetation would be retained and improved. Any current gaps would be filled with suitable riverine species to maximise biodiversity. This vegetation would screen the lower portion of the housing and act to soften their impact on the view. The housing would be taller than the existing structures covering some more of the woodland, however the vast majority seen in this view would still be visible.	Medium
Significance of construction visual effects	The medium sensitivity of the receptor coupled with the medium visual impact would result in a moderate effect.	**Moderate Adverse**

Viewpoint 6.

Notes on this view

- View investigated at the request of Vale of Glamorgan local authority
- No pedestrian access available to ring road, let alone elevated section
- Photographs taken from moving car were attempted but proved to low quality to use
- Image used in analysis is from Google Earth, which provides an elevated view much higher than most passengers would be afforded.

View 6: A4232, looking west		
	Assessment	**Significance**
Baseline Description	This is the view from the A4232, approximately above the B4267, looking west over the development site. In the foreground is the carriageway, road edge and safety fencing of the A4232. Through and beyond this is visible the development site.	

	On the far left are trees which form part of the vegetation on the eastern bank of the Ely, then the B4267 viaduct as it drops in level to pass under the elevated section. In the centre portion of the site visible is Old Leckwith Bridge. Then on the far bank are the buildings and vehicles of the commercial units. The rest of the site is screened by resumption of the bankside trees. In the background are Factory and Leckwith Woods on the slopes.	
Value of View	This view is from a busy, elevated, four lane highway, on to a road and industrial estate, with a glimpse of a Scheduled Monument. However the woodland back is a reminder that the area is within an SLA.	Medium
Susceptibility of visual receptors to change	Typical receptors would be motorists, typically commuters and deliveries.	Low
Sensitivity of receptor	The receptor is not considered to have a high sensitivity when considering the activities of the receptor and the potential to accept change in the view.	Low
Magnitude of visual impact	The vegetation on both sides of the view and both sides of the river would be retained meaning the portion of the site visible remains the same. The new alignment of the B4267 would be to the north of Old Leckwith Bridge, to the right in this view. Where the B4267 is now would be a highway junction connecting the housing and the new bridge. Visible to the right of the new road would be the corner of Area 01, access to a deck garden, the houses and duplex apartments, these are five storey units. These would be taller than the existing buildings The current riverside vegetation would be retained and improved. Any current gaps would be filled with suitable riverine species to maximise biodiversity. This vegetation would screen the lower portion of the housing and act to soften their impact on the view. The woodland will still be visible on the slopes behind the site.	Low
Significance of construction visual effects	The low sensitivity of the receptor coupled with the low visual impact would result in a minor effect.	**Minor Adverse**

Résumé of Visual Effects

6.6.3 Of the six viewpoints, three were judged to have a moderate effect at operation stage, which is considered significant. The rest were minor, which are not considered significant effects.

6.7 Summary of Effects

Summary of Landscape Assessment

6.7.1 Nine landscape receptors were assessed in the context of the Proposed Development, of which five were judged to have significant as a result of the construction phase of the development , i.e. having a moderate or major and adverse effect. This was related to the potential landscape effects caused by the loss of trees from the ancient woodlands.

6.7.2 While the planting of new trees, and other vegetation, to the streets, deck garden and public open spaces goes a small way towards appropriate mitigation nothing can truly compensate for the loss of ancient woodland.

6.7.3 The same nine receptors were assessed for effects of the proposals during the operational life of the development, none were judged to be under impacts resulting in significant effects. Five were judged to have moderate beneficial effects. This is a result of a more sensitive development replacing the existing uses, which were noted detractors of several of the landscape receptors.

Summary of Visual Assessment

6.7.4 Twenty one viewpoints were initially assessed, but only six offered a view of the site. This is because the site is incredibly well contained by topography on one side, an elevated section of the ring road on the other and vegetation all around. While short, medium and long views towards the site were checked, only short views offered more than a glimpse of it.

6.7.5 Of the six viewpoints analysed four were judged to have a significant and adverse effect on the view during construction phase of the Proposed Development. Construction impacts are generally considered to have greater landscape and visual effects than the finished development, because of the number of activities required from demolition, to groundworks, construction, power generation, and welfare. The baseline is generally rural in perception so construction activities will have a large impact.

6.7.6 The same six views were assessed for the operational life of the Proposed Development and only one was judged to have a moderate beneficial effect the remainder were judged to have not significant effects.

6.7.7 The assessment has found that there would be some significant effects arising from construction, as expected. These would be temporary and would be replaced by the operational landscape and visual effects post-construction.

6.7.8 During operation the views would be changed but only with the replacement of one set of, low quality, structures for another set, of higher quality. The proposed structures will be a little taller than the existing but there will be much more vegetation on site and alongside the river.

Conclusion

6.7.9 This chapter finds that the Proposed Development form is likely to cause some significant adverse landscape and visual effects during the construction stage, however it will confer several significant beneficial effects during the operational phase.

6.7.10 The negatives derive largely from the loss of trees from the ancient woodlands which mitigation cannot fully replace.

6.7.11 The positives derive from the improvement of the settings of several landscape receptors by replacing low quality, ad hoc light industrial and commercial uses currently on site with a sensitive, integrated housing scheme with a strong landscape strategy.

Table 6.14 Summary of Likely Landscape Effects

Construction Phase							
Receptor	**Sensitivity of Receptor**	**Description of Impact**	**Timescale**	**Magnitude of Impact**	**Significance of Effect**	**Significant / Not Significant**	**Notes**
Cwrt-yr-Ala basin SLA	High	Removal of some trees, vegetation and existing structures	Long term	Medium	Moderate adverse	Significant	
Factory Wood SINC	High	Removal of some trees	Long term	Medium	Moderate adverse	Significant	
Leckwith Woods SINC	High	Removal of some trees	Long term	Medium	Moderate adverse	Significant	
River Ely SINC	Medium	Removal of commercial units. Construction disturbance	Long term	Low	Moderate adverse	Significant	
Old Leckwith Bridge	High	Removal of inappropriate elements for setting. Construction disturbance	Long term	Medium	Moderate adverse	Significant	
Cwm Cydfin SSSI	High	Construction disturbance	Short term	Negligible	Minor adverse	Not significant	
Ancient Woodland	Very high	Removal of some trees	Long term	Low	Moderate adverse	Significant	
Vegetation	Low	Removal of all vegetation, except that riverside	Medium term	High	Minor adverse	Not significant	
Topography	High	Construction groundworks	Short term	Low	Minor adverse	Not significant	
Operation Phase							
Cwrt-yr-Ala basin SLA	High	Site developed with housing including landscape scheme	Long term	Low	Moderate beneficial	Significant	
Factory Wood SINC	High	Setting of SINC improved	Long term	Medium	Moderate beneficial	Significant	
Leckwith Woods SINC	High	Setting of SINC improved	Long term	Medium	Moderate beneficial	Significant	

River Ely SINC	Medium	Setting of SINC improved	Long term	Medium	Moderate beneficial	Significant	
Old Leckwith Bridge	High	Setting of Scheduled Monument improved	Long term	Low	Minor beneficial	Not significant	
Cwm Cydfin SSSI	High	No change	Long term	No change	No change	Not significant	
Ancient Woodland	Very high	Improve setting of ancient woodland	Long term	Negligible	Minor Beneficial	Not significant	
Vegetation	Low	New planting on site including trees. Selected and managed to improve biodiversity	Long term	High	Moderate beneficial	Significant	
Topography	High	Small adjustment for new road junction	Long term	Negligible	Minor Adverse	Not significant	

Table 6.15 Summary of Likely Visual Effects

Receptor	Sensitivity of Receptor	Description of Impact	Timescale	Magnitude of Impact	Significance of Effect	Significant / Not Significant	Notes
Construction Phase							
Viewpoint 1	Low	Construction activity	Short term	Low	Minor Adverse	Not significant	
Viewpoint 2	Low	Construction activity	Short term	Low	Minor Adverse	Not significant	
Viewpoint 3	Medium	Removal of detractors, plus construction activity	Short term	Medium	Moderate adverse	Significant	
Viewpoint 4	Medium	Removal of detractors, plus construction activity	Short term	Medium	Moderate adverse	Significant	
Viewpoint 5	Medium	Removal of detractors, plus construction activity	Short term	Medium	Moderate adverse	Significant	
Viewpoint 6	Low	Removal of detractors, plus construction activity	Short term	Medium	Moderate adverse	Significant	
Operation Phase							
Viewpoint 1	Low	Existing built structures replaced with new	Long term	Low	Minor beneficial	Not significant	
Viewpoint 2	Low	Existing built structures replaced with new, clutter from around the old bridge is removed	Long term	Low	Minor beneficial	Not significant	
Viewpoint 3	Medium	Road bridge changes location, high quality scheme replaces existing low quality structures, clutter removed, vegetation improved	Long term	Medium	Moderate adverse	Significant	
Viewpoint 4	Medium	High quality scheme replaces existing low quality structures, clutter removed, vegetation improved	Long term	Medium	Moderate adverse	Significant	
Viewpoint 5	Medium	High quality scheme replaces existing low quality structures, clutter	Long term	Medium	Moderate adverse	Significant	

		removed, vegetation improved					
Viewpoint 6	Low	Road bridge changes location, high quality scheme replaces existing low quality structures, clutter removed, vegetation improved	Long term	Low	Minor adverse	Not significant	

6.8 References

6.8.1 Landscape Institute and Institute of Environmental Management and Assessment (2013) Guidelines for writing Landscape and Visual Impact Assessment reports, third edition (GLVIA 3)

6.8.2 Welsh Government (2018) Planning Policy Wales 10

6.8.3 Welsh Assembly Government (2009) Technical Advice Note 5 – Nature Conservation and Planning

6.8.4 Welsh Government (2016) Technical Advice Note 12 – Design

6.8.5 Vale of Glamorgan (June 2017) Local Development Plan 2011 – 2026

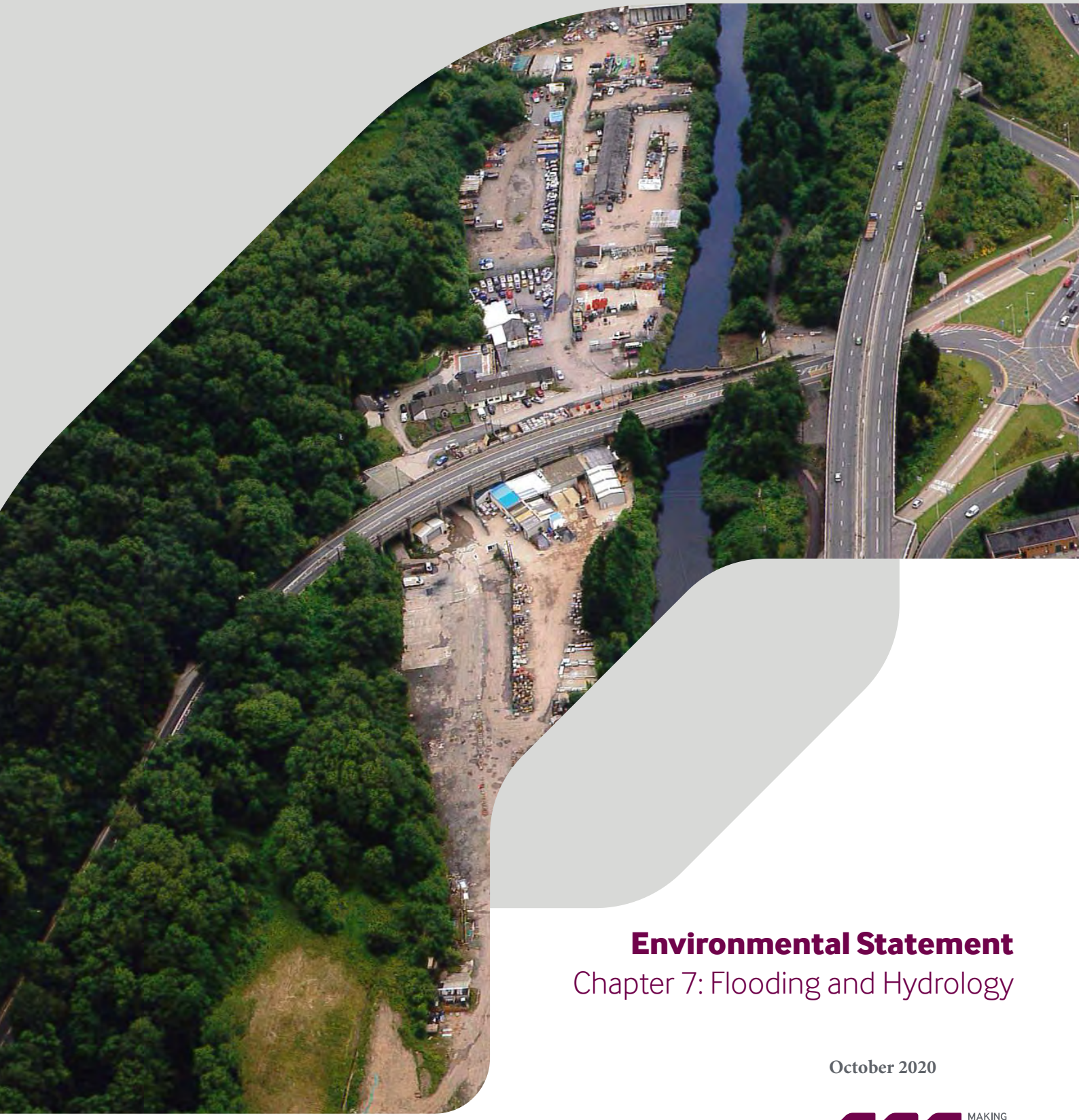
6.8.6 Landscape Institute (2011) Advice Note 01/11: Photography and Photomontage in Landscape and Visual Impact Assessment

6.8.7 National Resources Wales (2014) National Landscape Character – NLCA35 Cardiff, Barry and Newport

6.8.8 National Resources Wales (2014) National Landscape Character – NLCA36 Vale of Glamorgan

Leckwith Quays

Leckwith Road, Cardiff



Environmental Statement

Chapter 7: Flooding and Hydrology

October 2020

MAKING COMPLEX EASY

Mr Phil Worthing

rpsgroup.com

7 FLOODING AND HYDROLOGY

7.1 Introduction

7.1.1 This Chapter reports the outcome of the assessment of likely significant environmental effects arising from the Proposed Scheme upon flooding, water quality, resources and hydrology. The focus of the assessment is on likely effects on construction workers, future users and controlled waters from either increase in physical contaminants, changes to flood risk or changes to water balance and levels.

7.1.2 The Chapter describes the assessment methodology, the baseline conditions at the Site and in the surrounding area, any primary and tertiary mitigation adopted for the purposes of the assessment, a summary of the likely significant effects, the further mitigation measures required to prevent, reduce or offset any significant negative effects, and the likely residual effects after these measures have been employed.

7.1.3 This Chapter (and its associated figures) is intended to be read as part of the wider ES, with particular reference to:

- The introductory chapters of the ES (Chapters 1- 3);
- Chapter 8 - Ground Conditions;
- The Flood Risk Advice Report (Appendix 7.1);
- The Flood Consequences Assessment (Appendix 7.2); and
- Drainage Strategy (Appendix 7.3).

7.2 Assessment Methodology

Planning Policy Context

7.2.1 Key planning policies are listed below

Planning Policy Wales Edition 10 (Welsh Government, December 2018)

- Chapter 3.51: Previously Developed Land
- Chapter 5.12: Design Choices to Prevent Waste
- Chapter 5.14: Minerals
- Chapter 6.3: Landscapes
- Chapter 6.9: Unlocking Potential by Taking a De-Risking Approach.

Vale of Glamorgan Local Development Plan (2011 – 2026): Written Statement (June 2017)

- Managing Development (MD) 1 – Location of New Development
- Managing Development (MD) 7 - Environmental Protection
- SP10 – Built and Natural Environment

Cardiff Local Development Plan 2006 – 2026: Adopted Plan (January 2016):

- EN10: Water Sensitive Design

- EN11: Protection of Water Resources
- EN14: Flood Risk
- KP15: Climate Change

Legislative Context

7.2 The applicable legislative framework is summarised as follows:

- Water Resources Act 1991;
- Land Drainage Act 1994;
- The Environment Act 1995;
- The Water Environment (Water Framework Directive) (WFD) (England and Wales) Regulations, 2003 (WFD) (2000/60/EC);
- Water Act 2003;
- Planning Policy Wales Technical Advice Note (TAN) 15 (Development and Flood Risk) 2004;
- The Environmental Permitting (England and Wales) Regulations 2010; and
- Flood and Water Management Act, 2019.

Relevant Guidance

7.3 The following guidance documents have been used during the preparation of this Chapter:

- CIRIA C532 'Control of Pollution from Construction Sites';
- CIRIA C697 'The SuDS Manual';
- Environment Agency (2012) Groundwater Protection: Policy and Practice (GP3);
- Highways England Design Manual for Roads and Bridges (DMRB) HD LA113: Road Drainage and the Water Environment; and
- WebTAG Unit A3 Environmental Impact Appraisal – Impacts on the Water Environment chapter.

Study Area

7.2.1 The 'study area' comprises the maximum physical extent of the proposed development and a buffer zone of 250 m. This distance is referenced in Best Practice documents, including Guidance for the Safe Development of Housing on Land Affected by Contamination: R&D Publication 66 (NHBC, 2008), and is typical at the hazard identification stage of an assessment.

7.2.2 Potential features outside of this buffer zone that may be impacted or constrain the proposed development will be included in the assessment, including the floodplain of the River Ely.

Baseline Methodology

7.2.3 The baseline information presented in this chapter has been informed by the following reports:

- WSP (2019) Leckwith Quay, Flood Advice Report – Appendix 7.1
- WSP (2020) Leckwith Quay, Flood Consequences Assessment – Appendix 7.2; and
- WSP (2020) Leckwith Quay, Outline Drainage Strategy – Appendix 7.3.

Environmental Designations

7.2.4 There are no environmental or geological SSSIs and there are no known Regionally Important Geological Sites (RIGS) within the study area.

7.2.5 The only designation within 500m of the site is for ancient woodland (Cwn Cydfin SSSI). However, this is connected to the site by the River Ely. Further information on the ecological impact of the Proposed Development can be found in Chapter 5: Ecology.

7.2.6 The Severn Estuary is the closest environmentally designated site (Ramsar, SSSI, SAC and SPA) located 4km to the south east, falling outside of the SSSI Impact Risk Zone.

Consultation

7.2.7 Table 7.1 details the consultation comments which were provided following a request for a formal opinion on the scope of an Environmental Statement:

Table 7.1 Consultation Comments

	Consultee and Issues Raised	Where Addressed
5th December 2019	**Natural Resources Wales** <u>Water quality</u> 'The presence of sensitive receptors including abstractions from the near-by spring and a private drinking water supply will also need to be considered in relation to the proposed development and appropriate mitigation measures included, to protect water quality.' '[It] is stated that the River Ely may also be impacted by pollution during and after the site's development. The ES should consider all aspects of pollution risk including drainage, site run off, silt control and waste storage and appropriate mitigation measures considered.' 'We are aware that the applicant intends to undertake a WFD (Water Framework Directive) scoping assessment, to assess the potential impacts of the proposed development on the water environment. We would take this opportunity to advise the applicant that this site falls within the Cardiff Bay waterbody GB30947042, not the Ely water body GB109057027270. The results of the WFD assessment should be included within the ES.'	Comments relating to water quality are discussed in this ES chapter.
31/01/2020	**Cardiff Council** *"Regarding hydrology, the drainage strategy for both surface and four water drainage should be considered. Further information is required in the form of site and ground water assessments, to determine opportunities for the use of sustainable drainage schemes. The presence of sensitive receptors including abstractions from the nearby spring and private drinking water supply will also need to be considered in relation to the proposed development and appropriate mitigation measures included, to protect water quality*." *"…The ES should consider all aspects of pollution risk including drainage, site run off, silt control and waste storage and appropriate mitigation measures considered. "*	Section 7.5 of this ES Chapter
16/12/19	**Natural Resources Wales (NRW)** <u>Flood Modelling</u> Natural Resources Wales have requested that the flood modelling includes the defences at Ely Mill which have yet to be completed in line with the agreed planning permission, and therefore these should be included in the model in their current, non-compliant construction.	The flood modelling includes the representation of the Ely Mill defences as per the model provided by NRW. Given that the applicant does not have permission to undertake survey work or gain a detailed understanding of any outstanding construction works, no alternative representation can be made. Furthermore, it is considered that if these defences are non-compliant with their planning permission then suitable enforcement action should be undertaken, which is not a matter for this application to be judged against.

Assessment Criteria and Assignment of Significance

7.2.8 The assessment of likely significant effects as a result of the site has taken into account both the construction and operational phases. The significance level attributed to each effect has been assessed based on the magnitude of change due to the site and the sensitivity of the affected receptor / receiving environment to change. Magnitude of change and the sensitivity of the affected receptor / receiving environment are both assessed on a scale of high, medium, low and negligible, as shown in Tables below.

Receptor Sensitivity/Value

7.2.9 The value or sensitivity of receptors is outlined in Table 7.2.

Table 7.2 Definitions of Sensitivity or Value

Sensitivity	Descriptors
Very High	Very high importance and rarity, international scale and very limited potential for substitution.
High	High importance and rarity, national scale, and limited potential for substitution.
Medium	High or medium importance and rarity, regional scale, limited potential for substitution.
Low	Low or medium importance and rarity, local scale.
Negligible	Very low importance and rarity, local scale.

Magnitude of Impact

7.2.10 The magnitude of impact is outlined in Table 7.3.

Table 7.3: Magnitude of Impact

vity	Descriptors
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse).
	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Medium	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse).
	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Low	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse).
	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse).
	Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

7.2.11 Both sensitivity/value and magnitude must be taken into account in determining the significance of effect. The section should define significance based on (as appropriate):

- Reference to regulations or standards;
- Reference to best practice guidance;
- Reference to policy objectives;
- Reference to criteria, for example designations or protection status;
- Outcomes of consultation to date; and
- Professional judgement based on local / regional / specialist experience.

Significance of Effects

7.2.12 The assessment of significance is allocated as per Table 7.4.

Table 7.4 Assessment Matrix"

Sensitivity	Magnitude of Impact				
	No Change	**Negligible**	**Low**	**Medium**	**High**
Negligible	No change	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	No change	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	No change	Negligible or Minor	Minor	**Moderate**	**Moderate or Major**
High	No change	Minor	Minor or Moderate	**Moderate or Major**	**Major or Substantial**
Very high	No change	Minor	**Moderate or Major**	**Major or Substantial**	**Substantial**

7.2.13 Environmental effects considered to be greater than 'Moderate' are considered to be potentially significant within the context of the assessment, which is based on professional judgement following review of the available information.

Limitations of the Assessment

7.2.14 The construction works at the site will be undertaken in accordance with industry best-practice and regulatory requirements. A Construction Environmental Management Plan (CEMP) will be in place to manage environmental risks.

7.2.15 If necessary, it is assumed that material moved around the site or imported onto site during the construction phase (e.g. to obtain required ground elevations) will have been subject to appropriate chemical testing (and will be geotechnical suitable) and will therefore not present a risk to controlled waters (e.g. via leaching of potential contaminants) or human receptors and works will be undertaken in accordance with the CL:AIRE Contaminated Land Definition of Waste: Development Industry Code of Practice.

7.2.16 It is assumed that any proposed temporary and permanent design drainage strategies will be implemented appropriately.

7.2.17 This extent of assessment is limited by the detailed nature of the access and the outline nature of the Proposed Development.

7.3 Baseline Environment

Site Topography

7.3.1 The topography of the site slopes from the west to the east from approximately 20m AOD to around 7m AOD.

Surface Water Bodies

7.3.2 The nearest surface water body is the Ely River which runs adjacent to the eastern site boundary and crosses the site beneath Leckwith Road. This feeds into Cardiff Bay Barrage, approximately 3km south-east of the site, which in turn feeds into the Severn Estuary. A review of Natural Resources Wales river and waterbodies information shows that the Ely lies within the South East Valleys River Catchment, assessed to have moderate overall status, moderate ecological status and good chemical status. Within the vicinity of the Site there are two crossings over the River Ely; Leckwith Road (B4267) road bridge and a Historic Road Bridge (Grade II*).

7.3.3 The study area is some 3km upstream of the River Ely's outfall into Cardiff Bay behind the Cardiff Bay Barrage and some 700m upstream of the Nant Cydfin's confluence with the Afon Ely, which itself is just upstream of the A432 Road bridge. Upstream there is at least one minor outfall, which once drained Leckwith Moors on the east bank and an unnamed watercourse draining the Leckwith Woods and Plymouth Woods as well as the remnants of what was the Caerau Brook on the western bank. The site is also downstream of another A432 Road bridge some 490m upstream as well as an Ely Trail Footbridge approximately 690m upstream.

7.3.4 The River Ely at Leckwith has been severely altered due to industrialisation and urbanisation with the introduction of weirs, straightening the channel, flood defences and watercourse realignments. The result is a channel that exhibits very little hydromorphological and, by extension, ecological variation: the river is essentially a canalized channel with a notable homogenous character in terms of flow structure, sinuosity and habitat structure. In addition, the Cardiff Bay Barrage has had a significant effect on the natural functioning of the lower River Ely system.

7.3.5 A spring/drain flows across the south of the site, towards the north east to the Ely River.

7.3.6 Further drainage channels have been noted approximately 70m north east of the easternmost part of the site.

7.3.7 Two surface water abstractions are present 95m and 110m west of the site. These are both higher than the site topography (by approximately 75m).

Hydrogeology

7.3.8 The superficial Tidal Flats are classified as a Secondary Undifferentiated Aquifer (assigned in cases where it has not been possible to attribute either category A or B to a rock type), and the Tufa, as a Secondary A Aquifer, defined as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. The bedrock of Mercia Mudstone and the Blue Anchor Formation are both classified as Secondary B Aquifers.

7.3.9 The bedrock of the Mercia Mudstone and the Blue Anchor Formation are both classified as Secondary B Aquifers, defined as predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of former non-aquifers.

7.3.10 There are no Source Protection Zones (SPZ) within 1km of the site.

7.3.11 Groundwater in the nearby British Geological Survey (BGS) borehole logs ranged between 2.0m and 4.3m bgl.

7.3.12 There is one groundwater abstraction area, located 105m west of the site. The location of this area (a well) is approximately 75m higher topographically than the site.

Flood Risk

Fluvial

7.3.13 The site is within an area benefitting from flood defences but is otherwise predominantly within Flood Zone 3 with small areas of Flood Zone 2 extending further into the site. Flood Zone 3 is the area Natural Resources Wales predict would flood either with a1 in 100 year return period or a 1% Annual Exceedance Probability (AEP) from fluvial sources or 1in 200 year return period (0.5% AEP) from tidal or with those probabilities from both sources. Flood Zone 2 is the area outside of Flood Zone 3 which Natural Resources Wales predict would flood with a probability of greater than 0.1% AEP from either fluvial or tidal sources.

7.3.14 The Welsh Government's Technical Advice Note 15: Development and Flood Risk (TAN15) includes Development Advice mapping, which indicates when flood risk issues need to be taken into account in planning future development.. The site is located in Zone C1 – land served by significant infrastructure, including flood defences. This means that development can take place subject to application of justification test, including acceptability of consequences. This is provided in the Flood Consequences Assessment (Appendix 7.2). It should be noted that the Development Advice Maps and TAN15 are currently being revised, as these have yet to be published the FCA and this ES Chapter has been prepared to satisfy the criteria in the July 2004 version of TAN15, which remains valid at the time of preparation of this ES Chapter.

Tidal

7.3.15 Additionally, of note are the flood defences present along the west bank of the Ely upstream of the Leckwith Road road bridge. A review of the Natural Resources Wales data set indicates that this is assessed as protecting up to the 1 in 25 year event (i.e. the 4% AEP) and is in good to fair condition. It does not necessarily follow that the Ely will flood the site, only that the onset of flooding to the river's floodplain is likely to commence from an event of this magnitude.

7.3.16 The site is understood to have a low risk of flooding from tidal sources in the present day due to the presence of the tidal barrage. The barrage is understood to protect against the 1000 year return period event (0.1% AEP). It is noted that the modelled tidal event (0.5% AEP) combined with a 30 year (3.3% AEP) fluvial event floods the site.

Pluvial

7.3.17 The site is identified as having isolated areas of low risk from surface water flooding, however waters appear to arise on site and the models used to inform the Natural Resources Wales map do not typically account for local drainage systems. Subject to a suitable SuDS scheme and exceedance flow route this risk would be satisfactory managed.

Groundwater

7.3.18 The Vale of Glamorgan Local Flood Risk Management Strategy identifies that the risk of groundwater flooding is poorly understood. The Vale of Glamorgan Local Flood Risk Management Strategy indicates that the site is located within a location identified as having between 25-50% susceptibility to groundwater flooding. However, according to the Cardiff Strategic Flood Consequences Assessment:

"The Taff and Ely CFMP states that groundwater flooding is not considered to be a significant issue within the catchment. It is noted that a large groundwater control scheme was introduced as part of the Cardiff Barrage scheme."

7.3.19 Groundwater in the nearby BGS borehole logs ranged between 2.0m and 4.3m bgl.

7.3.20 The superficial Tidal Flats are classified as a Secondary Undifferentiated Aquifer (assigned in cases where it has not been possible to attribute either category A or B to a rock type), and the Tufa, as a Secondary A Aquifer, defined as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

7.3.21 The bedrock of the Mercia Mudstone and the Blue Anchor Formation are both classified as Secondary B Aquifers, defined as predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.

Reservoir

7.3.22 According to Natural Resource Wales, the site is at risk of flooding from the Pontsticill (Taf Fechan) Reservoir (north of Merthyr Tydfil) were it to fail catastrophically.

Abstractions

7.3.23 There are no Source Protection Zones (SPZ) within 1km of the site.

7.3.24 There is one groundwater abstraction within 500m of the site, located 105m west of the site at Woodland Farm, used for general farming and domestic use. The location of the well is elevated approximately 75m higher than the site topographically (according to Ordnance Survey mapping). It is assumed groundwater flows from this area at the top of the escarpment down towards the River Ely to the south east. Therefore, the site is downgradient of this abstraction well and is therefore not considered to be affected by the site and will be discounted from this assessment going forward.

7.3.25 There are two surface water abstractions within 500m of the site, in approximately the same location, to the west of the site, from a spring in Leckwith Woods. The closest is approximately 95m west, held by Mr W Coles for household water supply (drinking, cooking, sanitary and washing), and for general farming and domestic use. The other is approximately 110m west which is held by Bryn Ceiliog Vineyard for general farming and domestic use.

7.3.26 As with the groundwater abstraction mentioned, the location of the abstractions are elevated approximately 75m higher than the site topographically (according to Ordnance Survey mapping). It is assumed this spring flows down towards the River Ely to the south east. Therefore, the site is considered downgradient of the abstraction points and therefore, the abstractions are not considered to be affected by the site and will be discounted from this assessment going forward.

Historical Flooding

7.3.27 The Cardiff Strategic Flood Risk Assessment (SFRA) reports the Ely catchment has only suffered from two significant events in the last few decades. These were a result of heavy rainfall falling on a wet catchment in March 1998 and in October 2000. The 1998 event only affected a small number of properties in the Ely Bridge area of Cardiff, St Fagans, Peterston Super Ely, Brynsadler and Talbot Green.

Receptor Importance

7.3.28 The following sensitive receptors have been carried forward for assessment within this Chapter:

- Surface Water (The River Ely);
- Biological Receptors - Cwn Cydfin SSSI (connected by virtue of being downstream in the River Ely);

- Groundwater (Tidal Flats Secondary Undifferentiated Aquifer, Tufa Secondary A Aquifer The, Mercia Mudstone and the Blue Anchor Formation Secondary B Aquifers);
- Properties and members of the public; and
- Construction workers and plant.

Construction Phase

7.3.29 The following potentially significant effects have been identified for inclusion in the construction phase assessment:

- Increased sedimentation of the River Ely as a result of runoff from construction materials;
- Increased sedimentation of the River Ely as a result of bridge construction in the river channel;
- Spillage of pollutants and harmful substances such as fuels and concrete to the River Ely and groundwater;
- Impacts to the hydromorphological and biological quality of the River Ely associated with works adjacent to these features;
    - Increased flood risk to people and property elsewhere associated with losses to flow conveyance and flood storage as a result of temporary works in the channel and on the floodplain; and
    - Fluvial, tidal and groundwater flood risk to construction workers and plant.

Operational Phase

7.3.30 The following potentially significant effects have been identified for inclusion in the operational phase assessment:

- Impacts to the hydromorphological and biological quality of the River Ely associated with the new bridge and other elements of the Proposed Development; and
- Increased fluvial, tidal and groundwater flood risk to people and properties in the vicinity and as part of the Proposed Development.

Aspects Scoped out of the Assessment

7.3.31 The following aspects have been scoped out of the assessment:

- The effects on surface and groundwater abstractions upgradient of the site;
- The effects of surface water run-off from the existing bridges on flood risk and the water environment;
- Direct effects on ecological, as these are addressed in Chapter 5: Ecology; and
- Effects on groundwater flow and those associated with contaminated land, as these are addressed in Chapter 8: Ground Conditions.

Future Baseline Conditions

7.3.32 The most significant change in the baseline conditions is likely to be associated with climate change that could cause an increase in peak river flows and peak rainfall intensity. The Welsh Government provide guidance on a range of climate change allowances dependant on the river basin district that the site and watercourse is in. The Proposed Scheme is located within the Severn River Basin District. In this region, it is predicted that by 2080, peak river flows could increase by 5% (the lower end estimate), 25% (central estimate) and 70% (the upper end estimate). This could increase the probability of depth of flooding at the site and surrounding areas, as well as the proportion of the site within Flood Zones 2 and 3.

7.3.33 As the site is located within a tidally influenced area there is the potential for changes to the predicted flood risk from the sea associated with seas level rise (as a result of climate change), subject to the performance for the tidal barrage. The impacts of climate change are included in the tidal still water levels as modelled for the design scenario.

7.3.34 The objectives of the South East Valleys River Catchment is to improve the overall quality status to Good by 2027. Based on this, it is anticipated that the water quality and ecological status of the surface water bodies will improve as measures are implemented.

7.4 Mitigation Measures Adopted as Part of the Project

Construction Phase

7.4.1 A CEMP and emergency incident response plan will be required to outline the mitigation, control and monitoring measures to be put in place to minimise the impact of the proposed development on flooding and hydrology during the construction process. The CEMP will align to relevant Guidance for Pollution Prevention (GPPs) documents. Measures to be employed as part of the CEMP will include:

- The use of sediment traps, silt fencing, cut-off ditches, covering of stockpiles, wheel-wash facilities and proprietary systems such as Siltbuster to intercept and treat water before it is returned to the environment;
- The inclusion of a flood management plan detailing measures to be employed in the event of a flood. The Contractor shall monitor weather forecasts and sign up to the Natural Resources Wales flood warning service for the River Ely to receive advance warning of a potential flood event to allow time for removal of plant equipment and evacuation of construction workers;
- The Contractor shall place high risk activities such as site offices, stockpiling of material, fuelling and concrete casting activities on higher ground where possible;
- All chemicals, fuels or materials that could cause pollution of the River Ely or groundwater will be stored in such a way that they can easily be moved in the event of a flood and will not leak / run-off to surface and groundwater;
- Drip trays shall be placed beneath all plant during re-fuelling activities;
- Material stockpiles and storing of potentially harmful substances will not be located within 10m of the River Ely;
- Appropriate welfare facilities will be provided for the work force including portable toilet blocks if required. No sewage will be released from the site unless via a formal sewage system through the agreement with the relevant bodies;
- Whilst the final flood mitigation strategy remains under development, should this require ground levels to be altered within the site, temporary flood mitigation measures (such as a demountable barrier or sheet pile walls) will be implemented to ensure sediment laden materials are not entrained within any flood waters, should a large flood event occur during this phase of works; and
- Whilst the final flood mitigation strategy remains under development, should this require floodplain compensation works, these would be undertaken at an early stage of the programme, in any instance, before the works remove the floodplain which they are required to offset.

Operational Phase

7.4.2 To ensure that the scheme is safe and does not result in an increase in flood risk during the operational phase the following mitigation measures have been adopted within the design:

- A surface water drainage strategy, this will restrict the surface water runoff from the impermeable areas of the developed site to the variable greenfield rate of 15.3l/s Qbar, 26.9l/s 30YRP, 33.4l/s 100YRP.
- The FFL will be set a minimum of 600mm above the 1 in 100 year plus climate change flood level;
- Flood mitigation works will be undertaken, whilst the exact details remain subject to confirmation following the completion of the hydraulic modelling, they may include installation of flood bypass culverts beneath the historical bridge, ground level raising and flood management plan; and
- Other measures may be identified subject to completion of the hydraulic modelling.

7.5 Assessment of Construction Effects

Increased sedimentation of the River Ely as a result of runoff from construction materials

7.5.1 During the Construction Phase of the Proposed Development, surface water runoff associated with activities such as land clearance, excavation, dewatering of excavations, stockpiles, wheel washings and movement of materials to and from the site has the potential to contain elevated levels of sediment that may migrate or be discharged into the River Ely. Runoff with high sediment loads can have direct adverse effects through increasing turbidity (thus reducing light penetration and aquatic plant growth), and by smothering vegetation and bed substrates (thus impacting on invertebrate and fish communities through the destruction of feeding areas, refuges and breeding / spawning areas). Indirect adverse effects can also be associated with suspended sediments that have inorganic or organic contaminants (e.g. heavy metals and pesticides). The majority of the proposed works will be located within Flood Zones 2 and 3. This creates the risk of increased sedimentation as a result of a flood event. Any ground raising required to facilitate the development within the floodplain will be undertaken in such a manner (e.g. temporary barrier / sheetpile) so that the works are separated from the floodplain and sediments cannot become entrained.

7.5.2 As discussed in section 7.4, a CEMP will be implemented to mitigate the risks of increased sedimentation in the River Ely through specific measures to prevent runoff into the watercourse. It is noted though that due to the location and nature of the works, the CEMP is unlikely to be able to mitigate risks of sedimentation entirely (resulting in residual risks such as flood risk).

7.5.3 The sensitivity of the River Ely is classified as High. Post embedded mitigation, the magnitude of change will be Negligible. As a result, residual effects are anticipated to be direct, temporary, short to medium term and of **Minor Significance**. No additional mitigation measures are required.

Increased sedimentation of the River Ely as a result of bridge construction in the river channel

7.5.4 During the Construction Phase of the Proposed Development, there is the risk that increased sedimentation could occur in the channel of the River Ely as a result of works taking place within the channel. Sedimentation loads may also be generated by works to facilitate the bridge demolition and construction within the channel, such as access tracks and excavation works. The adverse impacts of this sedimentation are described above.

7.5.5 As discussed in section 7.4, a CEMP will be implemented to mitigate the risks of increased sedimentation in the River Ely through specific measures to prevent runoff into the watercourse. It is noted though that due to the location of in channel works, the CEMP is unlikely to be able to mitigate risks of sedimentation entirely. In addition to these embedded mitigation measures, the monitoring of waste water generation as a result of in channel works should be undertaken.

Appropriate treatment and disposal measures should be considered, such as the removal of site and off-site disposal.

7.5.6 The sensitivity of the River Ely is classified as High. Post embedded mitigation, the magnitude of change will be Negligible. Pre-further mitigation effects are anticipated to be direct, temporary, short to medium term and of **Minor Significance**. Residual effects are also anticipated to be of **Minor Significance**.

Spillage of pollutants and harmful substances such as fuels and concrete into the River Ely and groundwater

7.5.7 During the Construction Phase of the Proposed Development, it is possible that surface water runoff containing contaminants from accidental spillages of fuels and other harmful substances such as concrete may migrate to the River Ely and groundwater features.

7.5.8 Hydrocarbons form a film on the surface of a water body, depleting oxygen levels and are toxic to fish. Even at very low concentrations, a hydrocarbon film can negatively affect the visual appearance of a water body. These impacts are temporary, as water quality will improve as the pollutants disperse. The dispersion and impact of hydrocarbons that enter groundwater resources is dependent on the type of overlying geology, depth to groundwater table and characteristics of the aquifer. In the case of the Proposed Development, the Mercia Mudstone Group underlying the Site is of low permeability. Groundwater contamination is difficult to treat and can have an adverse indirect effect on water quality of watercourses that receive groundwater baseflow and / or are in hydraulic connectivity with groundwater. Should pollutants enter groundwater bodies, the impacts would be long-term and potentially widespread.

7.5.9 Concrete has a very high alkalinity, which could change river chemistry and have adverse effects on habitats and aquatic species that are present in the watercourse. Due to the nature of the works it is inevitable that concrete will come into contact with groundwater. However, where this occurs the volume of concrete will be negligible in comparison to the size of the aquifer and contact time while wet will be very short.

7.5.10 There is an additional risk of spillages of fuels and harmful substances from the disruption of plant and materials due to a flood event. Should a flood warning be issued, the Site will need to be secured which will entail movement of equipment and potential spillages of fuels and harmful substances.

7.5.11 As discussed in section 7.4, measures to mitigate pollutant and substance spillages and the potential for migration of such substances to surface and groundwater will be required. In addition, the CEMP will require the Contractor to develop additional mitigation statements for the safe relocation of plant equipment in the event of a flood warning. This should identify areas of high ground at lower risk of flooding and ensure that access to those areas is maintained at all times. It should also specify working practices that involve removing plant equipment from the bridge construction area when not in use. Along with measures outlined in the CEMP, a specific method statement will be developed to protect water quality during all construction activities. This will include the isolation of in channel works to prevent potential contamination pathways, and downstream water quality monitoring. On-site welfare facilities will be adequately designed and maintained to ensure sewage is disposed of appropriately. The use of wet concrete around watercourses (<20m) will be minimised and carefully controlled.

7.5.12 The sensitivity of the River Ely is classified as High and includes the additional consideration of a pathway to the Cwn Cydfin SSSI, while the sensitivity of the groundwater resources is classified as Medium. The magnitude of change for both the River Ely and groundwater features is classified as Low due to the temporary nature of any adverse effects. Prior to additional mitigation measures the effects will be direct, temporary, short-term of **Minor to Moderate Significance** on the River Ely and indirect, temporary, long-term of **Minor Significance** for groundwater features. With the implementation of further mitigation measures the contractor would have sufficient time to respond

to a flood event and be provided with an appropriate monitoring regime. On this basis, there remains a direct, temporary, short-term residual effect of **Minor Significance** on the River Ely and an indirect, temporary, long-term effect of **Minor Significance** on groundwater features.

Impacts to the hydromorphological and biological quality of the River Ely associated with works adjacent to these features

7.5.13 During the Construction Phase of the Proposed Development, works within the river channel may impact the hydromorphological quality of the watercourse and affect the sediment regime. In channel works may also result in the movement of material into the channel and materials within the channel, changing the river bed morphology and therefore potentially affecting the flow regime of the river.

7.5.14 As discussed in section 7.4, a CEMP will be implemented to limit the disturbance of the river bank and channel associated with the bridge element of the Proposed Development. In addition, a WFD assessment (WFDa) will be carried out at the detailed design stage to further assess and determine likely effects on WFD receptors. The WFDa will identify mitigation options that would neutralise the impacts of the Proposed Scheme, thus preventing any deterioration in water body status; and thirdly, where practicable, identify enhancement opportunities to incorporate into the scheme design that would ultimately contribute towards achieving Good Ecological Status.

7.5.15 The sensitivity of the River Ely is classified as High, while the magnitude of change is considered to be low as a result of measures to be implemented through the CEMP. As a result, a direct, temporary, short-term effect of **Moderate to Minor Significance** on the River Ely is anticipated.

Increased flood risk to people and property elsewhere associated with losses to flow conveyance and flood storage as a result of temporary works in the channel and on the floodplain

7.5.16 The construction of the Proposed Development will result in plant, works, equipment and facilities being located on the flood plain adjacent to the River Ely as well as within the River Ely channel. The presence of such equipment, works and facilities in the river channel and flood plain will result in changes to flow conveyance and loss of flood storage, which could lead to an increased flood risk to nearby properties and people should there be a flood event during the course of the works.

7.5.17 As discussed in section 7.4, the CEMP will include a flood management plan that requires the Contractor to monitor weather forecasts and sign up to the Natural Resources Wales flood warning service for the River Ely. The CEMP also requires the location of high risk activities such as material stockpiles being located on higher ground where practicable. No further mitigation will be required. Any flood compensation works required as part of the Scheme will be implemented prior to the works which will result in the removal of floodplain that they are required to offset.

7.5.18 The sensitivity of people and property in the area is High, in particular the large commercial estate east of the A4232, and the magnitude of change is considered to be Negligible due to size of the works areas. As a result, a direct, temporary, short-term effect of **Minor Significance** on property and people is anticipated.

Fluvial, tidal and groundwater flood risk to construction workers and plant

7.5.19 The construction of the Proposed Development will result in plant, works, equipment, facilities and construction workers being located on the flood plain adjacent to the River Ely as well as within the River Ely channel. In the event of a flood, these areas are likely to become inundated (in particular those Flood Zone 3 areas). A flood event could result in adverse effects to the health of construction workers and disruption and damage to works and construction plant.

7.5.20 As discussed in section 7.4, the CEMP will include a flood management plan, including an evacuation procedure, that requires the Contractor to monitor weather forecasts and sign up to the

Natural Resources Wales flood warning service for the River Ely. The CEMP also requires the location of high risk activities such as material stockpiles being located on higher ground where practicable. No further mitigation will be required.

7.5.21 The sensitivity of construction workers and plant is considered to be High, and the magnitude of change when considering the embedded mitigation measures is considered to be Negligible. As a result, a direct, temporary, short-term effect of **Minor Significance** is anticipated on construction workers and plant.

Further Mitigation

7.5.22 Off-site disposal of generated waste water and sediment from in-channel works should be considered as part of the development of the CEMP.

7.5.23 The Contractor should develop mitigation statements for the safe relocation of plant equipment in the event of a flood warning. This should identify areas of high ground at lower risk of flooding and ensure that access to those areas is maintained at all times. It should also specify working practices that involve removing plant equipment from the bridge construction area when not in use. A specific method statement will be developed to protect water quality during all construction activities. This will include the isolation of in channel works to prevent potential contamination pathways, and downstream water quality monitoring. On-site welfare facilities will be adequately designed and maintained to ensure sewage is disposed of appropriately. The use of wet concrete around watercourses (<20m) will be minimised and carefully controlled.

Construction Phase Monitoring

7.5.24 The monitoring of water generation and downstream water quality as a result of in channel works would be undertaken throughout the construction phase. Any significant change in water quality downstream of the construction works (for example observations of oils or high sediment levels not found upstream) will immediately be fed back to the site manager and works halted to ensure the cause is identified and isolated as soon as possible.

Accidents and/or Disasters

7.5.25 The incident of pollution to surface and ground water or the occurrence of a flood event has the potential to result in a Major Accident and Disaster (MA&D) during the construction phase. It is assumed that, along with standard health and safety practices, the mitigation described through section 7.5 is sufficient to mitigate the risks to and as a result of the Proposed Development. In addition, a catastrophic failure of the Pontcticill (Taf Fechan) Reservoir would expose the Proposed Development to a MA&D event of flooding. Additional mitigation to address this risk is not deemed practicable beyond measures already proposed in the CEMP.

7.5.26 Due to the proximity of the Proposed Development to the River Ely, it is recommended that in the event of a pollution incident or damage as a result of a flooding event, that Natural Resources Wales, Cardiff Council and the Vale of Glamorgan Council are notified immediately.

7.6 Assessment of Operational Effects

Operational Phase

7.6.1 The flood risk to the site will be managed through raising key parts of the site above the design flood level, this will be undertaken in accordance with that detailed within the FCA (Appendix 7.2).

7.6.2 The changes to the highway crossing of the River Ely through the retention of the historical bridge, the demolition of the current highway crossing and the construction of a new highway crossing will be designed and constructed in accordance with that detailed within the FCA (Appendix 7.2).

7.6.3 A Drainage Strategy has been prepared for the proposed development to accord with the Sustainable Drainage Systems Standards for Wales (SDSSW). These standards require the following:

- Surface water to be managed to prevent as far as possible any discharge from the development for rainfall events of less than 5mm and that the surface water runoff rate and volume for up to a 1 in 100-year return period should be managed to protect people, properties and the receiving water body. Consideration is also required to the risk associated with runoff from events greater than 1 in 100-year return period with mitigating proposals developed for the scheme.
- Treatment of surface water runoff to prevent negative impacts on the receiving water quality and/or protect downstream drainage systems including sewers.
- The design of the surface water management system should maximise amenity benefits.
- That the surface water management system should maximise biodiversity benefits
- The surface water drainage system should be designed with the overriding ethos of simplicity in construction, use and maintenance.

7.6.4 The Proposed Development has been designed to ensure that properties are above the potential flood level (see Appendix 7.2).

Impacts to the hydromorphological and biological quality of the River Ely associated with the new bridge and other elements of the Proposed Development

7.6.5 The Proposed Development is located adjacent to the River Ely and includes the construction of a bridge across the channel. The presence of the bridge may lead to a change in the natural hydromorphological regime of the watercourse, affecting the river bed and biological receptors. Due to the presence of hard engineering works and flood defences, the river channel is unlikely to migrate over time as a result of the presence of the new bridge, which is assumed to be constructed with no in channel works.

7.6.6 The sensitivity of the River Ely and biological receptors is high, and the magnitude of change is Low. Therefore, there is likely to be a direct, temporary and long-term effect of **Minor to Moderate Significance**.

Increased fluvial, tidal and groundwater flood risk to people and properties in the vicinity and as part of the Proposed Development

7.6.7 The Proposed Development includes a bridge across the River Ely, as well as raising the site above the design flood level, construction of hard engineered, impermeable structures adjacent to the river and within the flood plain. The presence of these structure will result in reduced flood flow conveyance within the river channel and result in displacement of flood waters due to a less of flood plain storage. This is assessed further within the FCA (Appendix 7.) and is subject to the completion of the mitigation hydraulic modelling.

7.6.8 As discussed in section 7.4, an operational drainage strategy (Appendix 7.3) will be implemented as part of the Proposed Development.

7.6.9 The sensitivity of people and properties within the area and as part of the operational Proposed Development is anticipated to be high, due to the relative size of the Proposed Development compared to the flood plain, the magnitude of change is anticipated to be Low. Therefore, there is likely to be a direct, permanent, long-term effect of **Minor** on people and properties within the Proposed Development as a result of flood risk.

7.6.10 In the absence of the final mitigation flood modelling, it is not possible to determine the full third party impacts of flood risk. It is expected that impacts on third parties could be between **Major and**

Minor significance in the absence of any mitigation. With mitigation in the form of attenuation or reduced impermeable areas, this effect could be limited to **Minor** significance.

Further Mitigation

7.6.11 No further mitigation anticipated to be required.

Future Monitoring

7.6.12 As part of the operational maintenance routine, the drainage system and any outfalls should be regularly inspected. Any areas of consistent pluvial flooding should be recorded and remedied as part of regular maintenance requirements.

Accidents/Disasters

7.6.13 The occurrence of a flood event has the potential to result in a Major Accident and Disaster (MA&D) during the operational phase. It is assumed that, along with the existing NWR flood defences and strategy, the mitigation described through section 7.6 is sufficient to mitigate the risks to and as a result of the Proposed Development. In addition, a catastrophic failure of the Pontcticill (Taf Fechan) Reservoir would expose the Proposed Development to a MA&D event of flooding. Additional mitigation to address this risk is not deemed practicable and the operational Proposed Development would adhere to standard emergency response and evacuation procedure under the jurisdiction of Cardiff Council and the Vale of Glamorgan Council.

Potential Changes to the Assessment as a Result of Climate Change

7.6.14 The Drainage Strategy and the Flood Modelling as detailed in Appendix 7.2 (Flood Consequences Assessment) and in turn this assessment has incorporated the appropriate climate change allowances.

7.7 Assessment of Cumulative Effects

7.7.1 A review of the proposed developments shows that there are no further proposed development within 1km of the site. The proposed developments are between 1km – 5km are predominantly residential, with two mixed use facilities and a hotel. The closest development (Ely Paper Mill), 1km north west of the site, and the only upgradient development is for a mixed use scheme comprising up to 900 dwellings, live/work units employment and associated commercial uses, new highway access and publicly accessible green space. This proposed site also lies adjacent to the River Ely and therefore the cumulative impacts of the effect on the surface water receptors should be considered as well as the implications on flood risk due to the in-combination effects of increased impermeable areas within the flood plain.

7.7.2 If silting and sedimentation, or any direct run-off of spills and leakages were to occur from the construction works on this proposed development for Ely Paper Mill, the cumulative effect could be detrimental further downstream in the Cardiff Bay Barrage.

7.7.3 In accordance with TAN15 each site will need to be designed in such a way to prevent an increase in flood risk to third parties, therefore there will be no cumulative impact in terms of flood risk.

7.8 Inter-relationships

7.8.1 Effects on groundwater and surface water have also been considered in Chapter 8: Ground Conditions while effects on ecology are considered in Chapter 5: Ecology.

7.9 Summary of Effects and Conclusion

7.9.1 Likely significant effects identified are identified in both the construction and operation phase but are predominantly associated with pollution and flood risk potential during the construction phase. Further operational phase effects on WFD receptors are likely and will need to be assessed with a full WFD assessment, prior to construction.

7.9.2 Mitigation measures for the potential effects identified are generally inherent to the site development and are incorporated into the detailed design (such as drainage design) and CEMP required for the Construction Phase.

7.9.3 A summary of the effects is presented in Table 7.6.

7.10 References

- WSP (2020) Leckwith Quay, Flood Consequences Assessment
- WSP (2020) Leckwith Quay, Drainage Strategy
- BGS 'Geology of Britain' viewer Available at: http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html (accessed March 2020);
- Natural Resources Wales (2020) Long term flood risk maps Available at: https://naturalresources.wales/evidence-and-data/maps/long-term-flood-risk/?lang=en (accessed March 2020);
- Welsh Government and Natural Resources Wales (2020) Lle Geo-Portal Available at: http://lle.gov.wales/home (accessed March 2020);
- Cardiff Council (2015) Strategic Flood Risk Assessment Available at: https://www.cardiff.gov.uk/ENG/Your-Council/Strategies-plans-and-policies/Local-flood-risk-management-strategy/Documents/Cardiff%20Flood%20Risk%20Management%20Plan%20-%20Consultation%20draft.pdf (accessed March 2020);
- Vale of Glamorgan (2012) Strategic Flood Risk Management Strategy Available at: https://www.valeofglamorgan.gov.uk/Documents/Living/Environment/Flood-and-coastal-erosion-risk/Local-Flood-Risk-Management-strategy-Draft.pdf (accessed March 2020);
- Welsh Government (2018) Statutory standards for sustainable drainage systems Available at: https://gov.wales/sites/default/files/publications/2019-06/statutory-national-standards-for-sustainable-drainage-systems.pdf (accessed March 2020)

Table 7.5: Summary of Likely Environmental Effects on Flooding and Hydrology

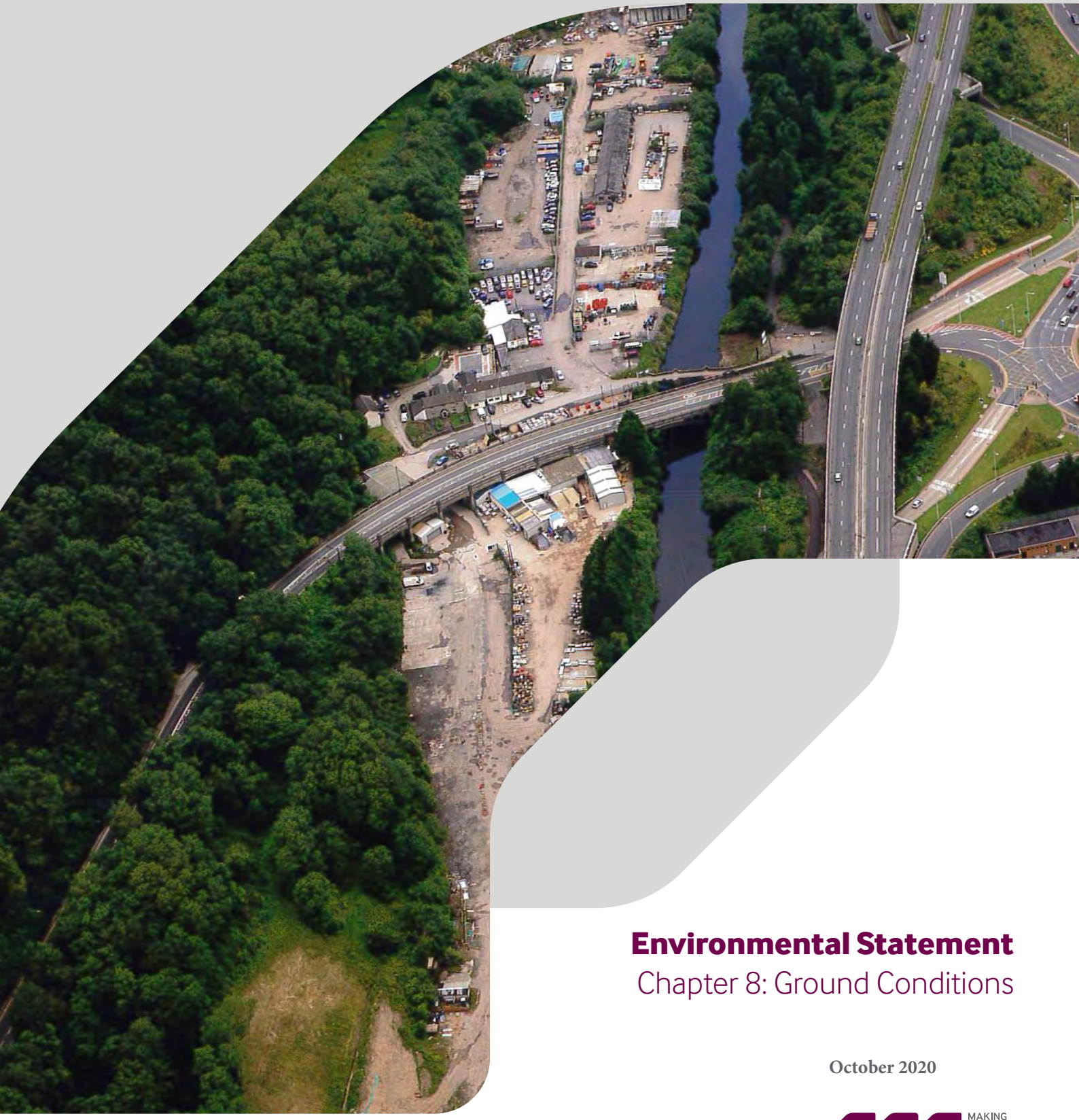
Receptor	Sensitivity of receptor	Description of impact	Short / medium / long term	Magnitude of impact	Significance of effect	Significant / Not significant	Notes
Construction phase							
Surface Water (River Ely)	High	Increased sedimentation of the River Ely as a result of runoff from construction materials	Short-Medium-term	Negligible	Minor	Not Significant	Residual significance dependent on measures implemented through a CEMP
Surface Water (River Ely)	High	Increased sedimentation of the River Ely as a result of bridge construction in the river channel	Short-Medium-term	Negligible	Minor	Not Significant	Residual significance dependent on measures implemented through a CEMP
• Surface Water (River Ely); • Biological Resources; and • Groundwater Resources and Aquifers	High / Medium	Spillage of pollutants and harmful substances such as fuels and concrete to the River Ely and groundwater	Short-term	Low	Minor	Not Significant	Residual significance dependent on measures implemented through a CEMP.
• Surface Water (River Ely); and • Biological resources.	High	Impacts to the hydromorphological and biological quality of the River Ely associated with works adjacent to these features	Short-term	Low	Moderate to Minor	Not Significant	Residual significance dependent on measures implemented through a CEMP. Results of WFD assessment may lead to additional effects and mitigation requirements.
Properties and members of the public	High	Increased flood risk to people and property elsewhere associated with losses to flow conveyance and flood storage as a result of temporary works in the channel and on the floodplain	Short-term	Negligible	Minor	Not Significant	Residual significance dependent on measures implemented through a CEMP and Flood Management Plan
Construction workers and plant	High	Fluvial, tidal and groundwater flood risk to construction workers and plant	Short-term	Negligible	Minor	Not Significant	Residual significance dependent on measures implemented through a CEMP and Flood Management Plan

Operational phase

• Surface Water (River Ely); and • Biological resources.	High	Impacts to the hydromorphological and biological quality of the River Ely associated with the new bridge and other elements of the Proposed Development	Long-term	Low	Minor to Moderate	Not Significant	Residual significance dependant on measures implemented through the drainage design. Results of WFD assessment may lead to additional effects and mitigation requirements.
Properties and members of the public	High	Increased fluvial, tidal and groundwater flood risk to people and properties in the vicinity and as part of the Proposed Development	Long-term	Low	Minor to Major	Not Significant	Residual significance dependant on measures implemented through the drainage design.

Leckwith Quays

Leckwith Road, Cardiff



Environmental Statement

Chapter 8: Ground Conditions

October 2020

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Mr Phil Worthing

8 GROUND CONDITIONS

8.1 Introduction

8.1.1 This chapter provides a high-level assessment of the effects the proposed residential development may have on ground conditions. The chapter describes the baseline condition of the study area and considers the potential for land to be affected by soil and geology which may impose constraints on the development. In order to assess the potential environmental impacts related to geology and soils, it is necessary to consider land contamination; and ground and surface water quality. The development area depicted in the concept masterplan (Figure 2.5) will hereby be referred to as 'the site'.

8.1.2 This chapter is accompanied by the following report which is included in Appendix 8.1:

- WSP (2019) Leckwith Quay, Cardiff, Preliminary Risk Assessment

8.1.3 This chapter should be read in conjunction with the ES introductory Chapters 1-3.

8.1.4 The scope of this chapter excludes any assessment of flooding and hydrology (see Chapter 7).

8.1.5 This chapter describes:

- The legislation, policy and guidance which have been taken into account in the assessment;
- The assessment methodology, including the consultation outcomes which have informed the assessment;
- Baseline conditions currently existing at the Project Site and in the surrounding study area;
- The likely significant effects following the implementation of embedded mitigation;
- The additional mitigation required to prevent, reduce or offset any significant adverse effects; and
- The likely residual effects and cumulative effects after these measures have been employed.

8.2 Assessment Methodology

Planning Policy Context

8.2.1 Key planning policies are listed below and are described in Appendix 8.2.

Planning Policy Wales Edition 10 (Welsh Government, December 2018)

- Chapter 3.51: Previously Developed Land
- Chapter 5.12: Design Choices to Prevent Waste
- Chapter 5.14: Minerals
- Chapter 6.3: Landscapes
- Chapter 6.9: Unlocking Potential by Taking a De-Risking Approach.

Vale of Glamorgan Local Development Plan (2011 – 2026): Written Statement (June 2017)

- Strategic Policy (SP) 9 - Minerals
- SP10 - Built and Natural Environment
- Managing Development (MD) 7 - Environmental Protection

Vale of Glamorgan Local Development Plan (2011 - 2026): Minerals Safeguarding (April 2018)

- Supplementary Planning Guidance (SPG) to assist with the consideration of planning applications within Minerals Safeguarding Areas.

Cardiff Local Development Plan (2006 – 2026): Written Statement (January 2016)

- Key Policy (KP) 5 - Good Quality and Sustainable Design

Detailed Policies:

- H6 - Change of use or Redevelopment to Residential Use
- EN5 - Designated Sites
- EN11 - Protection of Water Resources
- EN13 - Air, Noise, Light Pollution and Land Contamination

Legislative Context

Part 2A of the Environmental Protection Act (1990)

8.2.2 Part 2A of the Environmental Protection Act 1990 (as amended) establishes a legal framework for dealing with land contamination in the UK. It provides a means of dealing with unacceptable risks posed by land contamination to human health and the environment. Government objectives with respect to land contamination policy and the Part 2A regime are set out in the Department for Environment Food and Rural Affairs (Defra) Contaminated Land Statutory Guidance 2012 as:

- to identify and remove unacceptable risks to human health and the environment;
- to seek to ensure that contaminated land is made suitable for its current use; and
- to ensure that the burdens faced by individuals, companies and society as a whole are proportionate, manageable and compatible with the principles of sustainable development.

8.2.3 These three objectives underlie the ‘suitable for use’ approach to the assessment and remediation of 'land contamination’. This approach recognises that the risks presented by any given level of land contamination will vary greatly according to the use of the land and a wide range of other factors, such as the sensitivity of the underlying geology and the receptors which may be affected. The ‘suitable for use’ approach consists of three elements:

- Ensuring that land is suitable for its current use;
- Ensuring that land is made suitable for any new use; and
- Limiting requirements for remediation to the work necessary to prevent unacceptable risks to human health or the environment in relation to the current use or future use of the land.

Other Legislation

8.2.4 The following legislation has been considered during the preparation of this Chapter:

- Control of Substances Hazardous to Human Health Regulations, 2002 (as amended) provides an assessment of the risk to health created by work involving substances hazardous to health;
- The Water Environment (Water Framework Directive) (England and Wales) Regulations, 2017 (2000/60/EC) establish a framework for protecting the water environment;

- Dangerous Substances Directive (Amendment), 2006 controls the amount of dangerous substances that are discharged into inland, coastal and territorial waters;
- Environmental Damage (Prevention and Remediation) (Wales) (Amendment) (EU Exit) Regulations, 2019, an amendment to the 2009 regulations which aim to prevent serious environmental effects or ensure that remediation is carried out. The duty to prevent or remediate falls on operators of activities. The Regulations specifically define three types of environmental damage: biodiversity damage - to European Union protected species and habitats, and Sites of Special Scientific Interest; water damage; and land damage;
- The Environmental Permitting (England and Wales) (Amendment) (EU Exit) Regulations, 2019 came into force on EU exit day, an amendment to the 2016 regulations which replaces those parts of the Water Resources Act that relate to the regulation of discharges to controlled waters. Under the Regulations, groundwater activities relate to inputs of pollutants to groundwater. The Regulations also replace the Groundwater Regulations, 2009 which in turn replaced the Groundwater Regulations, 1998. The Regulations also transpose the Groundwater Directive 1980, the Water Framework Directive and Groundwater Daughter Directive 2006 into UK law;
- Control of Asbestos Regulations, 2012 prohibit the importation, supply and use of all forms of asbestos. If existing asbestos containing materials are in good condition, they may be left in place; their condition monitored and managed to ensure they are not disturbed. The Control of Asbestos Regulations also include the 'duty to manage asbestos' in non-domestic premises; and,
- Contaminated Land (Wales) (Amendment) Regulations, 2012 provides a definition of what constitutes 'contaminated land' and set out the responsibilities of the Local Authority and the Environment Agency (now known as Natural Resources Wales) in the identification and management of contaminated land; and
- Construction (Design & Management) (CDM) Regulations, 2015. This requires clients to use their influence to ensure that the arrangements made by other duty holders are sufficient to safeguard the health and safety of those working or those affected by that work.

Relevant Guidance

8.2.5 The following guidance documents have been used during the preparation of this Chapter:

- Health and Safety Executive (HSE) (1991), Guidance Note HS (G) 66, Protection of Workers and the General Public during the Development of Contaminated Land;
- Construction Industry Research and Information Association (CIRIA) C532 (2001), Control of Pollution from Construction Sites;
- Environment Agency (2004), Model Procedures for the Management of Contaminated Land (CLR11) (soon to be superseded by Land Contamination: Risk Management, 2019);
- Welsh Local Government Association and Environment Agency Wales, 2012, Development of Land Affected by Contamination: A Guide for Developers;
- CL:AIRE (2011), The Definition of Waste: Development Industry Code of Practice;
- Environment Agency and NHBC (2008), Guidance for the safe development of housing on land affected by contamination, Environment Agency R&D Publication 66;

- British Standards (BS) 10175 (2011+A2:2017) Investigation of Potentially Contaminated Sites – Code of Practice;
- Department for Environment, Food and Rural Affairs (DEFRA) April 2012, Contaminated Land Statutory Guidance;
- Environment Agency (2012) Groundwater Protection: Policy and Practice (GP3);

Study Area

8.2.6 The 'study area' comprises the maximum physical extent of the proposed development and a buffer zone of 250 m. This distance is referenced in Best Practice documents, including Guidance for the Safe Development of Housing on Land Affected by Contamination: R&D Publication 66 (NHBC, 2008), and is typical at the hazard identification stage of an assessment.

8.2.7 Potential features outside of this buffer zone that may be impacted or constrain the proposed development will be included in the assessment.

Baseline Methodology

8.2.8 The following desk study report was carried out for the site to inform the ground conditions, included as Appendix 8.1.

- WSP (2019) Leckwith Quay, Cardiff, Preliminary Risk Assessment.

8.2.9 The methodology of the assessment is listed within this chapter.

Consultation

The following consultation comments were provided following a request for a formal opinion on the scope of an Environmental Statement:

Table 8.1: Consultation Responses Relevant to this Chapter

	Consultee and Issues Raised	Where Addressed
5th December 2019	**Environmental-health officers (Shared Regulatory Services (Pollution)):** 'The applicant has indicated that Ground Conditions Assessments will be included within the scope of the proposed Environmental Statement. It is noted that their preliminary assessments have identified the need for intrusive investigations in relation to the risk from ground gas and contamination, to inform any remediation/mitigation measures.' Although it did not express any concern over the applicants' approach at the 'scoping opinion' stage, SRS did say that it would probably recommend that planning permission carry standard conditions about ground-gas protection, contaminated land, imported soil, imported aggregates and the use of site-won materials.	Intrusive investigation has not been undertaken at this stage, therefore this ES chapter has been based on desk-based information only.
5th December 2019	**Natural Resources Wales (NRW)** <u>Land contamination</u> 'We note, and concur with, the intention to undertake intrusive ground investigations which will serve to inform any required remediation mitigation measures. Full details should be included within the ES.' <u>Water quality</u>	As above, intrusive investigation has not been undertaken at this stage, therefore this ES chapter has been based on desk-based information only.

‘The presence of sensitive receptors including abstractions from the near-by spring and a private drinking water supply will also need to be considered in relation to the proposed development and appropriate mitigation measures included, to protect water quality.’	Comments relating to water quality will be discussed in this ES chapter and within the flooding and hydrology chapter.
‘[It] is stated that the River Ely may also be impacted by pollution during and after the site’s development. The ES should consider all aspects of pollution risk including drainage, site run off, silt control and waste storage and appropriate mitigation measures considered.’	
‘We are aware that the applicant intends to undertake a WFD (Water Framework Directive) scoping assessment, to assess the potential impacts of the proposed development on the water environment. We would take this opportunity to advise the applicant that this site falls within the Cardiff Bay waterbody GB30947042, not the Ely water body GB109057027270. The results of the WFD assessment should be included within the ES.’	A WFD scoping assessment will be provided in the flooding and hydrology chapter.

Assessment Criteria and Assignment of Significance

8.2.10 The assessment of likely significant effects as a result of the site has taken into account both the construction and operational phases. The significance level attributed to each effect has been assessed based on the magnitude of change due to the site and the sensitivity of the affected receptor / receiving environment to change. Magnitude of change and the sensitivity of the affected receptor / receiving environment are both assessed on a scale of high, medium, low and negligible, as shown in Tables below.

Receptor Sensitivity/Value

Table 8.2: Definitions of Sensitivity or Value

Sensitivity	Descriptors
Very High	Very high importance and rarity, international scale and very limited potential for substitution.
High	High importance and rarity, national scale, and limited potential for substitution.
Medium	High or medium importance and rarity, regional scale, limited potential for substitution.
Low	Low or medium importance and rarity, local scale.
Negligible	Very low importance and rarity, local scale.

Magnitude of Impact

Table 8.3: Definitions of Magnitude

Sensitivity	Descriptors
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements; exposure to acutely toxic contaminants. (Adverse).
	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Medium	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements; short-term exposure to contaminants with chronic (long-term) toxicity. (Adverse).
	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).

Low	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements. (Adverse).
	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse).
	Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

Significance of Effects

8.2.11 The assessment of significance is based on the following matrix.

Table 8.4: Assessment Matrix

Sensitivity	Magnitude of Impact				
	No Change	**Negligible**	**Low**	**Medium**	**High**
Negligible	No change	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	No change	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	No change	Negligible or Minor	Minor	Moderate	Moderate or Major
High	No change	Minor	Minor or Moderate	Moderate or Major	Major or Substantial
Very High	No change	Minor	Moderate or Major	Major or Substantial	Substantial

8.2.12 Environmental effects considered to be greater than 'Moderate' are considered to be potentially significant within the context of the assessment, which is based on professional judgement following review of the available information.

Limitations of the Assessment

8.2.13 The assessment is limited to available, desk-based information only. A ground investigation will be required to refine the assessment. Following the outcome of the high-level ground investigation, it may be required to undertake further detailed ground investigation and assessment based on the results and finalised development masterplan. A remediation strategy and remediation and validation works are also likely to be required prior to construction.

8.2.14 The provided masterplan is to be submitted for illustrative purposes, produced to show a possible relationship between the main highway components, to reflect how the perceived site constraints have been accommodated, and to assist in establishing maximum site capacities. It should not be viewed as a final masterplan.

8.2.15 The construction works at the site will be undertaken in accordance with industry best-practice and regulatory requirements. A Construction Environmental Management Plan (CEMP) will be in place to manage environmental risks.

8.2.16 If necessary, it is assumed that material moved around the site or imported onto site during the construction phase (e.g. to obtain required ground elevations) will have been subject to appropriate chemical testing (and will be geotechnical suitable) and will therefore not present a risk

to controlled waters (e.g. via leaching of potential contaminants) or human receptors and works will be undertaken in accordance with the CL:AIRE Contaminated Land Definition of Waste: Development Industry Code of Practice.

8.2.17 It is assumed that any proposed temporary and permanent design drainage strategies will be implemented appropriately.

8.2.18 Any sections referencing hydrology and hydrogeology in this Chapter should be reviewed and updated, if necessary, following the completion of the final Flooding and Hydrology Chapter.

8.3 Baseline Environment

Geology

Made Ground / Reworked Ground

8.3.1 The BGS GeoIndex indicates the presence of Made Ground in the eastern extent of the site associated with the construction of the roundabout. Made Ground is anticipated on the majority of the site associated with the landfilling, landscaping and development over time. Made Ground was observed in the embankments along the north and west of the site with a high content of construction and household waste, metal and plastic. Brick and concrete was noted in the gravel hardstanding across the majority of the site.

Superficial Deposits

8.3.2 Tidal Flat deposits of clay, silt and sand are indicated along the east of the site associated with the Ely River. Tufa deposits are indicated in the southernmost part of the site. Tufa is a sedimentary rock composed of calcium carbonate or silica, formed by evaporation around the mouth of springs, seeps or along streams carrying calcium carbonate in solution.

8.3.3 In BGS borehole ST17NE935, superficial deposits were encountered to 11.5m below ground level (bgl), comprising clay with lenses of sand and silt to 8.8m bgl overlying gravel. In BGS borehole ST17NE781, clay was encountered to 4.0m bgl, overlying sand and gravel to the base of the hole at 8.0m bgl.

Bedrock Geology

8.3.4 The site is located on the edge of a syncline with the Mercia Mudstone underlying the majority of the site, described as red, less commonly green-grey, mudstones and subordinate siltstones with thick halite-bearing units in some basinal areas.

8.3.5 The Blue Anchor Formation is found upgradient, overlying the Mercia Mudstone in the south west of the site. This typically comprises pale green-grey, dolomitic silty mudstones and siltstones.

8.3.6 Bedrock was only encountered in one borehole (ST17NE935), drilled to 11.9m bgl. Weathered Mercia Mudstone was encountered at 11.5m bgl. A limestone escarpment is present to the west of the site which is likely to result in the creation of the spring line and Tufa deposits identified, as it meets the low lying less permeable Mercia Mudstone deposits.

8.3.7 The South East Wales Mineral Resource Map of Wales, 2010 indicates that brick clay is present beneath an overburden of less than five metres. The Vale of Glamorgan LDP indicates the site is within a mineral safeguarding area for Category 2 limestone resource, considered of local importance. A ground investigation would need to be completed to confirm the ground conditions. Due to the former and current land uses at the site, and environmental constraints (vicinity of the River Ely to the east, and steep valley side to the west), the site is unlikely to be considered for viable for future mineral extraction.

Geological Hazards

8.3.8 A steep 8 – 9m soil embankment is located around the northern boundary of the site containing waste material. This shows evidence of instability with debris piles at the base.

8.3.9 The Envirocheck Report indicates that the site lies in a non-coal mining area. There are no records of mining within 1km of the site.

8.3.10 Little is known of the true ground profile below the proposed development. The geotechnical ground conditions in the study area are likely to have compressibility and differential settlement concerns. Ground conditions should be confirmed through an appropriate intrusive site investigation.

Radon

8.3.11 The Envirocheck Report indicates that the site is located in an intermediate probability radon area (between 5 to 10% of homes are estimated to be at or above the Action Level), and therefore, basic radon protective measures are considered necessary in the construction of new dwellings or extensions. The exact level of radon protection measures will need to be agreed with the Local Planning Authority.

Hydrogeology

8.3.12 Groundwater in the nearby BGS borehole logs ranged between 2.0m and 4.3m bgl.

8.3.13 The superficial Tidal Flats are classified as a Secondary Undifferentiated Aquifer (assigned in cases where it has not been possible to attribute either category A or B to a rock type), and the Tufa, as a Secondary A Aquifer, defined as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

8.3.14 The bedrock of the Mercia Mudstone and the Blue Anchor Formation are both classified as Secondary B Aquifers, defined as predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.

8.3.15 There are no Source Protection Zones (SPZ) within 1km of the site.

8.3.16 There is one groundwater abstraction within 500m of the site, located 105m west of the site at Woodland Farm, used for general farming and domestic use. The location of the well is elevated approximately 75m higher than the site topographically (according to Ordnance Survey mapping). It is assumed groundwater flows from this area at the top of the escarpment down towards the River Ely to the south east. Therefore, the site is downgradient of this abstraction well and is therefore not considered to be affected by the site, and will be discounted from this assessment going forward.

Hydrology

8.3.17 The nearest surface water body is the Ely River that runs adjacent to the eastern site boundary and crosses the site beneath Leckwith Road. This feeds into Cardiff Bay Barrage which in turn feeds into the Severn Estuary.

8.3.18 A review of NRW's river and waterbodies information shows that the Ely lies within the South East Valleys River Catchment, assessed to have moderate overall status, moderate ecological status and good chemical status.

8.3.19 A spring/drainage flows across the south of the site, towards the north east to the Ely River.

8.3.20 Further drainage channels have been noted approximately 70m north east of the easternmost part of the site.

8.3.21 There are two surface water abstractions within 500m of the site, in approximately the same location, to the west of the site, from a spring in Leckwith Woods. The closest is approximately 95m west, held by Mr W Coles for household water supply (drinking, cooking, sanitary and washing), and for general farming and domestic use. The other is approximately 110m west is held by Bryn Ceiliog Vineyard for general farming and domestic use. As with the groundwater abstraction mentioned in Section 8.3.16, the location of the abstractions are elevated approximately 75m higher than the site topographically (according to Ordnance Survey mapping). It is assumed this spring flows down towards the River Ely to the south east. Therefore, the site is considered downgradient of the abstraction points and therefore, the abstractions are not considered to be affected by the site and will be discounted from this assessment going forward.

Environmental Designations

8.3.22 There are no environmental or geological SSSIs and there are no known Regionally Important Geological Sites (RIGS) within the study area.

8.3.23 The only designation within 500m of the site is for ancient woodland. The Severn Estuary is the closest environmentally designated site (Ramsar, SSSI, SAC and SPA) located 4km to the south east, falling outside of the SSSI Impact Risk Zone.

Current Land Use

8.3.24 The site comprises industrial land uses including a cement works, scrap yards and storage occupying the Northern Plateau and the north of the Southern Plateau, and open land/woodland occupying the majority of the Southern Plateau.

8.3.25 The Northern Plateau and northern extent of the Southern Plateau is predominantly covered with gravel hardstanding/Made Ground with softstanding areas to the south, west, and along eastern boundary, adjacent to the River Ely. A tarmac road is present through the north of the site.

8.3.26 Various raised embankments are noted around the site boundaries and in the south of the site, likely associated with historical waste stockpiles.

8.3.27 Several well established Japanese Knotweed plants were noted around the site, particularly on the eastern boundary along the River Ely.

8.3.28 The surrounding land use to the east is commercial/industrial with rural land to the west beyond the escarpment. The nearest residential property is a farm house approximately 100m west of the site (beyond the wooded escarpment).

8.3.29 The site lies within an HSE consultation zone, indicating proximity to a major hazard site or a major accident hazard pipeline. However, this record is associated with the above ground storage of liquefied petroleum gas (LPG) by Flogas. It us understood that this facility is now disused, and the historic gas cylinder storage on hardstanding is not considered high risk. Therefore, this will not be considered, associated with ground conditions, going forward.

Historical Land Use

8.3.30 The site was utilised for a number of industrial and commercial uses from pre-1880s to present day including scrap yards, lime kilns. The southern section remains predominantly undeveloped over time with the exception of landfilling indicated between 1984 and 1996.

8.3.31 The River Ely, which previously meandered through the site was rechannelled from 1950 to run parallel with the eastern site boundary. The infill material of the original channel is unknown.

8.3.32 Surrounding land use has remained predominantly industrial over time.

Landfills

8.3.33 There are four historical landfill records on site, the location of the landfills is indicated in the PRA in Appendix 8.1:

- Leckwith Bridge North, receiving waste between 1985 and 1994. Deposited waste not specified. Located in the northernmost part of the site;
- Leckwith Bridge South, receiving waste between 1984 and 1996. Deposited waste included industrial and household. Boundary not defined, located in the southernmost part of the site;
- Lawrenny Avenue, receiving waste between 1978 and 1992. Deposited waste included inert. Located to the north east of the current roundabout; and
- Leckwith River Loop. Hadfield Road, receiving waste between 1956 and 1974. Deposited waste included inert, industrial, commercial, household and special waste. Located to the south of the current roundabout.

8.3.34 There are a further four historical landfill records within 500m of the site, the closest is located 11m north of the site.

8.3.35 During the site walkover, an 8m high embankment in the north of the site had evidence of the landfill, comprising construction and household waste within the soil.

Unexploded Ordinance

8.3.36 The Zetica Regional Unexploded Bomb Risk map indicates that the majority of the site is located in an area of 'low' risk, having a low density of bombing hits (15 bombs per 1000 acres or less). However, the eastern extent of the site is classified as 'moderate' risk (15 to 49 bombs per 1000 acre). A report from Zetica (with the PRA in Appendix 8.1) concluded that there were various WWI and WWII strategic targets located in the vicinity (within 5km) of the site. However, no readily available records have been found to indicate that the site was bombed. It was recommended that a detailed desk study, whilst always prudent, is not considered essential in this instance.

Potential Sources of Contamination

8.3.37 Table 8.5 provides a summary of the potential sources of contamination and the likely nature of such sources, both on site and in the immediate surrounds.

Table 8.5: Potential Sources of Contamination

Source	Potential Contaminants of Concern	Location and Likely / Anticipated Distribution
Made Ground associated with ground cover and road	Inorganics, Total Petroleum Hydrocarbons (TPH), Polyaromatic hydrocarbons (PAHs), Volatile Organic Compounds (VOCs), Semi-volatile Organic Compounds (SVOCs), Asbestos, heavy metals, phenols, Benzene, Toluene, Ethylbenzene and Xylenes	On site in the north and centre and surrounding the site to the east
Historical Landfills		In the north, east and south of the site

Fly tipping and waste storage	(BTEX) and Methyl tert-butyl ether (MTBE), ammoniacal nitrogen, nitrates, nitrite, sulphates and ground gases.	Over the site, predominantly in the centre
Unknown infilling of the re-channelled River Ely		Through the centre of the site
On site scrap yards and vehicle repair works	Inorganics, TPH, PAHs, VOCs, SVOCs, heavy metals, BTEX and MTBE.	On site and surrounding site to the east
The cement works with gas cannister storage		In the centre of the site
Electrical substation	Polychlorinated Biphenyls (PCBs)	Historically in the west of the site and currently south of the easternmost part of the site
Agricultural land	Pesticides, herbicides, fertilisers, ammoniacal nitrogen, nitrates, nitrite, metals, ground gases.	To the immediate west, beyond the escarpment. Potential to discharge via on-site springs
Radon gas	Radon gas	On site

Conceptual Site Model

8.3.38 Table 8.6 provides an evaluation of the potential contaminant linkages that were considered to be plausible on the basis of the information currently available using the risk matrix method explained in the PRA in Appendix 8.1.

Table 8.6: Conceptual Site Model

Source	Pathway	Receptor	Risk	Comment
Made Ground associated with historical landfills and road construction (volatile and non-volatile contaminants) Industrial land use on site and to the west of the site Ground gases associated with the historical landfills. Radon	Direct contact, ingestion and inhalation of dust	Human health: Future Site Residents	High Risk	***(Severity: Medium, Probability: High Likelihood).*** Due to the presence of former landfills and Made Ground across the site, future residents have potential to come into direct contact with contaminants at the surface, if not properly capped and managed. If gardens are associated with the residential properties, future residents are at risk at contamination associated with ingestion from home grown produce, if not appropriately mitigated.
		Human Health: Neighbouring industrial/ commercial workers/ site users	Low Risk	***(Severity: Medium, Probability: Unlikely).*** The nearest neighbouring property (commercial / industrial) is approximately 115m east of the site reducing the likelihood of this pathway occurring. Appropriate environmental management controls will need to be implemented during construction to manage the generation of dust / nuisances.
		Human Health: Construction workers	Very Low Risk	***(Severity: Minor, Probability: Unlikely).*** Construction workers are more likely to come into direct contact with any contaminated materials on site during earthworks. However, it is assumed appropriate health and safety and environmental management controls will be implemented during construction.
	Migration and accumulation of ground gas and radon in the subsurface, resulting in accumulation indoors	Human health: Future Site Residents	High Risk	***(Severity: Medium, Probability: High Likelihood).*** The site is located in an Intermediate Radon Protection Area and as a minimum basic radon protection measures will be required. Furthermore, there is a high potential of ground gas generation in the subsurface associated with the former landfills, Made Ground and superficial deposits. Future residents in houses and ground floor apartments are at a high risk of exposure to any accumulation of ground gases indoors. The requirement for radon protection measures may be sufficient to mitigate risks from ground gases, subject to the findings of ground gas monitoring and assessment.
		Human health: construction/ maintenance workers	Low Risk	***(Severity: Minor, Probability: Likely)*** Ground gases have the potential to accumulate in confined spaces such as manhole entries or earthwork voids. It is assumed appropriate health and safety and environmental management controls will be implemented during construction to mitigate such risk.

Source	Pathway	Receptor	Risk	Comment
	Leaching of soils and subsequent vertical and lateral migration.	Controlled Waters: Groundwater within the bedrock (Secondary B Aquifer) and superficial deposits (Secondary A/ Undifferentiated Aquifers) and springs The River Ely Potable surface water abstractions (95m and 110m west (upstream))	Moderate Risk	***(Severity: Severe, Probability: Likely).*** The soils beneath the site are potentially contaminated based on the previous and current land uses. Groundwater is assumed to be shallow within the superficial deposits/perched in the Made Ground, based on nearby borehole logs (2 – 4.3m bgl) and therefore, the likelihood of leaching of potential contaminants to controlled waters is high. A number of springs, surface water and groundwater abstractions are present within the vicinity of the site which could be impacted by leaching of contaminants in soil and subsequent migration within groundwater. It is likely that groundwater is migrating off site, however it is not thought that the groundwater is utilised in the surrounding area. The groundwater is assumed likely to be shallow and in continuity with the River Ely and therefore any impacted groundwater has a direct pathway towards the River. Further assessment is required to fully quantify the risks to controlled water receptors.
	Surface run-off	Controlled Waters: The River Ely and the Cardiff Bay catchment	Moderate Risk	***(Severity: Medium, Probability: Likely).*** The River Ely bounds the site to the east. Due to the lack of hardstanding and exposed nature of landfill deposits, contaminants in the soil have potential to be entrained within the surface run off following rainfall and may discharge directly to the river. Appropriate drainage design would need to be implemented to prevent this pathway as currently surface water regularly ponds across the site.
	Contact in soil and exposure to vapours	Potable Water Pipes	Low	***(Severity: Minor, Probability: Likely).*** A risk to potable water supply pipes may be posed by Made Ground soils across the site. These may need to be upgraded to barrier pipes.
Potentially impacted groundwater: non-volatile and volatile contaminants	Migration and accumulation of groundwater vapours in the subsurface, resulting in accumulation indoors.	Human health: Future Site Residents	High Risk	***(Severity: Medium, Probability: High Likelihood).*** Organic vapour volatising from contaminated groundwater may accumulate in the subsurface. Future residents in houses and ground floor apartments are at a high risk of exposure to any accumulation of vapours indoors. Further assessment is required to fully quantify the risk posed. Radon and ground gas protection measures may go some way to mitigate potential vapour risk but may require upgrading to be hydrocarbon resistant.

Source	Pathway	Receptor	Risk	Comment
		Human health: construction/ maintenance workers	Low Risk	***(Severity: Minor, Probability: Likely)*** Organic vapours volatilising from groundwater have the potential to accumulate in confined spaces such as manhole entries and excavation voids. It is assumed appropriate health and safety controls and environmental management controls will be implemented during construction to mitigate such risk.
	Lateral migration of groundwater	Off-site groundwater and surface water bodies	Moderate Risk	***(Severity: Severe, Probability: Likely).*** A number of springs, surface water and groundwater abstractions are present within the vicinity of the site which could be impacted by migration of contaminants within groundwater. It is likely that groundwater is migrating off site, however it is not thought that the groundwater is utilised downgradient in the surrounding area. The groundwater is assumed likely to be shallow and in continuity with the River Ely and therefore any impacted groundwater has a direct pathway towards the river. Further assessment is required to fully quantify the risks to controlled water receptors.

Receptor Importance

8.3.39 The following elements of the site are considered relevant to the assessment of the effects on land affected by contamination:

- Earthworks - as part of the construction and preparation phase of the site there will be an element of soil excavation and ground preparation and temporary storage of chemicals/materials/waste;
- Land uses - hardstanding, buildings and particularly areas of soft landscaping where contaminated soils may be present at/or near the surface; and
- Construction of Buildings - creation of enclosed spaces and placing below ground structure/services into the ground.

8.3.40 The potentially significant effects that have been identified for inclusion in the assessment are as follows:

Construction Phase

- Disturbance of contaminated ground during construction resulting in mobilisation of contaminants and dust impacting human health;
- Disturbance of the ground causing both physical (siltation/sedimentation) and chemical (contamination) run-off impacting surrounding surface watercourses;
- Mobilisation of contaminants to the underlying groundwater through the creating of a preferential pathway (through piling);
- Hazardous ground gas accumulation within confined spaces posing risks to human health;
- Introducing polluting substances to the Site via leaks and spills to ground associated with vehicles and chemical/waste storage areas; and
- Potential for ground instability impacting construction workers.

Operational Phase

- Ongoing pollution to groundwater and surface water due to insufficient drainage across the site;
- Potential exposure of future site occupants to contaminants;
- Potential risk of hazardous ground gas including radon ingress into future properties and associated effects on the health of future site users and third parties if protection measures are not correctly installed and verified; and
- Ongoing stability issues associated with the escarpment to the west and north of the site impacting future site users.

Aspects Scoped out of the Assessment

8.3.41 The following aspects have been scoped out of the assessment based on the findings of the Desk Study (Appendix 8.1):

- The effect on statutory and non-statutory sites of geological importance as no sites have been identified on site or within the wider study area;
- The effect of best and most versatile agricultural land as there is no agricultural land on site; and
- The effect on the groundwater and surface water abstractions upgradient of the site.

Receptors Attribute Importance

8.3.42 Table 8.7 provides a summary of the potential sources of contamination and the likely nature of such sources, both on site and in the immediate surrounds.

Table 8.7: Receptors Attribute Importance

Attribute / Receptor	Justification	Attribute Importance (Sensitivity)
Geology & Geomorphology	There are no geological Sites of Special Scientific Interest (SSSIs) and there are no known RIGS (also known as Local Geological Sites) within the study area. These have been scoped out of the assessment going forward.	**Negligible**
Mineral Resources	Site is in a LDP Safeguarded Mineral Area for Category 2 (local importance) limestone. Brick clay is also present at the site. Due to the former and current site uses, and environmental constraints extraction is not considered viable.	**Low**
Soil	No agricultural land. Mostly Made Ground across the site.	**Negligible**
Groundwater	It is likely that groundwater is migrating off site, however it is not thought that the groundwater is utilised in the surrounding area. The Mercia Mudstone (bedrock) and the Tufa (superficial deposits) are Secondary A Aquifers. The Tidal Flats are a Secondary undifferentiated Aquifer. There are no Source Protection Zones (SPZ) within 1km of the site and the abstraction well is considered to be upgradient of the site.	**Medium**
Surface Water	The River Ely (a statutory main river) is adjacent to the site, which feeds the Cardiff Bay catchment, and further springs and drainage channels are noted in the south of the site. The two surface water abstractions, approximately 95m west of the site (for household water supply) are considered to be upgradient of the site.	**High**
Built Environment	The study area currently includes existing roads and commercial industrial properties, located in a predominantly commercial/industrial area, considered of low/medium sensitivity.	**Low**
End Users	The proposed future land use (i.e. residential) is considered likely to expose end users to land contamination. All relevant legislation, guidance and best practice will be adhered to throughout the construction phase and some risks can mitigated through design.	**High**
Construction Workers	Construction workers may be exposed to acute contamination associated with the land and water quality. However, earthworks are considered to be limited and health and safety protocols will be followed.	**Medium**

Attribute / Receptor	Justification	Attribute Importance (Sensitivity)
Surrounding land users	Land users to the east of site are users and workers of the industrial and commercial properties, beyond the main road, and are therefore considered low sensitivity. The nearest residential receptor is 100m west, approximately 75m higher topographically than the site are not anticipated to be affected by the site.	**Low**

Future Baseline Conditions

8.3.43 Should the site development not proceed, it is considered that the future baseline conditions in relation to ground conditions and contamination at the site would remain relatively unchanged (assuming there are suitable and appropriate environmental management controls in place at the site). The baseline is only likely to change in future if there are any pollution incidents, legislation updates (i.e. change in acceptable contamination concentrations in the environment), if new groundwater abstraction(s)/potable well(s) are installed close-by (meaning that the site could be then located within a SPZ) or if surrounding land-uses change.

8.3.44 With climate change, and the potential for rising surface water and groundwater levels, there could be an increased risk of leaching and mobilisation of contaminants from the Made Ground on the site towards the controlled waters.

8.4 Mitigation Measures Adopted as Part of the Project

8.4.1 Intrusive ground investigation work is required to characterise the existing ground conditions and test the pollutant linkages in relation to the preliminary Conceptual Site Model (CSM). This will include consideration of soil, groundwater, surface water, ground gas, and geotechnical parameters including slope stability.

8.4.2 A CEMP and emergency incident response plan will be required to outline the mitigation, control and monitoring measures to be put in place to minimise the impact of the proposed development on ground conditions, land quality and water resources during the construction process. An asbestos survey and demolition survey will be required on site prior to any development and an Asbestos Management Plan (AMP) may be necessary due to the landfill on site, and construction of current properties on site.

8.4.3 There is some potential for soils to be retained and re-used, either as part of the proposed development design, landscape works or elsewhere. The level of damage and deterioration in soil quality during storage and transit will depend on the types of earthworks machinery used, methods of handling and storage conditions. The geochemical and geotechnical suitability of soils for re-use will be assessed. A Materials Management Plan (MMP) will be necessary to undertake earthworks on the site if the reuse of material on site is considered suitable. A clean capping layer of soil may need to be imported to site, to mitigate potential flooding risk, but also as a barrier to human health receptors.

8.4.4 The following section sets out the likely effects of the site development to sensitive receptors in accordance with the methodology set out in this chapter and in the absence of mitigation. It is assumed that future construction works at the site will be undertaken in accordance with legislative requirements, statutory and regulatory guidance and industry best practice e.g. Personal

Protective Equipment (PPE) will be used appropriately for construction workers, and visitor access will be restricted during works.

8.5 Assessment of Construction Effects

Mineral Resources

8.5.1 The sensitivity of the mineral resources (Category 2 limestone and brick clay) is considered to be **low** as mineral extraction is not considered viable due to the former and current land uses sterilising the site currently, and environmental constraints at the site for future sterilisation. This is anticipated to be **no change** impact and a direct, local, permanent **no change** effect.

Land and / or Water

8.5.2 The sensitivity of the land and water at the site is considered to be **medium** based on the Secondary Aquifer classification**.** The use of machinery and plant associated with construction activities (including the establishment of a site compound and storage of any chemicals or fuels) could give rise to a pollution risk to soils, groundwater and surface water features through incorrect storage/transport/use of materials, including accidental fuel / oil and chemical spills and leaks. Soils impacted by pollutants may represent a source of contamination to controlled waters via leaching or run-off directly into surface water bodies. This is anticipated to be a **negligible adverse** impact following embedded mitigation, including the implementation of a CEMP, with a **negligible / minor** adverse effect.

8.5.3 This is considered to be a direct, local, short to medium term and temporary effect.

Groundwater

8.5.4 The superficial Tidal Flats are classified as a Secondary Undifferentiated Aquifer, and the Tufa, as a Secondary A Aquifer. The bedrock of the Mercia Mudstone and the Blue Anchor Formation are both classified as Secondary B Aquifers. An abstraction well is located 105m west of the site, however that is considered upgradient of the site and unlikely to be impacted. The overall sensitivity of the groundwater is considered to be **medium**.

8.5.5 Piling is anticipated to be required as part of the construction works, and as such there is potential for impact to groundwater quality depending on construction methods. Contamination is anticipated to be within the Made Ground on site, therefore the potential magnitude of impact is considered to be **medium adverse**, and the significance of effect **moderate adverse**.

8.5.6 This is considered to be a direct, local, short to medium term and temporary effect.

Surface Water

8.5.7 There is the potential for any excavations to require dewatering. Water pumped from excavations may contain contaminants, which if not managed appropriately could result in discharge to surrounding surface watercourses.

8.5.8 Due to the close proximity, the River Ely and the on-site springs are susceptible to chemical and physical pollution (i.e. sedimentation and siltation) generated by earthworks associated with the construction phase of the site development.

8.5.9 Activities such as materials handling, stockpiling and generating formation levels have the potential to generate surface water run-off during periods of inclement weather if not managed appropriately, which then has the potential to impact surrounding surface watercourses. Earthworks and vehicle movements resulting in damage to soil structure may generate increased sedimentation within surface run-off. In addition, during periods of dry, windy weather wind-blown dusts generated by the excavation and movement of soils have the potential to directly reduce the quality of surface water features. Sediments entering watercourses via surface water run-off /

wind-blown dusts could cause increased sediment loads potentially resulting in effects such as increased turbidity and a reduction in dissolved oxygen.

8.5.10 Increased surface water sediment content has the potential to subsequently affect the chemical and biological quality of surface water receptors. The biological quality could be affected indirectly through sediment smothering feeding and breeding grounds and physically altering the habitat. The River Ely feeds into Cardiff Bay Barrage but is not ecologically designated as a protected site.

8.5.11 It should be noted that the surface water abstraction is upgradient of the site so is not anticipated to be affected.

8.5.12 The sensitivity of controlled water bodies is considered to be **high**, and the magnitude of change following the embedded mitigation (emergency incident response plan and CEMP in place), is considered to be **low adverse**. Therefore, there is likely to be a direct, temporary, short to medium term effect on controlled water receptors of **minor or moderate** significance prior to the implementation of mitigation measures.

Built Environment

8.5.13 There is a potential for Made Ground to contain chemicals destructive to concrete (e.g. sulphates and acids) with the potential to constrain the design of the development. The sensitivity of this receptor, including potable water pipes, is considered to be **high**.

8.5.14 However, it is assumed that laboratory data will be available at the detailed design stage to enable selection of suitably resistant construction materials. The risk category for this potential contaminant linkage in the Phase 1 PRA was considered a low risk.

8.5.15 Ground stability issues are associated with the compressibility and differential settlement concerns across the site, and the 8 to 9m high landfilled material soil embankment in the north. Unstable ground workings could lead to injuries or fatalities and loss/damage to plant and structures. These risks will be addressed and characterised at the ground investigation stage and are therefore considered to be designed out within embedded mitigation (**no change**).

8.5.16 On the basis that a ground investigation will be undertaken to inform detailed design and the data obtained used to design out adverse effects on the built environment, there will be **no change** to built environment receptors and the effect of the proposed development on the built environment will be **no change** in the construction phase.

Human Health: Construction workers

8.5.17 Excavation of potentially contaminated soils (including asbestos) could pose a health risk to workers and third parties involved in site preparation, earthworks and construction. Potential pathways include dermal contact (i.e. direct skin contact with contaminated soils and groundwater), ingestion (e.g. via the transfer of contaminated soils from unwashed hands during eating) and inhalation of dusts or fibres (i.e. breathing in contaminated dusts and particulate matter generated by excavation activities, potentially including asbestos).

8.5.18 Potential sources of ground gas have been identified associated with the site, primarily relating to on and off site historic landfills and the intermediate probability of radon. Construction workers are considered to be susceptible to exposure to hazardous gases and/or depleted oxygen levels within excavations or confined spaces associated with the earthworks and installation of any below ground infrastructure (i.e. drainage chambers).

8.5.19 Although there is potential to cause a direct, localised impact to the health of construction workers from exposure to substances in soil, gas or groundwater, ground works is considered to be limited, and this will be mitigated through the embedded mitigation, and adherence to all relevant guidance and legislation and therefore considered of **medium** sensitivity.

8.5.20 There will be **negligible adverse** in the construction phase. The potential effect of the proposed development will therefore be direct, temporary, short to medium term effect **negligible or minor adverse** in the construction phase.

Human Health: Surrounding Land Users

8.5.21 The surrounding land users are predominantly industrial/commercial, beyond the main road and are considered to be **low sensitivity**.

8.5.22 Dust may be created during construction works, however the nearest residential receptors is 100m west, up a 75m escarpment and the nearest commercial/industrial receptor is approximately 100m east, beyond the main road and therefore there is considered to be **no change**.

8.5.23 The potential effect of the proposed development is therefore **no change** in the construction phase.

Further Mitigation

8.5.24 It is assumed that remedial measures outlined within a Remediation Strategy (if required) will be undertaken in the construction phase. These may include incorporating a clean cover layer in any garden areas, the installation of a ground gas membrane into new buildings and appropriate management of the asbestos fibres during the earthworks phase. It will be the responsibility of the Principal Contractor, in accordance with CDM 2015 Regulations, to ensure that a safe working system is in place to deal with the potential risk of asbestos and any other identified contamination.

8.5.25 In the event that elevated concentrations of ground gas is identified, where entry into confined spaces and/or excavations is required by construction workers, a combination of protection will be utilised. This includes the use of appropriate PPE, monitoring equipment, safe entry procedures and Respiratory Protective Equipment (RPE) to mitigate the potential risk of exposure to hazardous gas / vapour and / or depleted oxygen. All works will be conducted in line with the Health and Safety Executive publication ‘Safe Work in Confined Spaces’ and CDM Regulations 2015.

8.5.26 To protect the controlled water receptors, a temporary drainage strategy should be implemented during the construction phase as part of the design solution.

8.5.27 A piling risk assessment should be completed to demonstrate that there will be no unacceptable risk to groundwater from the proposed development should piling be required, and justification of the choice of piling methodology.

8.5.28 All equipment, materials and chemicals will be stored, if practicable, at a suitable distance away from surface watercourses (greater than 10m). Chemicals, fuel and oil stores will be sited on bunded areas. Standing machinery will have drip trays placed underneath to prevent oil or fuel leaks causing pollution. Refuelling of vehicles and machinery will be carried out in one designated area comprising an impermeable surface a suitable distance away from surface water bodies, spill kits will be located close by in the event of a spill.

8.5.29 On-site welfare facilities will be adequately designed and maintained to ensure sewage is disposed of appropriately. The use of wet concrete around watercourses (<20m) will be minimised and carefully controlled.

8.5.30 Should unexpected contamination be encountered during the construction phase, or if remediation is identified as being required following the completion of a ground investigation, appropriate remediation/ mitigation measures will be implemented as part of the construction works, mitigating associated risk prior to the operational phase.

Future Monitoring

8.5.31 Verification and validation of the remediation strategy and MMP will be required throughout the construction phase of the works. Depending on the outcome of the ground investigation and assessment, monitoring of the controlled water receptors throughout the duration of the earthworks and verification of the installation of any gas protection measures is considered likely.

Accidents and/or Disasters

8.5.32 Service strikes (which may lead to electrocution, fires or explosions), contact with heavy plant, fuel spillages to ground from plant and machinery, and contact with potentially contaminated materials during earthworks are the main construction related hazards. It is assumed these will be mitigated through appropriate health and safety practices.

8.5.33 Due to the proximity of the River Ely, it is recommended that appropriate measures are put in place to prevent pollution incidents. In the case of any pollution events to the River Ely, NRW and Cardiff Council/ Vale of Glamorgan Council should be notified immediately.

8.6 Assessment of Operational Effects

Mineral Resources

8.6.1 During the operation of the site there is considered to be **no change** on the effect of mineral resources.

Land and / or Water

8.6.2 Given the primarily residential nature of the site development, the likelihood of significant leaks and spillages is considered unlikely.

8.6.3 The incorporation of landscaped areas may increase the infiltration rates through potentially contaminated soils towards groundwater during the operational phase. However, appropriate drainage should be incorporated into the design with a capping system, if required.

8.6.4 The sensitivity of the groundwater is considered to be **medium**, and the magnitude of impact is considered to be **negligible adverse,** if all mitigation measures during the construction phase are adhered to. The significance of effect is therefore considered to be direct, local, short term, **negligible / minor adverse**.

Groundwater

8.6.5 Following the completion of any remedial works (if required) and construction works, the operation of the site is considered to be **no change** on the effect.

Surface Water

8.6.6 The management of surface-water run-off along highways and access roads will be incorporated into the drainage design and implemented during the construction phase. The end use is proposed residential, with minimal likelihood of spills or leakages impacting on surface waters. Therefore, there will be **no change** in the operational phase.

8.6.7 The potential effect of the proposed development is therefore **no change** in the operational phase.

Built Environment

8.6.8 On the basis that all required ground investigation and assessment will be undertaken to inform detailed design and incorporated within the construction phase, there will be **no change** to built environment receptors in operational phase.

Human Health: Future Residents

8.6.9 The end users considered in this assessment are future residents in both high-rise apartment blocks, semi-detached and terraced housing with landscaped gardens (as most conservative approach) with potential for homegrown produce and are considered to be **high sensitivity**.

8.6.10 Based on the available baseline information there is the potential for localised contamination sources to be present with the potential to impact human health when exposed at the surface. If human health receptors (e.g. future site residents, visitors and any maintenance workers) are exposed to contaminants above threshold concentrations there is potential for both temporary and permanent health problems to arise dependent on a number of factors including type of potential contaminant, characteristics of receptor and duration of exposure.

8.6.11 The risk from ground gas and radon exists and should be refined further through intrusive investigation. It is considered that the risks from contaminated land will be mitigated during the construction phase.

8.6.12 With appropriate design, including ground gas and radon protection measures in the future dwellings. With appropriate remediation, including clean imported fill on landscaped areas/gardens, the impact is considered to be **negligible adverse** magnitude resulting in a **minor** effect, considered to be direct, local, and permanent.

Human Health: Surrounding Land Users

8.6.13 The surrounding land users are predominantly industrial/commercial, beyond the main road and are considered to be **low sensitivity**. There is considered to be **no change** in the operational phase.

Further Mitigation

8.6.14 Ground Investigation is required to refine the assessment of the effects mentioned above.

8.6.15 No mitigation measures will be necessary during the operational phase, assuming that all the mitigation measures relating to potential exposure to contamination have been implemented during the construction phase (e.g. capping system incorporated into any garden or landscaped areas, gas protection measures and appropriate water supply pipe specification).

8.6.16 Any maintenance / entry into confined spaces needs to follow appropriate health & safety legislation.

Future Monitoring

8.6.17 Future monitoring at the site is not considered necessary in the operational phase.

Accidents/Disasters

8.6.18 No accidents or disasters are considered likely in the operational phase.

Potential Changes to the Assessment as a Result of Climate Change

8.6.19 It is not expected that the potential effects of climate change will affect the above assessment for ground conditions. Water levels may rise however, the flooding model and drainage design should consider climate change and incorporate this into the design. Based on this, our assessment will remain unchanged.

8.7 Assessment of Cumulative Effects

8.7.1 A review of the proposed developments shows that there are no further proposed development within 1km of the site. The proposed developments between 1km – 5km are predominantly residential, with two mixed use facilities and a hotel. The closest development (Ely Paper Mill), 1km north west of the site, and the only upgradient development is for a mixed use scheme comprising up to 900 dwellings, live/work units employment and associated commercial uses, new highway access and publicly accessible green space. This proposed site also lies adjacent to the River Ely and therefore the cumulative impacts of the effect on the surface water receptors should be considered.

8.7.2 If silting and sedimentation, or any direct run-off of spills and leakages were to occur from the construction works on this proposed development for Ely Paper Mill, the cumulative effect could be detrimental further downstream in the Cardiff Bay Barrage.

8.8 Inter-relationships

8.8.1 Effects to the groundwater and surface water will also be considered in the flooding and hydrology chapter.

8.9 Summary of Effects and Conclusion

8.9.1 Likely significant effects identified are principally associated with the construction phase and the contamination which may be caused by potential spills or leaks from construction plant, physical contamination caused by run-off containing a high percentage of sediment into the River Ely. Also, effects to construction workers following exposure to potentially contaminated material. There are no significant effects identified during the operational phase as the risks are anticipated to have been designed out or remediated prior to or during the construction phase.

8.9.2 Mitigation measures for the potential effects identified are generally inherent to the site development and are incorporated into the detailed design (such as drainage design) and RAMS and CEMP required for the Construction Phase. Should contamination sources be identified in subsequent plot specific phases of ground investigation mitigation measures will include the implementation of a remedial scheme in accordance with a site-specific remediation strategy; mitigation measures may, for example, include the provision of a capping layer across garden and landscaped areas.

8.9.3 A summary of the effects is presented in Table 8.8.

8.10 References

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- Environment Agency (2004) Model Procedures for the Management of Contaminated Land (CLR11).
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- The Water Environment (Water Framework Directive) (England and Wales) Regulations, 2017 (2000/60/EC);
- Dangerous Substances Directive (Amendment), 2006;
- Environmental Damage (Prevention and Remediation) (Wales) (Amendment) (EU Exit) Regulations, 2019;
- The Environmental Permitting (England and Wales) (Amendment) (EU Exit) Regulations, 2019;
- Control of Asbestos Regulations, 2012,
- Contaminated Land (Wales) (Amendment) Regulations, 2012
- Construction (Design & Management) (CDM) Regulations, 2015.

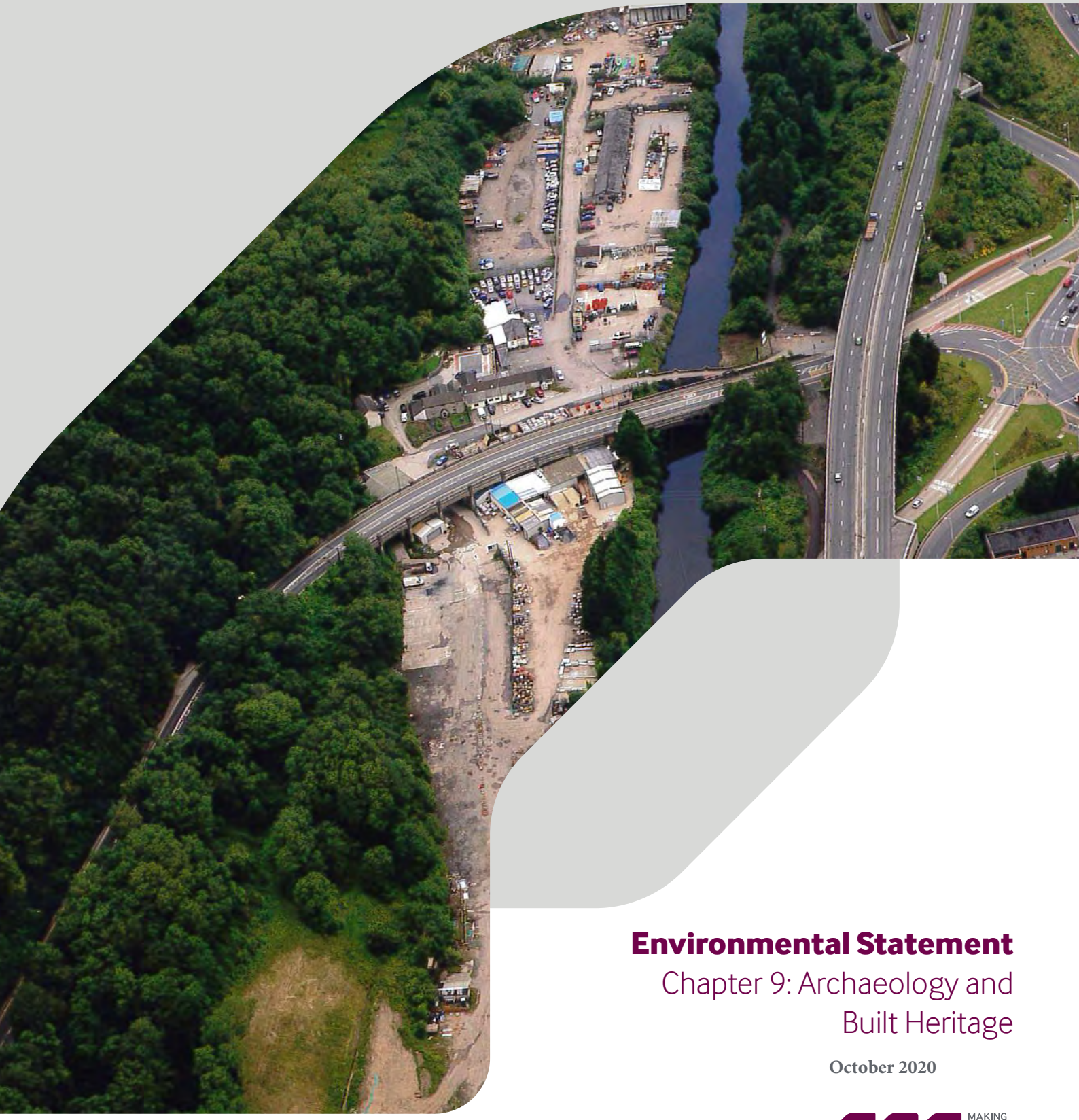
Table 8.8: Summary of Likely Environmental Effects on [insert topic]

Receptor	tivity of receptor	ription of impact	/ medium / long term	nitude of impact	cance of effect	ificant / Not significant	Notes
Construction phase							
Mineral Resources	Low	Sterilisation of resource	Permanent	No change	No change	Not significant	Extraction unlikely due to environmental constraints at the site.
Land and /or Water	Medium	Spills and leakages from plant polluting soils, groundwater and surface water	Short to medium term	Negligilbe adverse	Negligible / Minor	Not significant	Appropriate measures should be taken to avoid controlled waters pollution.
Groundwater	Medium	Creation of preferential pathways dependent on construction methods.	Short to medium term	Medium adverse	Moderate	Not significant	A piling works risk assessment should be undertaken and montiroing during the construction period may be required.
Surface Water	High	Silting and sedimentation entering river through surface run off.	Short and medium term	Low adverse	Minor / Moderate	Not significant	Appropriate measures should be taken to avoid controlled waters pollution including CEMP and emergency incident response plan
Built Environment	High	Chemical attack on concrete and ground stability issues	Long term	No change	No change	Not significant	Ground investigation necessary to appropriately design out this risk
Human Health (construction workers)	Medium	Exposure to contaminated material/ ground gases to construction works.	Short term	Negligible adverse	Negligible / Minor	Not significant	Health and safety procedures in accordance with CDM 2015 based on the ground conditions and potential sources of contamination. Remediation strategy and remediation works to be undertaken if required.
Human Health (Surrounding land users)	Low	Exposure to wind blown dust from construction site	Short term	No change	No change	Not significant	Appropriate measures should be taken to avoid wind blown pollution.

Receptor	tivity of receptor	ription of impact	/ medium / long term	nitude of impact	cance of effect	ificant / Not significant	Notes
Operational phase							
Mineral Resources	Low	Sterilisation of resource	Permanent	No change	No change	Not significant	-
Land and /or Water	Medium	Significant spills and leaks unlikely given nature of development	Short term	Negligible adverse	Negligible / minor	Not significant	Mitigation measures included within construction phase. Ongoing pollution during the operation phase is unlikely.
Groundwater	Medium	Spills and leakages from plant leaching into groundwater/ creating direct pathways.	Short term	No change	No change	Not significant	Ongoing pollution to groundwater is unlikely. A period of post construction monitoring may be required.
Surface Water	High	Silting and sedimentation entering river through surface run off.	Short term	No change	No change	Not significant	It is unlikely that ongoing pollution to the surface waters will occur in the operational phase.
Built Environment	High	Chemical attack on concrete and ground stability issues.	Long term	No change	No change	Not significant	Ground investigation necessary to appropriately design away this risk
End Users (future residents)	High	Exposure to contaminated material/ ground gases to residents.	Long term	Negligible adverse	Minor	Not significant	This risk rating assumes mitigation in design and remediation of the ground during construction works
Human Health (Surrounding land users)	Low	Exposure to pollutants from the development	Short Term	No change	No change	Not significant	-

Leckwith Quays

Leckwith Road, Cardiff



Environmental Statement

Chapter 9: Archaeology and Built Heritage

October 2020

rpsgroup.com

Mr Phil Worthing

9 ARCHAEOLOGY

9.1 Introduction

9.1.1 This chapter considers the likely effects on the historic environment which can be expected to arise as a result of the proposed development. Forty-two sites of direct archaeological interest were identified within a study area, including five new sites and additionally but indirectly, viewsheds from two Registered Historic Parks and Gardens namely Gm 71 Thompson's Park (Sir David's Field) and Gm 73 Fairwood House, Cardiff.

9.1.2 Ten sites are directly within the proposed development area including Scheduled Monument and Grade II* Listed Building Leckwith Bridge (GM014/ 0134S/ LB13748/ LB26487/ 24126), Leckwith New Bridge and Viaduct (307689), Limekiln (04120s) Structures (04122s, 04125s) and five new sites - LQ001 (Leckwith Bridge Public House), LQ002 (Old Weir), LQ003 (Cottage), LQ004 (Milestone) and LQ005 (Drain cover). It is considered that any proposed development will have a 'Major to Minor' effect on these identified sites.

9.1.3 Any such archaeological mitigation works should be tailored to detailed construction proposals and will be determined by the LPA.

9.1.4 Further consultation with Cadw is also required regarding proposed mitigation measures for Scheduled Monument and Grade II* Listed Building Leckwith Bridge (00134S/GM014/LB13748/LB26487/24126).

9.1.5 This study has been undertaken to the professional standards of the Chartered Institute for Archaeologists and is intended to meet the Standards and Guidance for Historic Environment Desk-based Assessments (2017).

9.2 Assessment Methodology

Assessment criteria

9.2.1 The desk-based assessment comprises a review of existing information about the archaeological resource within a 750m study area around the development site, centred on NGR ST 15884 75224 (Figure 9.1). The assessment is intended to conform to the Chartered Institute for Archaeologists Standards and Guidance for Historic Environment Desk-based Assessments (2017).

9.2.2 The information recorded on the regional Historic Environment Record (HER, Enquiry Reference: 5769) and National Monuments Record (NMR – Curated by the Royal Commission on the Ancient and Historical Monuments of Wales, Enquiry Reference: RC18-0239) was assessed. Cartographic and documentary sources were referred to, along with relevant published information. Current Listed Building data and information on Scheduled Ancient Monuments and Registered landscapes was obtained from Cadw. Collections of aerial photographs held by the Central Register of Air Photography for Wales (CRAPW) were examined (Enquiry Reference: W-AP-PR 18-083).

Direct effects (Monuments)

9.2.3 The archaeological sites within the study area are categorised in accordance with the only available criteria that are nationally agreed; these values are set out in the Department of

Transport/Welsh Office/Scottish Office Design Manual for Roads and Bridges paragraph 3.4 Vol. 11 Section 3 Part 2 (HA 208/07 Cultural Heritage).

- Category A: national importance
- Category B: regional importance
- Category C: local importance
- Category D: low importance
- To these an additional category has been added
- Category U: unknown

9.2.4 The assessment of the importance of individual sites is essentially a subjective exercise based upon the experience of the project team. The importance of certain sites will be implied by their status within the statutory framework. Scheduled Monuments will always be of national importance; Listed Buildings will be of at least regional importance. Values assigned to other sites are given both in relation to their individual importance and to their context within the wider landscape.

9.2.5 The condition of individual sites and the general overall condition of surviving remains has bearing on the value of the sites themselves and on the value that they impart within a wider landscape context. The condition of sites is recorded following the system used by the GGAT HER, using the following criteria:

- Intact: the site is intact
- Near intact: the site is nearly intact
- Damaged: the site has been moderately damaged
- Near destroyed: the site has nearly been destroyed
- Destroyed: the site has been destroyed
- Restored: the site has been restored
- Moved: the site has been moved (usually finds)
- Not known: the condition of the site is not known

9.2.6 For the purposes of desk-based assessments, rarity is assessed at regional level only. The following criteria are used:

- High: very few sites of this type are known
- Medium: the site is not unusual, but cannot be considered common
- Low: the site is quite common

9.2.7 Group association is where a connection between sites within the landscape can be demonstrated. These will usually be of the same period, but may include groups where the presence of an earlier site or sites has led to the formation of a later complex, or where an earlier site or sites can be shown to have acquired importance as part of a later complex. The criteria are as follows:

- High: the site forms part of an interconnected complex occupying a clearly definable landscape where little or no fragmentation has occurred

- Medium: the site is part of an interconnected complex, which is either limited in scope or badly fragmented
- Low: there are few or no other sites, which are associated

9.2.8 Historical association is where there is a link between the site and known historical or cultural persons or events. Prehistoric sites, which are by definition before historical evidence, cannot have any contemporary historical association, but they may acquire later associations. For the Roman and Early-medieval periods, where survival of historical evidence is poor and patchy, any contemporary documentation at all will be important. Two classifications are given for historical association, one reflecting the certainty of the identification, and the other its importance. Only sites with certain or possible association can be assessed for importance, and historical association can only increase the importance of a site; the absence of it will never decrease its importance.

9.2.9 Historical association- identification

- Certain
- Possible
- Unknown

9.2.10 Historical association- importance

- High
- Medium
- Low

9.2.11 The assignment of values to identified interests requires consideration of the reliability and accuracy of the source data, ranging from fully-recorded features seen in open excavation to antiquarian comments on finds of note from a poorly-defined location.

9.2.12 The confidence with which the values have been assigned is noted, using the following criteria:

- High: existing information is reliable and detailed
- Medium: existing information is apparently reliable but limited in detail
- Low: existing information is too limited to allow its reliability to be assessed

9.2.13 The effect of the proposal on the archaeological resource has been assessed using the following criteria:

- Severe: total loss
- Major: significant loss, likely to result in a reduction of value of the surviving site
- Minor: loss unlikely to result in a reduction of value of the surviving site
- None: no identifiable effect
- Beneficial: development will protect, preserve or enhance the site better than if the development did not occur

Indirect Effects (Monument and Landscape settings)

9.2.14 Indirect effects identified for the archaeological resource include those of visibility and setting issues. Only monuments of National and Regional importance with a direct visual significance will be assessed for indirect effects. If the development is situated within (or sometimes in close

proximity to) a Registered Historic Landscape then an ASIDOHL2 (Assessment of the Significance of the Impact of Development on Historic Landscape) assessment is usually required.

9.2.15 The following indirect visual assessment does not conform to the full ASIDOHL2 methodology. However, in order to ensure a thorough evaluation, indirect effects have been assessed employing the principles of ASIDOHL2.

9.2.16 Indirect effects to category A and B sites will be measured against criteria for the assessment of indirect, visual impacts based upon the ASIDOHL2 methodology in Guide to Good Practice on Using the Register of Landscapes of Historic Interest in Wales in the Planning and Development Process (2nd Edition 2007). The grading for the assessment is as follows:

- Very severe: the setting of, key views and/or essential lines of sight to and from the monument are dominated or obscured by the development. The form, scale and appearance, including motion, of the development, compromise the cultural integrity of the monument and its setting resulting in severance of historical links and/or degradation of an unaltered setting.
- Severe: the setting of, key views and/or essential lines of sight to and from the monument are interrupted by the development. The form, scale and appearance, including motion, of the development, largely affects the cultural value of the monument and its setting resulting in possible severance of historical links and/or uncharacteristic change to a largely unaltered setting.
- Considerable: the development is significantly visible in or interrupts the setting of, key views and/or essential lines of sight to and from the monument. The form and appearance, including motion of the development results in discordance with the monument and change to a largely unaltered setting.
- Moderate: the development is visible in key views and/or essential lines of sight to and from the monument and its setting. The form and appearance, including motion of the development results in discordance with the monument and/or alteration to its setting.
- Slight: the development is noticeable in key views and/or essential lines of sight to and from the monument and its setting. The form and appearance, including motion of the development is noticeable and results in minor alteration to the setting of the monument.
- Very slight: the development is barely noticeable within the setting of, key views and/or essential lines of sight to and from the monument. The setting is already largely altered and unsympathetic and/or the form and appearance, including motion of the development is barely noticeable and results in little discernible change to the setting.
- None: the development is not noticeable within the setting of, key views and/or essential lines of sight to and from the monument. The setting is already altered and unsympathetic and/or the form and appearance, including motion of the development is not noticeable and results in no discernible change to the setting.
- The assessment of individual sites is essentially a subjective exercise based upon the experience of the project team. The following aspects will be considered when determining the results of the assessment.

9.2.17 Any potential impacts that the development may have on the relationships of the monument to its surrounding landscape, including other monuments.

9.2.18 The nature, extent and intrinsic value of the monument's setting, including its role in relation to the monument; the impact to both the immediate, essential setting and the wider setting is considered.

9.2.19 Interference with the inter-visibility between the monument and other related monuments or particular landscape elements, impact to key viewpoints, vistas and lines of sight.

9.2.20 The purpose of the monument and significance of views to and from it will be considered in terms of visual intention. Whilst the location, construction and function of some monuments were specifically chosen to afford views of a particular area or monument(s), others may instead have been the targets of observation. The visual impact of the development in terms of form, scale, appearance and the effect of movement of constituent parts as well as the extent of encroachment of the development into the setting (both immediate and wider) of the monument should be considered.

9.2.21 Impacts to the direct lines of sight as well as impacts upon wider views of monuments will be determined and graded using the categories described above (very severe down to very slight).

Indirect Effects (Monument and Landscape settings)

9.2.22 Indirect effects identified for the archaeological resource include those of visibility and setting issues. Only monuments of National and Regional importance with a direct visual significance will be assessed for indirect effects. If the development is situated within (or sometimes in close proximity to) a Registered Historic Landscape then an ASIDOHL2 (Assessment of the Significance of the Impact of Development on Historic Landscape) assessment is usually required.

9.2.23 The following indirect visual assessment does not conform to the full ASIDOHL2 methodology. However, in order to ensure a thorough evaluation, indirect effects have been assessed employing the principles of ASIDOHL2.

9.2.24 Indirect effects to category A and B sites will be measured against criteria for the assessment of indirect, visual impacts based upon the ASIDOHL2 methodology in Guide to Good Practice on Using the Register of Landscapes of Historic Interest in Wales in the Planning and Development Process (2nd Edition 2007). The grading for the assessment is as follows:

Table 9.1: Assessment of indirect, visual impacts based upon the ASIDOHL2 methodology

Very severe	The setting of, key views and/or essential lines of sight to and from the monument are dominated or obscured by the development. The form, scale and appearance, including motion, of the development, compromise the cultural integrity of the monument and its setting resulting in severance of historical links and/or degradation of an unaltered setting.
Severe	The setting of, key views and/or essential lines of sight to and from the monument are interrupted by the development. The form, scale and appearance, including motion, of the development, largely affects the cultural value of the monument and its setting resulting in possible severance of historical links and/or uncharacteristic change to a largely unaltered setting.
Considerable	The development is significantly visible in or interrupts the setting of, key views and/or essential lines of sight to and from the monument. The form and appearance, including motion of the development results in discordance with the monument and change to a largely unaltered setting.
Moderate	The development is visible in key views and/or essential lines of sight to and from the monument and its setting. The form and appearance, including motion of the development results in discordance with the monument and/or alteration to its setting.
Slight	The development is noticeable in key views and/or essential lines of sight to and from the monument and its setting. The form and appearance, including motion of

	the development is noticeable and results in minor alteration to the setting of the monument.
Very Slight	The development is barely noticeable within the setting of, key views and/or essential lines of sight to and from the monument. The setting is already largely altered and unsympathetic and/or the form and appearance, including motion of the development is barely noticeable and results in little discernible change to the setting.
None	The development is not noticeable within the setting of, key views and/or essential lines of sight to and from the monument. The setting is already altered and unsympathetic and/or the form and appearance, including motion of the development is not noticeable and results in no discernible change to the setting.

9.2.25 The assessment of individual sites is essentially a subjective exercise based upon the experience of the project team. The following aspects will be considered when determining the results of the assessment.

- Any potential impacts that the development may have on the relationships of the monument to its surrounding landscape, including other monuments.
- The nature, extent and intrinsic value of the monument's setting, including its role in relation to the monument; the impact to both the immediate, essential setting and the wider setting is considered.
- Interference with the inter-visibility between the monument and other related monuments or particular landscape elements, impact to key viewpoints, vistas and lines of sight.

9.2.26 The purpose of the monument and significance of views to and from it will be considered in terms of visual intention. Whilst the location, construction and function of some monuments were specifically chosen to afford views of a particular area or monument(s), others may instead have been the targets of observation. The visual impact of the development in terms of form, scale, appearance and the effect of movement of constituent parts as well as the extent of encroachment of the development into the setting (both immediate and wider) of the monument should be considered.

9.2.27 Impacts to the direct lines of sight as well as impacts upon wider views of monuments will be determined and graded using the categories described above (very severe down to very slight).

Hedgerow Regulations

9.2.28 The Environment Act 1995 (section 95) allowed regulations to be drawn up to protect important hedgerows from activities that were not subject to planning consent. The Environment Act 1995 Hedgerow Regulations 1997 were specifically intended to provide objective criteria of importance which could be applied consistently across England and Wales. Thus although administered by the local planning authorities, the opportunity to develop local criteria for protection was restricted to designation as a key landscape characteristic for development control purposes (Section7b ii) by the relevant date (April 1997). The regulations permit the removal of any hedgerow (including any stretch of hedgerow) for 'carrying out development for which planning permission has been granted' on the basis that the development control process provides a framework for weighing up the loss of hedgerows against the benefits of a proposal. Thus in such a context the significance of surviving hedgerows needs to be considered.

9.2.29 The regulations were the subject of a review by the Department of the Environment, Transport and the Regions, Review of the Hedgerow Regulations 1997 (1998), which suggested a simplified set of criteria, notably to include all pre-1845 or pre-1800 hedgerows where the field system is substantially complete. The Government noted the proposed changes but has not

endorsed them (The Government's response to the Environment, Transport and Regional Affairs Committee's Report 'The Protection of Field Boundaries' 1999). The 1997 criteria therefore remain in force. Judicial Review of the application of the regulations (Flintshire County Council v NAW and Mr J T Morris) has clarified the interpretation of some of the criteria.

- The criteria of historic importance in The Hedgerow Regulations 1997 can be summarised as:
- marking a parish or township boundary
- incorporating or associated with a Scheduled Monument or site on the SMR at the relevant date
- marking a pre-1600 AD manor or estate boundary, or related to a building of such a manor or estate
- part of a field system pre-dating 1845 shown on a map in a Record Office
- part of a pre-1845 field system that is substantially complete
- part of a pre-1845 field system where the pattern was identified in 1997 as a key landscape characteristic

9.3 Assessment Criteria and Assignment of Significance

Significance of Effects

9.3.1 The significance of effect can be assessed by evaluating the value of an asset against the effect of the proposal. The below table is meant to guide the assessment but professional judgement should be used in the process. The effects can be adverse or beneficial.

9.3.2 The significance of effects is classified as very large, large, moderate, slight or negligible. Major and moderate effects are considered to be significant for the purposes of this assessment.

Table 9.2: Significance of Effect Matrix based on DMRB Chapter 5 Table 5.1

		Effect				
		None	Negligible	Minor	Moderate	Major
Value of Asset	A	Neutral	Slight	Moderate/Large	Large/Very Large	Vary Large
	B	Neutral	Slight	Moderate/Slight	Moderate/Large	Large/Very Large
	C	Neutral	Neutral/Slight	Slight	Moderate	Moderate/Large
	D	Neutral	Neutral/Slight	Neutral/Slight	Slight	Slight/Moderate
	E	Neutral	Neutral	Neutral/Slight	Neutral/Slight	Slight

9.4 Planning Policy Context

Planning Policy Wales 2018

9.4.1 Planning Policy Wales (PPW, (Edition 10, Chapter 6, section 6.1)) deals with the protection of the historic environment in Wales. This sets out the land use planning policies of the Welsh Assembly Government. The Objectives of PPW are to:

- the general well-being of present and future generations;
- understand that the historic environment is a finite, non-renewable and shared resource and a vital and integral part of the historical and cultural identity of Wales
- recognise its contribution to economic vitality and culture, civic pride, local distinctiveness and the quality of Welsh life, and its importance as a resource to be maintained for future generations;
- Cadw's published Conservation Principles highlights the need to base decisions on an understanding of the impact a proposal may have on the significance of an historic asset.
- protect the Outstanding Universal Value of the World Heritage Sites in Wales;
- conserve archaeological remains, both for their own sake and for their role in education, leisure and the economy;
- safeguard the character of historic buildings and manage change so that their special architectural and historic interest is preserved;
- preserve or enhance the character or appearance of conservation areas, while at the same time helping them remain vibrant and prosperous;
- preserve the special interest of sites on the register of historic parks and gardens; and
- protect areas on the register of historic landscapes in Wales.
- consideration of the setting of an historic asset which might extend beyond its curtilage;
- any change that impacts on an historic asset or its setting should be managed in a sensitive and sustainable way
- protection, conservation and enhancement of historic assets is most effective when it is considered at the earliest stage of plan preparation or when designing proposals new proposals
- must fully consider the impact on the historic environment and on the significance and heritage values of individual historic assets and their contribution to the character of place.

Relevant Guidance

9.4.2 The following legislation has been noted as relevant for the current assessment.

9.4.3 The Historic Environment (Wales) Act 2016

- The Act makes amendments to The Ancient Monuments and Archaeological Areas Act 1979 and to The Planning (Listed Buildings and Conservation Areas) Act 1990. It aims to deliver improved protection of scheduled monuments and listed buildings in Wales, to enhance the management of the historic environment and to establish a greater degree of transparency and duty regarding decisions that affect the historic environment. It also includes provisions concerning historic place names, a historic environment record for each local authority in Wales and for the formation of the Advisory Panel for the Welsh Historic Environment.

9.4.4 The Ancient Monuments and Archaeological Areas Act 1979

- The Act was introduced to make provision for the investigation, preservation and recording of matters of archaeological or historical interest and for the regulation of operations or activities affecting such matters. It necessitates Scheduled Monument Consent for any works of demolition, repair, and alteration that might affect a Scheduled Monument.
- The Act sets out a presumption in favour of preservation in-situ concerning sites and monuments of national importance.

9.4.5 The Planning (Listed Buildings and Conservation Areas) Act 1990

- The Act sets out the legislative requirements which must be regarded in the determination of any application affecting either listed buildings or a conservation area. The Act (Section 66) states that in considering whether to grant planning permission for development which affects a listed building or its setting, the local planning authority or, the Secretary of State shall have special regard to the desirability of preserving the building or its setting or any features of special architectural or historic interest which it possesses.

9.4.6 Technical Advice Notice (TAN) 24 2017

- The purpose of this TAN is to provide guidance on how the planning system considers the historic environment during development plan preparation and decision making on planning and Listed Building (LBC) to be used in conjunction with PPW. This guidance replaces Welsh Office Circulars 60/96, 61/96 and 1/98. The TAN provides specific guidance on how the following aspects of the historic environment should be considered: World Heritage Sites;
- Scheduled Monuments; archaeological remains; Listed Buildings; Conservation Areas; historic parks and gardens; historic landscapes; and historic assets of special local interest.

9.4.7 Standard and Guidance for historic environment desk-based assessment (CIfA)

- This guidance published in 2014 (updated 2017) applies to all types of non-intrusive assessment of the historic environment and aims to define a framework of study for carrying out and the reporting of desk-based assessments in line with the CIfA Code of conduct.

9.4.8 Conservation Principles for the Sustainable Management of the Historic Environment in Wales 2011 (Cadw)

- These principles provide the basis upon which Cadw discharges certain statutory duties on behalf of the Welsh Ministers. Conservation Principles should be used by others (including owners, developers and other public bodies) to assess the potential impacts of a development proposal on the significance of any historic asset/assets and to assist in decision making where the historic environment is affected by the planning process.

9.4.9 Setting of Historic Assets in Wales 2017 (Cadw)

- Cadw has published guidance for assessing the impacts of development on the setting of historic assets. It lays out the meaning behind the term ‘setting’ in relation to a historic asset and who and when the setting should be assessed. The guidance sets out a staged process of assessing the impact of change on a setting.
- Stage 1: Identify the historic assets that might be affected by a proposed change or development.
- Stage 2: Define and analyse the settings to understand how they contribute to the significance of the historic assets and, in particular, the ways in which the assets are understood, appreciated and experienced.

- Stage 3: Evaluate the potential impact of a proposed change or development on that significance.
- Stage 4: If necessary, consider options to mitigate or improve the potential impact of a proposed change or development on that significance.
- The guidance from Cadw states that Local planning authorities must consult Cadw on all planning applications which in their opinion are within the setting of a scheduled monument and meet certain criteria listed in the guidance document. Applications will need to include sufficient information to assess the impact of the proposal on the historic asset and its setting, but this should be proportionate to the likely impact of the proposal.

9.4.10 Local Development Plan (Cardiff)

- The Cardiff Local Development Plan 2006 - 2026 was adopted on January 2016. As one of the fastest growing cities in UK, it is vital that new development is guided by an up-to-date development plan. The LDP provides the necessary framework and certainty to bring forward the new homes (especially affordable/family housing) and jobs which are required in a managed manner.
- Policy KP17 Built Heritage states that Cardiff's distinctive heritage assets will be protected, managed and enhanced, in particular the character and setting of its Scheduled Monuments; Listed Buildings; Registered Historic Landscapes, Parks and Gardens; Conservation Areas;
- Locally Listed Buildings and other features of local interest that positively contribute to the distinctiveness of the city. This will be preserved or enhanced by;
- This Policy affords appropriate protection to these monuments and others that may be scheduled over the Plan period, as well as other important archaeological remains identified within the Historic Environment Record.
- Archaeologically Sensitive Areas will provide further guidance on four areas of the city where significant finds have been recorded. 109 Cardiff Local Development Plan 2006- 2026 Adopted Plan 4.
- This Policy affords appropriate protection to these statutory listed buildings and others that may be added to the list by Cadw over the Plan period.
- The Council also holds a Local List of Buildings of Merit. This Policy identifies the significance of these locally listed buildings (and others that may be added to the list by the Council over the Plan period) have in forming the character of the area.
- This Policy affords appropriate protection to these and other areas that may be designated by the Council over the Plan period. The Policy should be read in conjunction with the adopted Conservation Area Appraisal prepared for each area, including the enhancement proposals included within them.
- This Policy affords appropriate protection to these and other historic parks, gardens and landscapes that may be added to the register by Cadw/ICOMOS over the Plan period.

9.4.11 Local Development Plan (Vale of Glamorgan)

- The Vale of Glamorgan Local Development Plan 2011 - 2026 was adopted on 28th June 2017. The LDP became operative on its adoption and supersedes the previous adopted Unitary Development Plan (UDP). The LDP will be the basis for decisions on land use planning in the Vale of Glamorgan and will be used by the Council to guide and manage new development proposals.

- The Plan sets out the vision, objectives, strategy and policies for managing development in the Vale of Glamorgan, and contains a number of local planning policies and makes provision for the use of land for the purposes of housing, employment, retailing, recreation, transport, tourism, minerals, waste, and community uses. It also seeks to identify the infrastructure that will be required to meet the growth anticipated in the Vale of Glamorgan up to 2026, and provides a monitoring framework for assessing the effectiveness of the Plan.
- Policy MD8 states that development proposals must protect the qualities of the built and historic environment of the Vale of Glamorgan, specifically:
- Within conservation areas, development proposals must preserve or enhance the character or appearance of the area;
- For listed and locally listed buildings, development proposals must preserve or enhance the building, its setting and any features of significance it possesses;
- Within designated landscapes, historic parks and gardens, and battlefields, development proposals must respect the special historic character and quality of these areas, their settings or historic views or vistas;
- For sites of archaeological interest, development proposals must preserve or enhance archaeological remains and where appropriate their settings.

Study Area

9.4.12 The desk-based assessment comprises a review of existing information about the archaeological resource within a 750m study area around the development site, centred on NGR ST 15884 75224 (Figure 9.1).

Baseline Methodology

Sources

9.4.13 Sources Consulted for this assessment are as follows:

- Cadw- scheduled monuments, listed buildings and registered landscapes
- The Glamorgan-Gwent Archaeological Trust curators of the Historic Environment Record- non-designated assets (Ref: 6060)
- Royal Commission on the Ancient and Historical Monuments of Wales curators of the National Monuments Record- non-designated assets (Ref: RC19-0452)
- Central Register of Air Photography for Wales-aerial photographs (Ref: W-AP-PR 19-126)
- Glamorgan Archives- Cartographic and documentary sources, along with relevant published information.
- LiDAR Survey data available from the Welsh Government (lle.gov.wales)
- British Geological Survey (BGS) Geology of Britain viewer (geological data)
- Department of Transport/Welsh Office/Scottish Office Design Manual for Roads and Bridges paragraph 5.30 Vol. 11 Section 3 Part 2 (HA 208/07 Cultural Heritage).

Consultation

Table 9.3: Consultation Responses Relevant to this Chapter

	Consultee and Issues Raised	Where Addressed
Date	Consultee and Issues Raised	How/ Where Addressed
20th June 2019	**CADW:** Confirmed the following Cadw designated historic assets fall within the study area region; Listed Buildings 13748 Old Leckwith Bridge (partly in the Michaelston community) & 26487 Old Leckwith Bridge (partly in Canton Community), Scheduled Monument GM014 Leckwith Bridge, Non-statutory Registered Historic Parks and Gardens PGW (Gm) 71(CDF) Thompson's Park (Sir David's Field) (Significant View only) and PGW(Gm) 73(CDF) Fairwood House, Cardiff (Significant View only).	Issues were resolved with appropriately assessed mitigation responses (see section 9.4). CADW confirms no setting of heritage assets aside from Old Leckwith Bridge (GM014) will be affected within a 3km area of the proposed development.
20th June 2019	**CRAPW**: Provided aerial photographs of the area (B&W & Colour). These were examined, no new archaeological sites were identified.	Issues were resolved with appropriately assessed mitigation responses (see section 9.8).
20th June 2019	**HER**: Analysis of the regional HER provided us with 29 known sites of archaeological interest recorded.	Issues were resolved with appropriately assessed mitigation responses (see section 9.8).
20th June 2019	**RCAHMW:** Analysis of the RCAHMW datasets provided us with 10 known sites of archaeological interest recorded.	Issues were resolved with appropriately assessed mitigation responses (see section 9.8).
05th December 2019	**Vale of Glamorgan Council:** Screening Opinion provided.	All comments were assessed and have been resolved within this document.
04th February 2020	**Cardiff Council:** Screening Opinion provided.	All comments were assessed and have been resolved within this document.

Limitations of the Assessment

9.4.14 Limitations were encountered within the datasets received, as some were either poor in information or not available entirely.

9.4.15 These limitations have been managed and accounted for within the evaluated proposed mitigation (Section 9.4). This includes both where not enough information was provided for the known sites of archaeological interest, and any unknown sites of archaeological interest by means of an archaeological watching brief. If however, remains are encountered during the watching brief which are of such complexity or significance that the contingency arrangements would not be of sufficient scope, a meeting with the client, the LPA, their archaeological advisors

and any other parties that may be relevant to the issue, should be convened in order to agree on an appropriate strategy.

9.5 Baseline Environment

Current Baseline Conditions

9.5.1 This assessment is based on the results of the archaeological desk based assessment (Appendix 9.II). This work assessed the historic environment record, aerial photography, map regression and archive studies, for detail see Appendix 9.II. All historic assets in Table 9.4 have been depicted in Appendix 9.I Location Plan.

Future Baseline Conditions

9.5.2 Any effects of climate change and human health impacts regarding the historic assets and recommended mitigation measures is considered negligible.

Archaeological Interests

9.5.3 There are 42 sites of archaeological interest identified within the study area of 750m around the proposed development site centred on NGR ST 15884 75224 (Figure 9.1, Table 9.4).

9.5.4 Five digit numbers with a letter suffix (s) are Primary Record Numbers (PRNs) recorded in the regional HER. Five or six figure numbers without a letter suffix are National Primary Record Numbers (NPRNs) of the NMR, as supplied by the RCAHMW. A prefix of 'GM' indicates a Scheduled Monument and Listed Buildings are prefixed 'LB', as supplied to the HER by Cadw. Numbers with a 'LQ' prefix were new sites identified during the present assessment.

Table 9.4: Direct Archaeological Interests

NO.	ID	Site Name	Type	Period	NGR	Status
1	00074S	Findspot	Hoard	Bronze age	ST1674	
2	00134S/GM014//24126 LB13748/LB26487	Leckwith bridge	Bridge	Medieval	ST15907524	Scheduled monument & Listed building
3	00142S	Leckwith flats	Coin	Roman	ST166755	
4	00742S	St James's church at Leckwith	Church	Medieval	ST15797440	
5	01516S	Late bronze age-iron age hoard	Hoard	Bronze age	ST165755	
6	01605S/113	Ynyston farm	Farm	Medieval	ST16167453	
7	01929S	Remains of dam	Dam	Medieval	ST1623474064	
8	03238S	Leckwith top engine house,	Engine house	Post-medieval	ST15847420	
9	03239S	Leckwith top limekiln, Michaelston	Lime kiln	Post-medieval	ST15797421	
10	03240S	Leckwith top quarry, Michaelston	Quarry	Post-medieval	ST15837424	
11	03779S	Leckwith churchyard	Churchyard	Medieval	ST15797440	
12	03791S	Leckwith	Place name	Early medieval	ST15797440	
13	04119S	Leckwith bottom quarry	Quarry	Unknown	ST15777497	
14	04120S	Lime kiln	Lime kiln	Post-medieval	ST1585875115	
15	04121S	Structure	Structure	Unknown	ST1583675104	
16	04122S	Two structures	Structure	Unknown	ST1585975125	
17	04123S	Well	Well	Unknown	ST1590074796	
18	04124S	Clay pit	Clay pit	Post-medieval	ST1489675421	
19	04125S	Clay pit	Clay pit	Post-medieval	ST1499875657	
20	04126S	Llandaff and Dinas Powys sewage works	Sewage works	Post-medieval	ST1525375817	
21	04128S	Quarry in factory wood	Quarry	Post-medieval	ST161746	

NO.	ID	Site Name	Type	Period	NGR	Status
22	04167S	Barrage balloon mooring point, Lawrenny Avenue, Cardiff	Mooring bollard	Modern	ST1576875909	
23	04321S	Clay pit, Plymouth wood	Clay pit	Post-medieval	ST1497975642	
24	04322S	Clay pit	Clay pit	Post-medieval	ST1489975430	
25	05036S	Ninian Park section, 3rd western general hospital, Cardiff	Military hospital	Modern	ST167757	
26	05051S	Landsdowne road section, 3rd western general hospital, Cardiff	Hospital	Modern	ST1570176081	
27	05152S	Miles Master mk iii w8698 crash site	Air crash site	Modern	ST1675674871	
28	05459S	Lodge, Lansdowne hospital	Lodge	Modern	ST1561276144	
29	05615S	Building in factory wood, east of Leckwith	House	Post-medieval	ST1608674783	
30	414921	Cardiff City stadium	Recreational	Modern	ST16537556	
31	400204	Ynyston farm, barn	Farm	Post-medieval	ST16167449	
32	400193	Old rectory, Leckwith	Rectory	Post-medieval	ST15797434	
33	307689	Leckwith new bridge and viaduct, Leckwith, Cardiff	Bridge	Modern	ST15927523	
34	270537	Cube, Cardiff	Military	Modern	ST168744	
35	9312	St John's	Church	Post-medieval	ST1676	
36	265819	Woodlands, garden, Cardiff	Shop	Post-medieval	ST1581474722	
37	419538	Wholesale fruit centre; Bessemer Road market, Bessemer Road, Leckwith moors, Cardiff		Modern	ST1689074830	
38	LQ001	Leckwith bridge house	Public house	Unknown	ST1585975203	
39	LQ002	Old weir	Weir	Unknown	ST1582375267	
40	LQ003	Rectangular structure	Structure	Post medieval	ST1595675280	
41	LQ004	Milestone	Milestone	Post medieval	ST1595675280	
42	LQ005	Drain coverDr	Drain cover	Post medieval	ST1584075267	

Indirect Archaeological Interests

9.5.5 Sites Registered Parks and Garden GM71 and GM73 were not assessed as being direct sites of archaeological interest as they fall outside of the study and development area, however have been taken into consideration as the viewsheds fall within the study area.

Table 9.5: Indirect Archaeological Interests

ID	Name	NGR	Type	Period	Status
00134s/GM014/LB13748/LB26487/24126	Leckwith Bridge	ST15907524	Bridge	Medieval	SM/LB II
PGW (GM 71)	Thompson's Park (Sir David's Field)	ST13837873	Registered Park and Garden	Post medieval	Registered Park and Garden
PGW (GM 73)	Fairwood House, Cardiff	ST16117708	Registered Park and Garden	Post medieval	Registered Park and Garden

9.6 Assessment of construction effects

Table 9.6: Summary of likely construction effects on historic assets

Receptor	Sensitivity of receptor	Description of impact	Short/medium /long term	Magnitude of impact	Significance of effect
3047689- Leckwith New Bridge and Viaduct	High	Demolition	Long term	Low	Moderate/adverse
LQ001- Leckwith Bridge House	High	Demolition and/or all construction/ground breaking activities	Long term	Low	Major/adverse
00134S/GM014/LB13748/LB 26487/24126- Leckwith Bridge	High	Any construction activities and an effect on the setting of the viewsheds	Long term	Low	Minor/adverse
04120s- Lime Kiln	High	All construction/ground breaking activities	Long term	Low	Moderate/adverse
04122s- Two structures	High	All construction/ground breaking activities	Long term	Low	Moderate/adverse
04125s- Structure	High	All construction/ground breaking activities	Long term	Low	Moderate/adverse
LQ002- Old Weir	High	All construction/ground breaking activities	Long term	Low	Moderate/adverse
LQ003- Cottage site	High	All construction/ground breaking activities	Long term	Low	Moderate/adverse
LQ004- Milestone	High	All construction/ground breaking activities	Long term	Low	Moderate/adverse
LQ005- Drain	High	All construction/ground breaking activities	Long term	Low	Moderate/adverse
PGW (Gm 71)- Thompson's Park (Sir Davids Field)	High	Construction works may have an effect on the setting of the viewsheds	Long term	None	None

(PGW (Gm 73)- Fairwood House	High	Construction works may have an effect on the setting of the viewsheds	Long term	None	None
Unknown archaeological sites	High	All construction/ground breaking activities	Long term	Low	Moderate/adverse

Accidents and/or Disasters

9.6.1 There is potential for accidental damage to the scheduled monument (Leckwith Bridge (00134s/ GM014/ LB13748/ LB26487/ 24126, 307689) during construction. Consultation with CADW is required before construction. A reasonable fencing barrier has been a suggested mitigation, however it is expected that CADW will inform on any protective mitigation for the monument.

9.7 Assessment of operational effects

Table 9.7: Summary of likely operational effects on historic assets

Receptor	Sensitivity of receptor	Description of impact	Short/medium /long term	Magnitude of impact	Significance of effect
00134S/GM014/LB13748/LB 26487/24126- Leckwith Bridge	High	Any construction activities and an effect on the setting of the view sheds	Long term	Low	Slight
Unknown archaeological sites	High	All construction/ground breaking activities	Long term	Low	Moderate/adverse

Further Mitigation

9.7.1 Further mitigation may be required if historic assets are encountered during the course of the archaeological works.

Future Monitoring

9.7.2 No further monitoring of the historic environment is envisaged, provided mitigation measures have been followed.

Accidents and/or Disasters

9.7.3 There is potential for accidental damage to the scheduled monument (Leckwith Bridge (00134s/ GM014/ LB13748/ LB26487/ 24126, 307689) during construction. Consultation with CADW is required before construction. It is expected that CADW will inform on any protective mitigations and measures for the monument.

Potential changes to the Assessment as a result of Climate Change

9.7.4 Any effects of climate change and human health impacts regarding the historic assets and recommended mitigation measures is considered negligible.

9.8 Assessment of cumulative effects

9.8.1 The development may have a slight effect on the setting of/and view sheds associated with the scheduled monument and listed building (00134S/GM014/LB13748/LB26487/24126) Leckwith Bridge located within the development area.

9.9 Inter-relationships

9.9.1 The Vale of Glamorgan scoping report has suggested that cross reference should be made from this chapter of the ES to the Landscape and Visual chapter.

9.10 Mitigation Measures Adopted as Part of the Project

9.10.1 It is considered that the proposed works will have a 'Major' effect on two sites of archaeological interest within the development area, Leckwith Bridge House (LQ001 and Leckwith New Bridge and Viaduct (307689).

9.10.2 A 'Minor' effect has been considered on the sites of Leckwith Bridge (00134s/GM014/LB13748/LB26487/24126), Two Structures (04122S), Structure (04125s), Limekiln (04120s), Old Weir (LQ002), Structure (Possible Cottage) (LQ003), Milestone (LQ004), and Drain (LQ005).

9.10.3 The effect of potential development on sites Leckwith Bridge (00134s/ GM014/ LB13748/ LB26487/ 24126), Two Structures (04122S), Structure (04125s), Limekiln (04120s), Old Weir (LQ002), Structure (Possible Cottage) (LQ003), Milestone (LQ004), and Drain (LQ005) should be mitigated by means of an archaeological watching brief.

9.10.4 The effect of the proposed development on Leckwith Bridge House (LQ001) should be mitigated by means of a Level 3 building survey.

9.10.5 The effect of the development on Leckwith New Bridge and Viaduct (307689) and Drain (LQ005) should be mitigated by means of a photographic survey.

9.10.6 The proposed development encompasses the Scheduled Monument and Listed Building Leckwith Bridge (00134S/GM014/LB13748/LB26487/24126), and falls within the significant viewing lines of Thompson's Park (Sir Davids Field) (PGW (Gm) 71) and Fairwood House (PGW (Gm) 73). However, as the Listed Building Leckwith Bridge (00134S/GM014/LB13748/LB26487/24126) has already had the setting affected by surrounding development (such as the Leckwith New Bridge and Viaduct) its setting has already been compromised. CADW (Scoping Reports) have suggested that PGW (Gm) 71 and PGW (Gm) 73 will not be impacted by the development.

9.10.7 Secure protective barriers with appropriate signage to be placed at each end of Leckwith Bridge (00134S/GM014/LB13748/LB26487/24126) outside of the scheduled monument boundary, whereby no construction works will take place within this. Consideration for toolbox talks to be given to all contractors regarding the monument at induction stage. Provision for an archaeological watching brief should be made for anything outside of this immediate area. These measures should have to be agreed with Cadw prior to construction. Any works of any nature to the monument will require monument consent from Cadw beforehand.

9.10.8 Provided that the mitigation recommendation is followed, and in lieu of any further detailed construction plans, including any contingencies, then it should be possible to reduce the effect of any proposed the development on the archaeological resource.

Table 9.8: Table of Recommended Mitigation

ID	Name	Effect	Archaeological mitigation recommended
3047689	Leckwith New Bridge and Viaduct	Major	Photographic record prior to demolition
LQ001	Leckwith Bridge House	Major	Level 3 Building Survey
00134S/GM014/LB13748/LB26487/24126	Leckwith Bridge	Minor	Appropriate protective measures (such as a barrier and appropriate signage) to be constructed outside both ends of the bridge before works commence and maintained during all works (to be approved by CADW before works commence). Archaeological watching brief outside of the immediate area

04120s	Lime Kiln	Minor	Archaeological watching brief. Preservation in situ where possible, preservation by record if not.
04122s	Two structures	Minor	Archaeological watching brief. Preservation in situ where possible, preservation by record if not.
04125s	Structure	Minor	Archaeological watching brief Preservation in situ where possible, preservation by record if not.
LQ002	Old Weir	Minor	Archaeological watching brief. Preservation in situ where possible, preservation by record if not.
LQ003	Cottage site	Minor	Archaeological watching brief. Preservation in situ where possible, preservation by record if not.
LQ004	Milestone	Minor	Archaeological watching brief. Preservation in situ where possible, preservation by record if not.
LQ005	Drain	Minor	Photographic record dependant of design of proposed development To be retained if possible.
PGW (Gm 71)	Thompson's Park (Sir Davids Field)		No mitigation required. Response from Cadw (Scoping Request Letters) suggests no impact will be had on this heritage asset.
(PGW (Gm 73)	Fairwood House		No mitigation required. Response from Cadw (Scoping Request Letters) suggests no impact will be had on this heritage asset.
-	Unknown archaeological sites		An archaeological watching brief during development. Preservation in situ where possible, preservation by record if not.

9.11 Summary of Effects

9.11.1 Ten sites of archaeological interest, including one scheduled monument/listed building, will be effected by the development. The recommended mitigation has addressed the historic assets and sets out an appropriate response.

Table 9.9: The direct effect of the development on archaeological interests

ID	Name	Type	Period	Condition	Status	Value	Rarity	Group Association	Historical Association	Confidence	Effect
00134S/GM014/LB 13748/LB26487/24 126	Leckwith Bridge	Bridge	Medieval	Intact	LB/SAM	A	Medium	Medium	Unknown	Medium	Minor
04120S	Lime kiln	Limekiln	Post medieval	Near destroyed	-	D	Low	Low	Unknown	Low	Moderate
04122S	Two structures	Structure	Post medieval	Near destroyed	-	D	Low	Low	Unknown	Low	Moderate
04125s	Structure	Structure	Post medieval	Near destroyed	-	D	Low	Low	Unknown	Low	Moderate
307689	Leckwith New Bridge and Viaduct, Leckwith, Cardiff	Bridge	Modern	Not known	-	D	Low	Low	Unknown	Low	Major
LQ001	Leckwith bridge house	Bridge	Unknown	Intact	-	C	Low	Low	Unknown	Medium	Major /Minor
LQ002	Old weir	Weir	Unknown	Near destroyed	-	D	Low	Low	Unknown	Low	Moderate
LQ003	Structures (possible cottage)	Structure	Post medieval	Post medieval	-	D	Low	Low	Unknown	Low	Moderate

LQ004	Milestone	Milestone	Post medieval	Intact	-	E	Low	Low	Unknown	Medium	Moderate
LQ005	Drain cover	Drain	Post medieval	Near destroyed	-	D	Low	Low	Unknown	Medium	Moderate

9.11.2 There is some potential for the development to have a major effect on unknown archaeological remains.

Indirect effects of the development on archaeological sites and landscapes

9.11.3 In addition to the potential direct effects the development may have on the archaeological resource of the area (such as setting), an assessment of the indirect effect on nearby sites of regional and national importance was conducted.

Table 9.10: Sites identified for assessment of indirect effect

ID	Name	NGR	Type	Period	Status	Nature of Effect/ Effect
00134s/GM014/LB13748/LB26487/24126	Leckwith Bridge	ST15907524	Bridge	Medieval	SM/LB II	Moderate
PGW (GM 71)	Thompson's Park (Sir David's Field)	ST13837873	Registered Park and Garden	Post medieval	Registered Park and Garden	None
PGW (GM 73)	Fairwood House, Cardiff	ST16117708	Registered Park and Garden	Post medieval	Registered Park and Garden	None

9.12 Justification of Effects

Justification of assessment Direct Effects

9.12.1 The works were considered as having a 'Major' effect on two sites of archaeological interest within the development area, Leckwith Bridge House (LQ001) and Leckwith New Bridge and Viaduct (307689).

9.12.2 The effect of the development on Leckwith Bridge House was assessed as being 'Major' as the full extent of the development plans are unknown, and that there is the possibility of demolition/alteration. There is also no firm indication of date of construction of this building, other than being at least 1841, as shown on the tithe map.

9.12.3 The effect of the development Leckwith New Bridge and Viaduct (307689) was assessed as being 'Major' as the current development plans require full demolition of the feature. Furthermore, this feature was built in and around 1933, and represents an architectural feature of this time.

9.12.4 A 'Minor' effect has been attributed to the sites of Two Structures (04122s), Structure (04125s), Limekiln (04120s), Old Weir (LQ002), Structure (Possible Cottage) (LQ003), Milestone (LQ004), and Drain cover (LQ005) as these sites has since faced extensive redevelopment, have been moved or have been left overgrown. However, no full archaeological record of these exits, and so mitigation would allow for the record of these to be enhanced.

9.12.5 The Two Structures (04122s) and Structure (04125s) have no further information other than being noted on the 1st Edition Mapping, and so possibly suggests that these are earlier in date, similarly the Structure (Possible Cottage) (LQ003) and Old Weir (LQ002). The Limekiln (04120s) is also visible from the 1st Edition OS mapping, and suggests links with the Leckwith Bolton Quarry to the south, interconnected by a number of tramways and trackways. Within a historical context, as Drain cover (LQ005) is labelled at 'Drain Cardiff Sewers 1857', this may be reflected by the Board of Health survey of Cardiff.

9.12.6 Any other unknown archaeological sites would also be mitigated against by an archaeological watching brief, including the potential for buried and waterlogged archaeological and environmental deposits and artefacts due to the recurrent phases of inundation and alluviation., reflecting the landscape of the nearby HLW (Gt) 2 Gwent Levels

9.12.7 An effect of 'Minor' has been attributed to the site of Leckwith Bridge (00134s/GM014/LB13748/LB26487/24126), as this it a Scheduled Monument and is not being affected by the development under current development proposals. However, features associated with the bridge, such as original road surfaces and associated walls etc, may be encountered during the development works.

Justification of assessment Indirect Affects

9.12.8 An effect of 'Moderate' was assigned to the site of Leckwith Bridge (00134s/ GM014/ LB13748/ LB26487/ 24126), due to the relatively flat nature of the development area, and the close proximity of the bridge to the proposed developments. However, it must also be noted that previous development has occurred immediately surrounding the bridge, most notably in the form of the Leckwith New Bridge and Viaduct (307689), forming the road, so the setting of the bridge has been previously compromised.

9.12.9 An effect of 'none' was assessed for Thompson's Park (Sir Davids Field) (PGW (Gm) 71) and Fairwood House (PGW (Gm) 73, as both sites are a considerable distance away from the development area, 3850m and 1598m, respectively. The development area is also situated within a relatively flat area, at a height of 15 to 30m OD, and is bordered by trees, the Ancient Semi Natural Woodland (Nos 8117 and 14161) to the west and south respectively, generally

obscuring any views to or from the development area. CADW (Scoping Letters) has stated that the proposed development will have no impact on the setting of any designated heritage asset.

9.13 Assessment of Cumulative Effects

9.13.1 Ten sites of archaeological interest, including one scheduled monument/listed building, will be effected by the development. The recommended mitigation has addressed the historic assets and sets out an appropriate response, altering the cumulative effects.

Table 9.11: The cumulative effect of the development on archaeological interests after mitigation

ID	Name	Significance of effect prior to mitigation	Mitigation	Cumulative effects
00134S/GM014/LB 13748/LB26487/24 126	Leckwith Bridge	Minor	Cadw to be consulted before any development works. Appropriate barrier to be constructed at both ends of the bridge, no construction works to take place within this. Archaeological watching brief outside of the immediate area	Minor
04120S	Lime kiln	Moderate	Mitigation recommendation of archaeological watching brief to be carried out during works	Minor
04122S	Two structures	Moderate	Mitigation recommendation of archaeological watching brief to be carried out during works	Minor
04125s	Structure	Moderate	Mitigation recommendation of archaeological watching brief to be carried out during works	Minor
307689	Leckwith New Bridge and Viaduct, Leckwith, Cardiff	Major	Mitigation recommendation of a photographic survey to be carried out before works take place	Minor
LQ001	Leckwith bridge house	Major	Mitigation recommendation of a level three building survey to be carried out before works take place.	Moderate/Minor
LQ002	Old weir	Moderate	Mitigation recommendation of archaeological watching brief to be carried out during works	Minor
LQ003	Structures (possible cottage)	Moderate	Mitigation recommendation of archaeological watching brief to be carried out during works	Minor
LQ004	Milestone	Moderate	Mitigation recommendation of archaeological watching brief to be carried out during works	Minor

LQ005	Drain cover	Moderate	Mitigation recommendation of a photographic record to be carried out before works take place and retained if possible	Minor

Assessment of Cumulative Effects Discussion

9.13.2 The present archaeological chapter has allowed for an analysis of the regional historical environment record, and subsequent assessment of effect of the development on the record.

9.13.3 The result of the assessment suggests that ten archaeological interests could be directly affected, and that one archaeological interest could be indirectly effected as a result of the proposed development.

9.13.4 When implemented, the proposed mitigation will reduce this magnitude of impact allowing for either preservation in situ, or preservation by record.

9.13.5 The mitigation recommendations to reduce the level of significance of effect have been assessed to be proportional responses to the historical assetts.

9.14 Conclusion

9.14.1 The assessment of the historic environment against the impact of the proposed development determined that ten archaeological sites will be effected.

9.14.2 The sites affected includes the Scheduled Monument and Grade II* Listed Building Leckwith Bridge (GM014/ 0134S/ LB13748/ LB26487/ 24126), Leckwith New Bridge and Viaduct (307689), Limekiln (04120s) Structures (04122s, 04125s) and five new sites - LQ001 (Leckwith Bridge Public House), LQ002 (Old Weir), LQ003 (Cottage), LQ004 (Milestone) and LQ005 (Drain cover).

9.14.3 It has been assessed that any proposed development will have a 'Major to Minor' effect on these identified sites during the construction stage, and that a 'slight, moderate or adverse' was identified on one historic site, and any unknown archaeological sites during the operational phase.

9.14.4 The suggested mitigation includes for appropriate protective measures (such as a barrier and appropriate signage) to be constructed outside both ends of the bridge before works commence and maintained during all works (to be approved by CADW before works commence) and an archaeological watching brief outside of the immediate area for the Scheduled Monument 00134S/GM014/LB13748/LB26487/24126 Leckwith Bridge.

9.14.5 It also includes for a Photographic Record prior to demolition on 3047689 Leckwith New Bridge and Viaduct, LQ005 Drain and a Level 3 Building Survey on LQ001 Leckwith Bridge House. An archaeological watching brief has been recommended on remaining sites and will also mitigate any previously unknown archaeological interests.

9.15 References

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Scoping Request for Environmental Statement Land at Leckwith Quays, Leckwith Road (Cardiff Jan 2020)

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Documentary Sources

C/C/RB/P/52 (1933) Contract plans: Cardiff to Penarth. Construction of viaduct adjoined proposed new bridge over Ely river at Leckwith

DXCT/9/1 (1952-1973) Photograph showing the old Leckwith Bridge, taken from the east bank, facing west

DA/15/1-56 (1824) Correspondence stating Leckwith Bridge and Limekiln were both in need of repair

Statutory documents

Ancient Monument and Archaeological Areas Act 1979

Conservation Principles for the sustainable management of the historic environment in Wales (Cadw) 2011

Design Manual for Roads and Bridges Cultural Heritage (2007).

Guide to Good Practice on Using the Register of Landscapes of Historic Interest in Wales in the Planning and Development Process (2nd Edition, Cadw) 2007

Historic Environment (Wales) Act 2018

LDP: Cardiff Local Development Plan 2006-2026 (Adopted Plan) January 2016

LDP: Vale of Glamorgan Local Development Plan 2011-2026 (Written Statement) June 2017

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Planning Policy Wales (PPW) Chapter 6 The Historic Environment, Edition 2010 (2018)

Review of the Hedgerow Regulations 1997 (1998)

Standards and Guidance for Historic Environment Desk-based Assessments (Chartered Institute for Archaeologists) 2017

The Environment Act 1995

The Government's response to the Environment, Transport and Regional Affairs Committee's Report 'The Protection of Field Boundaries' 1999

The Hedgerow Regulations 1997 A Guide to the Law and Good Practice

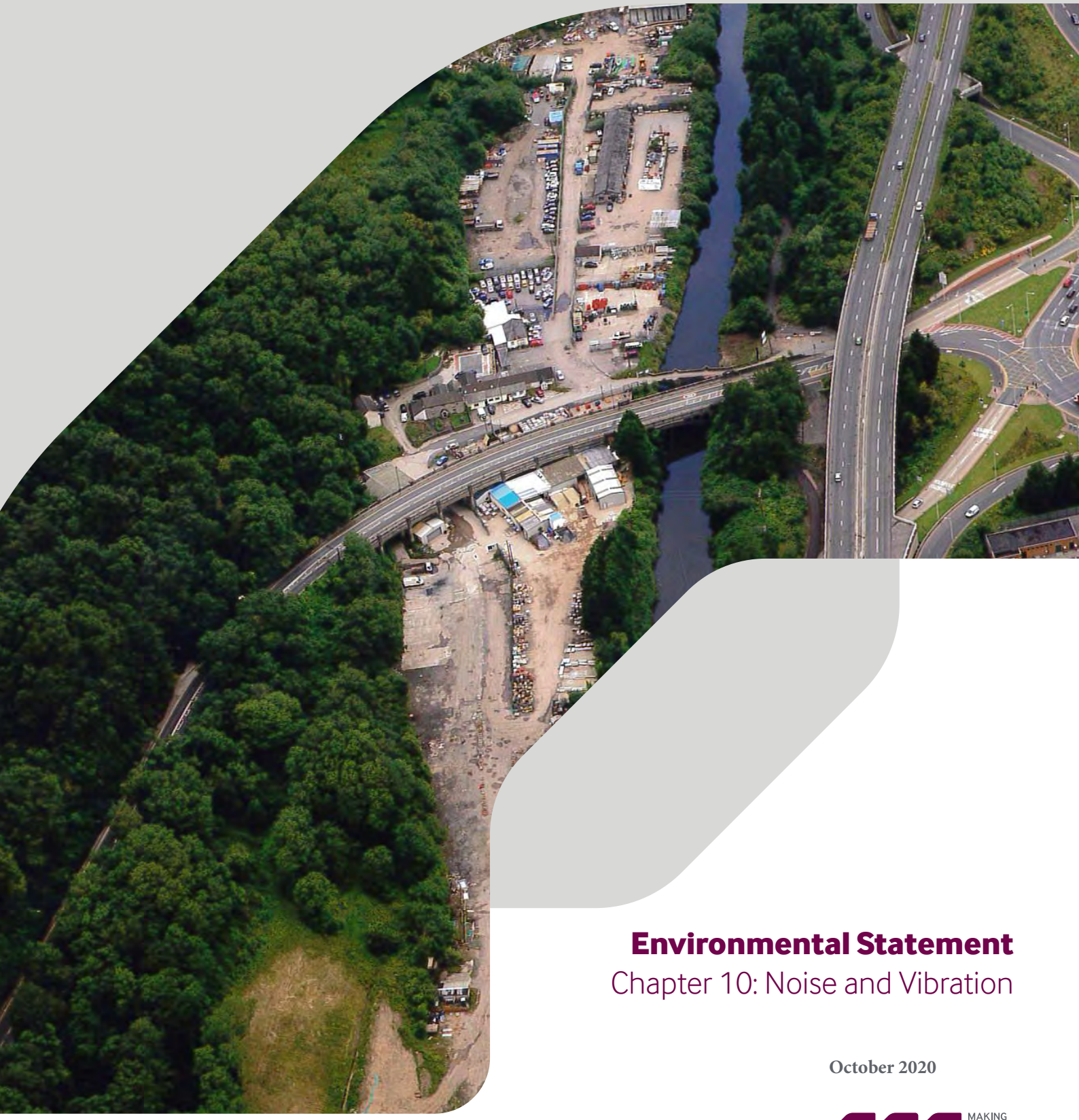
Technical Advice Note (TAN) 24: The Historic Environment (2017)

Vale of Glamorgan LANDMAP Historic Landscape of Leckwith and Cwm Cydfin (VLFGLHL025)

9.16.16 Consultation with Cadw is also required regarding recommended mitigation measures for Scheduled Monument and Grade II* Listed Building Leckwith Bridge (00134S/GM014/LB13748/LB26487/24126) prior to construction works.

Leckwith Quays

Leckwith Road, Cardiff



Environmental Statement

Chapter 10: Noise and Vibration

October 2020

MAKING COMPLEX EASY

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10 NOISE AND VIBRATION

10.1 Introduction

10.1.1 This chapter considers the effects on the surrounding environment of noise and vibration associated with the construction and operation of the proposed Leckwith Quay development. It specifically describes the methodology used to assess the effects; the baseline conditions currently existing at the site and surrounding area; the mitigation measures required to prevent, reduce or offset any significant negative effects; and the likely residual effects after these measures have been adopted.

10.1.2 Assessments have been carried out in accordance with relevant national standards and guidelines.

10.1.3 The assessment of temporary effects considers noise and vibration from construction activities on site.

10.1.4 Assessment of the effects of operational noise considers changes in road traffic noise due to operation of the development. An assessment of the suitability of the site for residential use will also be assessed.

10.2 Assessment Methodology

Planning Policy Context

Planning Policy Wales (Edition 10) 2018

10.2.1 Planning Policy Wales states the following in regards to guidance on assessing environmental noise and air quality; “In proposing new development, planning authorities and developers must:

- Address any implication arising as a result of its association with, or location within, air quality management areas, noise action planning priority areas or areas where there are sensitive receptors150;
- Not create areas of poor air quality or inappropriate soundscape; and
- Seek to incorporate measures which reduce overall exposure to air and noise pollution and create appropriate soundscapes.

Technical Advice Note 11: Noise (1997)

10.2.2 Technical Advice Note 11 provides guidance in regards to planning criteria for noise levels within residential developments. The different exposure categories and levels are summarised in the tables below.

10.2.3 As summarised below, noise exposure categories A and B are considered to be appropriate for residential developments, however it is clear that there is expectation for noise levels to be considered within the layout and planning of the development.

10.2.4 For road noise, this relates to daytime noise levels up to 55dB L_{Aeq} for Category A and 63dB L_{Aeq} for Category B.

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.
B	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection.
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.
D	Planning permission should normally be refused.

Table 10.1: TAN 11 Noise Exposure Categories

Noise Source		**Noise Level, $L_{Aeq,T}$ dB**			
		Noise Exposure Category			
		A	**B**	**C**	**D**
Road Traffic	07:00 – 23:00	< 55	55 - 63	63 - 72	> 72
	23:00 – 07:00	< 45	45 - 57	57 - 66	> 66

Table 10.2:TAN 11 Noise Exposure Levels

Standards and Guidance

10.3 BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings'

10.3.1 The Noise Policy Statement for England does not provide guidance on internal noise levels within residential buildings. As a result, the advised levels within BS8233: 2014 'Guidance on sound insulation and noise reduction for buildings' have been adopted.

Internal Noise Levels

10.3.2 BS8233 states that to achieve adequate sleeping and living conditions, background noise levels should be 30 dB L_{Aeq} or less within bedrooms at night, and 35 dB L_{Aeq} or less within Living rooms during the day. The advised levels are tabulated below.

Activity	**Location**	**0700 – 2300**	**2300 - 0700**
Resting	Living Room	35 dB $L_{Aeq, 16\ Hour}$	-
Dining	Dining Room	40 dB $L_{Aeq, 16\ Hour}$	-
Sleeping	Bedroom	35 dB $L_{Aeq, 16\ Hour}$	30 dB $L_{Aeq, 8\ Hour}$

Table 10.3: BS8233 internal noise levels

10.3.3 BS 8233: 2014 provides no definitive methodology for assessment of L_{Amax} levels. The standard simply states that a guideline value for the internal level may be set depending on the character of

the noise source and number of events occurring. Due to the proximity of the proposed site to sources of road traffic noise, assessment of L_{Amax} is critical to ensuring that disturbance is avoided.

10.3.4 In order to provide an assessment of L_{Amax} levels, the recommendations of the World Health Organisation are recommended. The WHO state that in order to avoid sleep disturbance within bedrooms during the night, the internal sound pressure level should not exceed 45 dB L_{Amax}.

10.3.5 Typically, BS8233 targets apply when a dwelling is being ventilated to achieve background ventilation rates, which can typically be achieved through the use of acoustic trickle vents. As trickle vents can achieve a high level of acoustic attenuation, it is relatively low risk achieving BS8233 noise targets, however there is much higher risk of occupant disturbance when ventilating to avoid overheating.

Outdoor Amenity

10.3.6 With regards to outdoor amenity areas, BS8233 states a lower exposure value of 50 dBA and a higher exposure value of 55 dBA (which would be acceptable in noisier environments). Due to the nature of the noise climate on site, MACH warrant that the Higher (55 dBA) exposure value will be applicable.

10.3.7 These values are specified as $L_{Aeq,T}$, where T refers to the activity period of the outdoor space. For this development, assessment is based on gardens during day time hours. Although L_{Amax} levels will exceed the upper value of 55 dBA, assessment must be based on an $L_{Aeq,\ 16\ Hour}$ value.

Acoustics, Ventilation and Overheating – Residential Design Guide (2020)

10.3.8 The Acoustics, Ventilation and Overheating - Residential Design Guide (Jan 2020) outlines the extent of risk associated with increased noise levels from increased ventilation openings in 'overheating' mode. The risk categories and associated noise levels are provided in the table opposite. It is recommended that a 'Low' risk approach is targeted for residential dwellings within Leckwith Quay. This translates to a +5dB relaxation to the internal ambient noise level targets outlined within BS8233.

10.3.9 The targets are to be achieved when the residential units are ventilating in 'overheating' mode which requires much higher rates of ventilation than background ventilation mode. Note, these targets also include contributions from any mechanical ventilation systems.

Internal Ambient Noise Level		**Examples of Outcomes**	**Risk Category**
Daytime, $L_{Aeq,T}$ 07:00 – 23:00	**Night Time, $L_{Aeq,2h}$ 23:00 – 07:00**		
≤ 35 dB	≤ 30 dB	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life	Negligible
> 35 dB and < 40 dB	> 30 dB and < 35 dB	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic environment inside the dwelling such that there is a perceived change in the quality of life.	Low

Internal Ambient Noise Level		Examples of Outcomes	Risk Category
Daytime, $L_{Aeq,T}$ 07:00 – 23:00	Night Time, $L_{Aeq,2h}$ 23:00 – 07:00		
> 40 dB and < 50 dB	> 35 dB and < 43 dB	Increasing risk of adverse effect due to impact on reliable speech communication during daytime or sleep disturbance at night. Although noise levels at the lower end of this category will cause changes in behaviour, they may still be considered suitable. Noise levels at the upper end of this category will result in more significant changes in behaviour and are only likely to be considered suitable if they occur for limited periods.	Medium
> 50 dB	> 43 dB	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	High

Table 10.4: Internal ambient noise level relaxations and likely outcomes for overheating (AVO Guide)

Activity	Location	0700 - 2300	2300 - 0700
Resting	Living Room	40 dB $L_{Aeq, 16 Hour}$	-
Dining	Dining Room	45 dB $L_{Aeq, 16 Hour}$	-
Sleeping	Bedroom	40 dB $L_{Aeq, 16 Hour}$	35 dB $L_{Aeq, 8 Hour}$

Table 10.5: Recommended Internal Noise Levels – Overheating Ventilation Mode

10.4 Baseline Environment

Nearest Noise Sensitive Properties

10.4.1 The development site is located near to a commercial/retail area to the east of Cardiff and as such there are relatively few noise sensitive receivers located nearby.

10.2 The nearest sensitive receiver is a dwelling located on a private road off Leckwith Road, located approximately 120m to the south of the lowest point of the site boundary. In addition to this, additional dwellings are found along Woodland Lane, approximately 250m to the south west of the site.

Noise Survey

10.4.1 The proposed development is situated in close proximity to the A4232 to north-east of the site, with an additional road (B4267) cutting through the site and continuing to the south-west. The site in relation to its surroundings is shown in the site plan below.

10.4.2 The noise sources on site are primarily traffic along the A4232, with road traffic along the B4267 contributing to a lesser extent, although the dominant noise source to the far south-west of the site. Ambient noise levels over the whole day time period are relatively high, with a reduction in levels to the night.

Noise Survey Methodology and Results

10.4.3 MACH carried out a noise survey at the proposed site from Thursday 9th May to Monday 13th May 2019. A combination of short and long-term noise monitoring positions were carried to establish environmental noise levels across the site.

Measurement Equipment

10.4.4 The measurement equipment illustrated in Table 3.1 was used during the survey, all equipment complies with BS EN 60942:2003 i.e. a class 1 device.

Name	Serial Number	Last Calibrated	Certificate number	Calibration Due
Norsonic Precision Sound Analyser Type 140	1403249	Oct-17	26727	Oct-19
Norsonic Type 1209 Pre-amplifier	12563	Oct-17	26727	Oct-19
NTI Microphone Capsule MC230A	A14417	Nov-17	STD92711	Nov-19

Table 10.6: Noise Measurement Equipment

Weather Conditions

10.4.5 The following climate conditions were recorded for the site:

10.4.6

Wind:	Less than 5 m/s.
Humidity:	Clear, sunny, low precipitation.
Temperature:	17 20°C.

10.4.7 The above weather conditions are suitable for the measurement of environmental noise in accordance with BS7445 Description and Measurement of Environmental Noise.

Methodology

10.4.8 In order to establish environmental noise levels on site, continuous 5-minute samples of the acoustic parameters $L_{Aeq,\,T}$, $L_{A90,\,T}$, and $L_{Amax,T}$ were measured between 15:00 on 09/05/2019 and 12:00 on 13/05/2019, at two fixed microphone positions on site, shown as ‘Fixed 1’ and ‘Fixed 2’ with Figure 10.2. Data has been gathered over an approximate 4-day period in order to provide definitive L_{Aeq} and L_{Amax} levels for both day and night. Additional spot measures were taken at various locations around site, so to inform and calibrate the noise map of the site.

10.4.9 The microphones were placed in free field conditions, approximately 2m above ground, at locations representative of ambient noise levels from the adjacent roads. All meters were set to measure consecutive ‘A’ weighted 5-minute time samples.

10.4.10 Traffic along the A4232 form the primary contribution to ambient noise levels, with additional audible noise from Leckwith Road.

Noise Survey Results

Fixed Measurement Results

10.4.11 Table 10.7 shows the measured noise levels at the spot position measurements. All measurements are shown in dB(A). The complete set of measurement data is available on request. The graph in Figures 10.3 and 10.4 provides the L_{Amax}, L_{Aeq} and L_{A90} levels measured during the noise survey for microphone positions F1 and F2.

Spot Measurement Results

Measurement Position	Times (hh:mm)		Measured Noise Levels (dB)
S1	14:10 – 14:25	L_{Amax}	74
		$L_{Aeq,5min}$	64
		L_{A90}	61
S2	15:15 – 15:25	L_{Amax}	79
		$L_{Aeq,5min}$	61
		L_{A90}	58
S3	15:55 – 16:00	L_{Amax}	82
		$L_{Aeq,5min}$	73
		L_{A90}	67
S4	16:05 – 16:10	L_{Amax}	84
		$L_{Aeq,5min}$	74
		L_{A90}	66
S5	15:15 – 16:20	L_{Amax}	87
		$L_{Aeq,5min}$	73
		L_{A90}	67

Table 10.7: Summary Of Spot Measurements

10.5 Assessment of Construction Effects

10.5.1 Vibration

10.5.1 As the proposed site is situated 120m from the nearest residential development, any impact from vibration from construction activities will be negligible.

10.5.2 Noise

10.5.1 As stated above, due to the large distance between the construction site and nearest residential receiver, it is anticipated that any temporary noise impact from construction activity will be negligible.

10.6 Assessment of Operational Effects

10.6.1 Noise

Operational Noise – Building Services Plant

10.6.1 The scope of building types within the development has not been fully determined, however it is anticipated that it will be mainly, if not all, residential buildings. As such the amount of associated external building services plant that will be installed in the development will be minimal. If any

external building services units are to be introduced, then building services limits will be provided to ensure that BS 4142 methodology and any local planning criteria is achieved.

10.6.2 Once designed to achieve this, the total effect on any building services plant is seen to be negligible.

Operational Noise – Traffic Noise

10.6.3 For a noticeable increase of 3dB, existing traffic volumes within the local area will need to double in volume. Both existing traffic flows within Leckwith Road and the adjacent A4232 are seen to be heavy, and as such the increase in road traffic from the proposed development is not seen to have any significant increase.

10.6.4 As such the resultant impact from any increase in traffic flow at any nearby residential properties is seen to be negligible.

Operational Noise – Suitability for Residential Use

10.6.5 As stated previously, noise levels across the site are above the recommended 55dB limit however it is possible to provide acoustic screening through the use of fencing adjacent to Leckwith Rd and from the building envelopes of the proposed development.

10.6.6 MACH have carried out noise mapping of the proposed site to determine the level of acoustic 0screening that can be achieved. Figures 10.4 and 10.5 provide noise maps of an indicative site layout option, with and without fencing adjacent to Leckwith Rd. As shown, there is opportunity to create central areas within the development site that fall within the 55dBA limit.

10.6.7 In regards to internal noise levels, it is recommended to include mitigation measures to reduce risk of high levels of noise ingress through ventilation openings in bedrooms and living rooms, particularly when ventilating to avoid overheating during the summer months.

10.6.8 Noise break-in can be reduced through passive design measures, through reducing the total open window requirement for cooling, increasing the acoustic performance of a window opening, or by decreasing the level of external noise on the building facade.

10.6.9 If a room has lower internal heat gains, the need to open windows is reduced to avoid overheating, and thus reduces the total open window area requirement. As a result of this the noise break-in is reduced through the smaller opening. This same improvement can be achieved by employing a more efficient ventilation system, to achieve the same levels of fresh air while reducing the total open area.

10.6.10 Alternatively, the acoustic performance of a ventilation opening can be improved through numerous different options, such as changing the window opening type or orientation, as well as adding additional baffles or screening to the façade.

10.6.11 It is possible to control noise ingress so that BS8233 internal noise level criteria within all dwellings can be achieved with natural ventilation strategies. Suitable design measures will be considered throughout the design stage of the proposed development, so to ensure a good quality acoustic environment will be achieved.

Vibration

10.6.12 No operational vibration impacts resulting from the operation of the development are anticipated. Therefore, the impact of this will be negligible and no specific mitigation measures are proposed during operation.

Potential Changes to the Assessment as a Result of Climate Change

10.6.13 Climate Change may result in prolonged periods of overheating within homes. This will have a knock-on impact upon the acoustic comfort levels within the proposed developments, as it may be required to have windows (or ventilation openings) open for longer of periods of time, thereby increasing the amount of noise break-in to the development. This impact can be reduced through the inclusion of passive cooling design measures within the proposed buildings.

10.7 Assessment of Cumulative Effects

10.7.1 As discussed in paragraph 10.5.1, existing traffic flows along the A4232 and Leckwith Rd are high and as such the increase in traffic flow from the proposed development will result in a negligible increase in noise level. As such no accumulative effects are anticipated.

10.8 Inter-relationships

10.8.1 The ventilation and overheating strategy of the proposed development will have a significant role in the quality of the internal acoustic environment of the proposed dwellings. Although it is too early in the design stage to review these elements in a detailed integrated assessment, this will need to be considered as the design progresses.

10.9 Summary of Effects

10.9.1 The proposed development is not considered to include any noise generating buildings or building services units, and the future traffic flows are not anticipated to increase in any significant amount. As such the proposed development is considered to have a negligible noise impact upon nearby noise sensitive receivers.

10.9.2 In regards to vibration, due to the distance of the site from any noise or vibration sensitive properties, it is expected that there will be no vibrational impact at any nearby property.

10.9.3 In regards to suitability for residential use, the noise levels across the majority of the site exceed the 55dBA recommended limit within TAN11, however it is found that screening provided by the proposed development and fencing can create areas of communal outdoor amenity spaces that fall below the 55dBA limit.

10.9.4 In addition to this, the internal noise levels of all dwellings can be suitably controlled through the use of trickle ventilators and a well-considered thermal and ventilation strategy. Such a strategy may include acoustic attenuators or baffled windows, both of which can be mitigated through assessing the orientation of noise sensitive facades and use of passive cooling (such as thermal mass) or shading.

Table 10.8: Summary of Likely Environmental Effects on Noise and Vibration

Receptor	tivity of receptor	ription of impact	/ medium / long term	nitude of impact	cance of effect	ificant / Not significant	Notes
Construction phase							
Nearby Residential Properties	Medium	Increase in ambient noise levels	Medium term	Negligible	Negligible	Not significant	-
Operational phase							
Proposed Residential Units within Development	Medium	High ambient noise levels	Long term	Low	Minor	Not significant	Acoustic design to include mitigation measures – to be finalised within detailed design phase.
Nearby Residential Properties	Medium	Increase in ambient noise levels from increased traffic flow	Long term	Negligible	Negligible	Not significant	-
Nearby Residential Properties	Medium	Increase in ambient noise levels from building services units	Long term	Negligible	Negligible	Not significant	-

Leckwith Quays

Leckwith Road, Cardiff

Environmental Statement

Chapter 11: Air Quality

October 2020

rps MAKING COMPLEX EASY

Mr Phil Worthing

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11 AIR QUALITY

11.1 Introduction

11.1.1 This chapter of the ES Report has been produced by WSP and sets out the potential local air quality impacts of the Proposed Development.

11.1.2 The Proposed Development has the potential to affect air quality as a result of emissions to air during construction and operation. Impacts will be considered at existing and future residential properties and sensitive ecological sites.

11.2 Assessment Methodology

Planning Policy Context

11.2.1 The following policies have been considered as part of the assessment:

National Policy

11.2.2 Planning Policy Wales (PPW, Edition 10) sets the overarching planning policies for Wales. Section 6.7 of PPW sets out Welsh Government's priorities for air quality.

11.2.3 Para 6.75 states that the "*key planning policy principle is to consider the effects which proposed developments may have on air or soundscape quality and the effects which existing air or soundscape quality may have on proposed developments*".

11.2.4 Para 6.76 places a requirement on developers to address any implications on air quality management areas, not create areas of poor air quality and seek to incorporate measures which reduce overall exposure to air pollution.

11.2.5 Decision makers should be provided with an appropriate level of information on air quality and the proposed development, and on mitigation measures. In particular, para 6.7.13 requires careful consideration of the impacts of increased transport activity associated with development activity.

11.2.6 Para 6.7.8 lists mitigation measures capable of being effectively implemented which include, inter alia:

- Traffic management;
- Ensuring progress towards zero emissions, such as electrical charging points; and
- Providing active travel infrastructure.

11.2.7 PPW states that care should be taken to avoid incremental development that exacerbates health and amenity inequalities through exposure to poor air quality and requires that development should be designed to prevent adverse effects to the environment but, as a minimum, to limit or constrain any effects that do occur.

11.2.8 PPW Technical Advice Note 18: Transport acknowledges that links between road traffic and local air pollution and states that well designed and implemented traffic management measures can help to reduce pollution levels.

Local Policy – Vale of Glamorgan

11.2.9 Vale of Glamorgan Local Development Plan (2011 – 2026) sets out the Council's strategy for future land use and sustainable development.

11.2.10 Objective 2 (para 4.6) in the Vale of Glamorgan LDP indirectly refers to air quality but aims to ensure that: *"development within the Vale of Glamorgan makes a positive contribution towards reducing the impact and mitigating the adverse effects of climate change"*.

11.2.11 Policy MD2 states that development proposals should: *"Mitigate the causes of climate change by minimising carbon and other greenhouse gas emissions associated with their design, construction, use and eventual demolition"*.

11.2.12 Policy MD7 relates directly to air quality and requires proposals to demonstrate that pollution of the air (caused by the development) will not result in an unacceptable impact on people, residential amenity, property and the natural environment. However if this is not the case it follows: *"Where impacts are identified the Council will require applicants to demonstrate that appropriate measures can be taken to minimise the impact identified to an acceptable level. Planning conditions may be imposed or legal obligation entered into, to secure any necessary mitigation and monitoring processes"*.

Local Policy – Cardiff City Council

11.2.13 Cardiff City Council Local Development Plan (2006 – 2026) became operative on its adoption in 2016 and is now the basis for decisions on land use planning in Cardiff.

11.2.14 Objective 3.c states Cardiff's priorities for air quality which are "*to protect, manage and enhance Cardiff's natural environmental assets including… air quality and the reduction of pollution"*.

11.2.15 Objective 4.a.2 also ensures that *"all new development areas create sustainable neighbourhoods that follow the following principles:*

11.2.16 *Minimise car travel, maximise sustainable transport use and decrease air pollution by creating accessible, permeable and legible places, preventing predominantly car-based developments and focusing new development in accessible locations which are linked to the strategic cycle network and can be served mainly by effective networks of sustainable transport - walking and cycling and fast and frequent public transport around and beyond the city"*

11.2.17 Policy KP18 requires developments to take full account of the need to minimise air pollution from industrial, domestic and road transportation sources.

11.2.18 Policy EN13 strictly states that developments can be refused where it would cause or result in unacceptable harm to health, local amenity or interests of nature conservation because of air pollution.

Relevant Guidance

Local Air Quality Management Technical Guidance (2016)

11.2.19 The Department for Environment, Food and Rural Affairs (Defra) has published technical guidance for use by local authorities in their review and assessment work. This guidance, referred to in this document as LAQM.TG(16), has been used where appropriate in the assessment presented herein.

Institute for Air Quality Management (IAQM) Guidance on the Assessment of Dust and Particulate Matter from Construction (2014)

11.2.20 This document published by the IAQM was produced to provide guidance to developers, consultants and environmental health officers on how to assess the impacts arising from construction activities The emphasis of the methodology is on classifying sites according to the risk of impacts (in terms of dust nuisance, PM_{10} impacts on public exposure and impact upon sensitive ecological receptors) and to identify mitigation measures appropriate to the level of risk identified.

Environmental Protection UK & IAQM Guidance on Planning for Air Quality (2017)

11.2.21 EPUK and IAQM have published guidance that offers comprehensive advice on when an air quality assessment may be required; what should be included in an assessment; how to determine the significance of any air quality impacts associated with the development; and, the possible mitigation measures that may be implemented to minimise these impacts.

IAQM Guidance on the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (2019)

11.2.22 This document has been produced by the IAQM to assist its members in the assessment of the air quality impacts of development on designated nature conservation sites. The document primarily focuses on air quality assessments in support of Habitats Regulations Assessments (HRA) but it can also be used to assess the air quality impact on national or local designated nature conservation sites.

Study Area

11.2.23 The study area was defined as follows:

11.2.24 For construction, the IAQM guidance was followed which requires consideration of an area within 350m of the site boundary or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

11.2.25 For operational impacts the study area was set to an area within 200m of the road network provided by AECOM Transport Planners. The use of a 200m corridor either side of the road network conforms to advice in the Design Manual for Roads and Bridges (DMRB).

Baseline Methodology

11.2.26 A desk study was undertaken to understand the baseline conditions at the Proposed Development. The following sources were used:

- Cardiff County Council and Vale of Glamorgan Council – monitoring data published by the two councils was collated to understand recent and current pollutant concentrations in the vicinity of the Proposed Development. The data was also used for model verification purposes.
- Defra – background pollutant concentrations are available on the Defra website where they have been mapped across 1km x 1km grid squares for the whole of the UK between 2017 and 2030.

Construction Phase Methodology

11.2.27 Dust comprises particles typically in the size range 1-75 micrometres (µm) in aerodynamic diameter and is created through the action of crushing and abrasive forces on materials. The larger dust particles fall out of the atmosphere quickly after initial release and therefore tend to be deposited in close proximity to the source of emission. Dust therefore, is unlikely to cause long-term or widespread changes to local air quality; however, its deposition on property and cars can cause ‘soiling’ and discolouration. This may result in complaints of nuisance through amenity loss or perceived damage caused, which is usually temporary.

11.2.28 The smaller particles of dust (less than 10µm in aerodynamic diameter) are known as particulate matter (PM_{10}) and represent only a small proportion of total dust released; this includes a finer fraction, known as $PM_{2.5}$ (with an aerodynamic diameter less than 2.5µm). As these particles are at the smaller end of the size range of dust particles they remain suspended in the atmosphere for a longer period of time than the larger dust particles and can therefore be transported by wind over

a wider area. PM_{10} and $PM_{2.5}$ are small enough to be drawn into the lungs during breathing, which in sensitive members of the public could have a potential impact on health. However, it is worth noting that, according to the IAQM guidance, the majority of fugitive particulate emissions arising from construction sites are expected to relate to the coarser fractions (i.e. PM2.5-10) with just 10-15% expected to comprise $PM_{2.5}$. The IAQM guidance therefore focusses on PM_{10} for the purposes of assessment.

11.2.29 An assessment of the likely significant impacts on local air quality due to the generation and dispersion of dust and PM_{10} during the construction phase has been undertaken using: the relevant assessment methodology published by the IAQM; the available information for this phase of the Proposed Development provided by the Client and Project Team; and, professional judgement.

11.2.30 The IAQM methodology assesses the risk of potential dust and PM_{10} impacts from the following four sources: demolition; earthworks; general construction activities and track-out. It takes into account the nature and scale of the activities undertaken for each source and the sensitivity of the area to an increase in dust and PM_{10} levels to assign a level of risk. Risks are described in terms of there being a low, medium or high risk of dust impacts. Once the level of risk has been ascertained, then site specific mitigation proportionate to the level of risk is identified, and the significance of residual effects determined. A summary of the IAQM assessment methodology is provided in Appendix 11.1.

11.2.31 In addition to impacts on local air quality due to on-site construction activities, exhaust emissions from construction vehicles and plant may have an impact on local air quality adjacent to the routes used by these vehicles to access the Application Site and in the vicinity of the Application Site itself. As information on the number of vehicles and plant associated with the construction phase was not available at the time of writing, a qualitative assessment of their impact on local air quality has been undertaken using professional judgement and by considering the following:

- The number and type of construction traffic and plant likely to be generated by this phase of the Development;
- The number and proximity of sensitive receptors to the Application Site and along the likely routes to be used by construction vehicles; and
- The likely duration of the construction phase and the nature of the construction activities undertaken.

Operational Phase Methodology

11.2.32 Of the pollutants included in the AQS, concentrations of NO_2 and particulate matter (PM_{10}) have been considered in this assessment as road traffic is a major source of these pollutants and their concentrations tend to be close to, or in exceedance of, the objectives in urban locations.

11.2.33 For the prediction of impacts due to emissions arising from road traffic during the operation of the Proposed Development, the dispersion model ADMS Roads (version 4.1.1.0) has been used. This model uses detailed information regarding traffic flows on the local road network, surface roughness, and local meteorological conditions to predict pollutant concentrations at specific receptor locations, as determined by the user.

11.2.34 Meteorological data, such as wind speed and direction, is used by the model to determine pollutant transportation and levels of dilution by the wind. Meteorological data used in the model was obtained from the Met Office observing station at Cardiff for 2019. This station is considered to provide representative data for the assessment.

11.2.35 The model was verified using local air quality monitoring to compare modelled concentrations to monitored concentrations. More detailed information on model verification can be found in Appendix 11.2.

11.2.36 A summary of the traffic data used in the assessment can be found in Appendix 11.3. It includes details of the Annual Average Daily Traffic (AADT) flows, vehicle speeds (kph) and the percentage of Heavy Duty Vehicles (HDVs) for the local road network in all assessment years considered. Traffic speeds were reduced at junctions in line with guidance provided in LAQM.TG(16), and using professional judgement.

11.2.37 For the assessment, three years were modelled, as follows:

- 2019 – Model Verification and Baseline;
- 2025 (Opening Year) – Do Minimum, Do Something (without mitigation) and Do Something (with mitigation); and
- 2030 (Design Year) – Do Minimum, Do Something (without mitigation) and Do Something (with mitigation).

11.2.38 The 'Do Minimum' flows represent an increase in background traffic due to natural growth with the addition of other committed developments in the study area.

11.2.39 The 'Do Something (without mitigation)' traffic flows are the same as the 'Do Minimum' flows with the addition of traffic generated by the Proposed Development (referred to in the traffic assessment as 'Do Nothing').

11.2.40 The 'Do Something (with mitigation)' flows are the same as the 'Do Something (without mitigation)' flows but with the implementation of mitigation to reduce traffic generated by the Proposed Development.

11.2.41 Traffic flows from the following committed developments are examples of what have been included in the future year scenarios:

- Ely Paper Mill
- ITEC Training Solutions, Butetown
- Clive Lane, Grangetown
- Bayscape
- Cardiff Pointe
- ITV Wales
- Port Road, Wenvoe
- Caerleon Road, Dinas Powys
- Leckwith Road

Vehicle Emission Factors

11.2.42 Vehicle emission factors for use in the assessment have been obtained using the Emission Factor Toolkit (EFT) version 9.0 (published in May 2019) available on the Defra website. The EFT allows for the calculation of emission factors arising from road traffic for all years between 2017 and 2030. For the predictions of future year emissions, the toolkit considers factors such as anticipated advances in vehicle technology and changes in vehicle fleet composition, such that vehicle emissions are assumed to reduce over time.

11.2.43 However, there is currently some uncertainty over how representative the future EFT emission factor predictions are, particularly for oxides of nitrogen (NOx) from diesel vehicles. To address this, Air Quality Consultants (AQC) Ltd's 'Calculator Using Realistic Emissions for Diesels (CURED) V3A' has also been used. The CURED tool has been developed to address the uncertainties associated with future emission estimates for diesel vehicles and is considered to provide more realistic NOx emission factors than the EFT.

11.2.44 The results presented in this report have been calculated using the CURED emission factors for NOx, and EFT factors for PM_{10}.

Selection of Background Concentrations

11.2.45 Background pollutant concentrations used in the assessment have been taken from the national maps provided on the Defra website, where background concentrations of those pollutants included within the AQS have been mapped at a grid resolution of 1x1km for the whole of the UK. Estimated concentrations are available for all years between 2017 and 2030. The maps assume that background concentrations will improve (i.e. reduce) over time, in line with the predicted reduction in vehicle emissions and emissions from other sources.

11.2.46 It should be noted that for NOx and PM_{10}, the background maps present both the 'total' estimated background concentrations and the individual contributions from a range of emission sources (for example, motorways, aircraft, domestic heating etc.). When detailed modelling of an individual sector is required as part of an air quality assessment, the respective contribution can be subtracted from the overall background estimate to avoid the potential for 'double-counting'. For this assessment, traffic data for all the main A Roads within the relevant grid squares have been included in the modelling; therefore, contributions from this sector have been removed from the background concentrations for this square.

11.2.47 AQC Ltd has also published a methodology for deriving more realistic future background concentrations of NOx and NO_2 for used with the CURED emission factors. AQC produced this methodology as they had found that the Defra background maps tend to under predict concentrations of NOx and NO_2, again as a result of disparity relating to the on-road emissions performance of modern diesel vehicles. The methodology calibrates the background concentrations against more recent monitoring data from Automatic Urban and Rural Network sites, to provide more realistic indications of background concentrations, as opposed to the overly optimistic Defra mapped backgrounds.

11.2.48 For the purposes of the assessment, the 2025 and 2030 Defra background concentrations have been calibrated as per AQC's methodology.

Selection of Sensitive Receptors

Construction Phase

11.2.49 The IAQM assessment is undertaken where there are: 'human receptors' within 350m of the site boundary, or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s); and/or 'ecological receptors' within 50m of the site boundary, or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s). It is within these distances that the impacts of dust soiling and increased particulate matter in the ambient air will have the greatest impact on local air quality at sensitive receptors.

Operational Phase

11.2.50 In terms of locations that are sensitive to pollutants emitted from engine exhausts these will include places where members of the public are likely to be regularly present over the period of time prescribed in the AQS. For instance, on a footpath where exposure will be transient (for the duration of passage along that path) comparison with a short-term standard (i.e. 15 minute mean or 1 hour mean) may be relevant. At a school or adjacent to a private dwelling, where exposure may be for longer periods, comparison with a long-term standard (such as 24 hour mean or annual mean) may be more appropriate. Box 1.1 of LAQM.TG(16) provides examples of the locations where the air quality objectives should/should not apply.

11.2.51 To complete the assessment of operational phase impacts, a number of 'receptors' representative of locations of relevant public exposure were identified at which pollution concentrations were predicted. Receptors have been located adjacent to the roads that are likely to experience the greatest change in traffic flows or composition, and therefore NO_2 and particulate matter concentrations, as a result of the Proposed Development.

11.2.52 To complete the exposure assessment, pollution concentrations were also predicted at a number of locations within the Proposed Development. These receptors were placed at ground level to account for the height difference for roads surrounding the site.

11.2.53 In terms of ecological receptors, paragraph 2.25 in guidance published in the DMRB define the type of designated habitats that require consideration and when, which depends on whether or not they lie within 200m of an 'affected road' as determined by specific changes to the traffic flow and composition on a road due to a proposal.

11.2.54 The locations of the assessment receptors are shown in Figure 11.2 and listed in Appendix 11.4.

Processing of results

11.2.55 Details of the verification factor calculations are presented in Appendix 11.2. The model was shown to be underpredicting and a factor of 1.5422 was derived. This factor was applied to the model road-NOx outputs prior to conversion to annual mean NO_2 concentrations utilising the NOx to NO_2 calculator (version 7.1, released April 2019) provided by Defra.

11.2.56 As local roadside monitoring data are not available for PM_{10}, the modelled road-PM_{10} components have been adjusted by the verification factor obtained for NOx before adding to the appropriate background concentration.

11.2.57 LAQM.TG16 advises that exceedances of the 1 hour mean NO_2 objective are unlikely to occur where annual mean concentrations are below 60µg/m^3, and it provides guidance on the approach that should be taken if either measured or predicted annual mean NO_2 concentrations are 60µg/m^3 or above.

11.2.58 For designated sites the total predicted NO_2 concentrations were converted to the amount of nitrogen deposited at each receptor, in line with guidance published by the IAQM. The deposition velocity for long vegetation (0.003) was used in the calculation which is considered more conservative than that of short vegetation (0.0015).

11.2.59 Once processed, the predicted concentrations at human receptors were compared against the relevant AQS objective levels for NO_2 and PM_{10} set out in Table 11.1.

Consultation

11.2.60 WSP submitted the scoping report to the relevant Air Quality Officer who in turn had no comment on the proposed methodology.

Assessment Criteria and Assignment of Significance

Construction Phase

11.2.61 The IAQM assessment methodology recommends that significance criteria are only assigned to the identified risk of dust impacts occurring from a construction activity with appropriate mitigation measures in place. For almost all construction activities, the application of effective mitigation should prevent any significant effects occurring to sensitive receptors and therefore the residual effect will normally be negligible.

11.2.62 For the assessment of the impact of exhaust emissions from plant used on-site and construction vehicles accessing and leaving the Site on local concentrations of NO_2 and particulate matter, the

significance of residual effects have been determined using professional judgement and the principles outlined in the EPUK/IAQM guidance, which are described below.

Operational Phase

11.2.63 The approach provided in the EPUK/IAQM guidance has been used within this assessment to assist in describing the air quality effects of additional emissions from traffic generated by the Proposed Development once operational.

11.2.64 This guidance recommends that the degree of an impact is described by expressing the magnitude of incremental change in pollution concentration as a proportion of the relevant assessment level and examining this change in the context of the new total concentration and its relationship with the assessment criterion, as summarised in Table 11.1.

Table 11.1: Impact Descriptors for Individual Receptors

Long term average concentration at receptors in assessment year	% Change in Concentration Relative to Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

Notes

AQAL = Air Quality Assessment Level, which for this assessment related to the UK Air Quality Strategy objectives.

Where the %change in concentrations is <0.5%, the change is described as 'Negligible' regardless of the concentration.

When defining the concentration as a percentage of the AQAL, 'without scheme' concentration should be used where there is a decrease in pollutant concentration and the 'with scheme;' concentration where there is an increase.

Where concentrations increase, the impact is described as adverse, and where it decreases as beneficial.

11.2.65 The EPUK/IAQM guidance notes that the criteria in Table 11.1 should be used to describe impacts at individual receptors and should be considered as a starting point to make a judgement on significance of effects, as other influences may need to be accounted for. The EPUK/IAQM guidance states that the assessment of overall significance should be based on professional judgement, taking into account several factors, including:

- The existing and future air quality in the absence of the development;
- The extent of current and future population exposure to the impacts; and
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

11.2.66 The EPUK/IAQM guidance states that for most road transport related emissions, long-term average concentrations are the most useful for evaluating the impacts. The guidance does not include criteria for determining the significance of the effect on hourly mean NO_2 concentrations or daily mean PM_{10} concentrations. The significance of effects of hourly mean NO_2 and daily mean PM_{10} concentrations arising from the operational phase have therefore been determined qualitatively using professional judgement and the principles described above.

11.2.67 The EPUK/IAQM guidance says that "*Where the air quality is such that an air quality objective at the building facade is not met, the effect on residents or occupants will be judged as significant,*

unless provision is made to reduce their exposure by some means. For people working at new developments in this situation, the same will not be true as occupational exposure standards are different, although any assessment may wish to draw attention to the undesirability of the exposure.".

11.2.68 For ecological receptors the significance criteria are based on the percentage change of nitrogen deposition at each receptor along a transect. If the percentage change between 'with' and 'without' the site is more than 1% of the site relevant critical load the impact is considered to be significant. If significance has been identified the relevant ecologists involved on the Proposed Development would need to be notified and mitigation implemented.

Limitations of the Assessment

11.2.69 As suitable information for the construction phase of the Proposed Development was not available professional judgement has been used in the completion of this part of the assessment.

11.2.70 There are uncertainties associated with both measured and predicted concentrations. The model (ADMS Roads) used in this assessment relies on input data (including predicted traffic flows), which also have uncertainties associated with them. The model itself simplifies complex physical systems into a range of algorithms. In addition, local micro-climatic conditions may affect the concentrations of pollutants that the ADMS Roads model will not take into account.

11.2.71 In order to reduce the uncertainty associated with predicted concentrations, model verification has been carried out following guidance set out in LAQM.TG(16). As the model has been verified against local monitoring data and adjusted accordingly, there can be reasonable confidence in the predicted concentrations.

11.2.72 Due to the uncertainty surrounding the accuracy of future year vehicle emissions and background concentrations, a precautionary approach has been taken whereby for the future scenario, the CURED methodology has been adopted. This approach is considered to provide a conservative assessment.

11.3 Baseline Environment

11.3.1 Air Quality in the Vale of Glamorgan and Cardiff is generally good and meets the standards set out in the UK Air Quality Strategy and European Union Ambient Air Quality Directive. However, concentrations are higher in areas with heavily trafficked roads and, as a consequence, Air Quality Management Areas (AQMA) have been established although none are within 2km of the Proposed Development.

Local Authority Air Quality Monitoring Data

11.3.2 Cardiff City Council monitors air quality using a combination of automatic monitors and passive diffusion tubes. There are 14 monitoring locations within 2km of the Proposed Development, as presented in Table 11.2. The monitoring shows that at these locations, there are no exceedances of the Air Quality Objectives in 2018 and that concentrations have generally decreased since 2013.

Table 11.2: Baseline Annual Mean NO_2 Concentrations Monitored by Cardiff County Council

ID	Site Name	Annual Mean NO_2 Concentration ($\mu g/m^3$)					
		2013	2014	2015	2016	2017	2018
16	Ninian Park Road	31.3	32.4	27.9	28.9	28.9	27.8
49	Penarth Road	32.1	32.6	29.4	30.4	27.7	27.3
111	98 Leckwith Road	25.2	24.7	21.3	23.3	20.1	-
112	17 Sloper Road	30.7	28.8	27.1	29.5	27.4	26.7
115	21 Llandaff Road	35.5	36.3	32.5	32.8	32.7	30.0
128	117 Tudor Street	34.7	36.5	29.6	31.2	29.8	28.3
140	Clare Street	**42.2**	**42.9**	36.3	37.3	35.2	-
146	Neville Street	30.9	29.7	26.6	27.5	26.8	-
147	211 Penarth Road	32	31.3	27.7	28.8	26.2	29.3
148	161 Clare Road	29.3	29.1	27.5	29.2	27.3	26.6
149	10 Corporation Road	34.5	33.2	33.6	31.2	32.5	31.3
165	6 Heol Tyrrell	19.4	17.4	15.1	17	15.2	-
166	163 Lansdowne Road	34.9	36.6	32.1	33.2	32.1	30.6
167	359 Lansdowne Road	31.7	31.5	28.3	29.8	26.9	27.8

11.3.3 The Vale of Glamorgan Council also monitors air quality through automatic monitors and diffusion tubes. There are no monitoring locations within 2km of the Proposed Development, the closest, 69, is approximately 2.3km away. The results in Table 11.3 show that concentrations at this location and others in the vicinity are well below the Air Quality Objectives and have also decreased since 2013.

Table 11.3: Baseline Annual Mean NO_2 Concentrations Monitored by Vale of Glamorgan Council

ID	Site Name	Annual Mean NO_2 Concentration ($\mu g/m^3$)					
		2013	2014	2015	2016	2017	2018
56	134 Andrew Road	38.5	33.9	**40.3**	17.5	23.2	-
68	99 Penlan Road	20.9	16.9	16.4	17.3	15.1	15.2
69	65 Penlan Road	19.8	19.6	17.2	18.1	16.6	-
70	Ty-Isaf	19.0	21.9	23.2	24.6	20.3	22.3

11.3.4 Both administrative districts monitor concentrations of PM_{10}. As shown in table 11.4, concentrations are well within the air quality objectives.

Table 11.4: Baseline Annual Mean PM_{10} Concentrations

ID	Site Type	Annual Mean PM_{10} Concentration ($\mu g/m^3$)					
		2013	2014	2015	2016	2017	2018
Cardiff Centre AURN	Urban Background	19.0	16.0	16.0	15.1	15.9	17.0
Penarth, Windsor Road	Roadside	-	17.5	20.8	21.4	15.6	21.7

Air Quality Management Areas

11.3.5 The closes AQMAs to the Proposed Development are:

- Windsor Road, Cogan, 3.2km South-East
- Ely Bridge, 2.1km North-West
- City Centre, 2.3km North-East
- Llandaff, 2.8km North-West

11.3.6 Traffic from the Proposed Development is likely to have dispersed significantly between the Development and these AQMAs.

11.3.7 Figure 11.1 summarises the baseline air quality data in the vicinity of the Proposed Development, as well as showing the nearby AQMAs.

Background Air Quality Data

11.3.8 Table 11.5 summarises the background pollutant concentrations of NO_2, and PM_{10} for 2019, 2025 and 2030 that were utilised in the assessment. All of the annual mean background concentrations are well below the relevant objectives.

Table 11.5: Current and Future Year Defra Mapped Background Concentrations

Grid Square (centre on O.S. Grid Reference	2019 NO_2	2025 NO_2	2030 NO_2	2019 PM_{10}	2025 PM_{10}	2030 PM_{10}
316500, 173500	11.7	9.0	7.5	10.9	10.3	10.2
316500, 176500	18.1	14.3	12.3	13.1	12.4	12.4
316500, 175500	13.6	10.5	8.9	12.1	11.5	11.4
315500, 175500	13.6	10.2	8.4	11.8	11.2	11.1
315500, 174500	9.6	7.4	6.3	10.5	9.9	9.8
317500, 172500	12.3	9.5	8.1	11.2	10.6	10.5
316500, 172500	10.9	8.6	7.5	10.6	10.0	9.9

Future Baseline Conditions

11.3.9 It is anticipated that roadside and background pollutant concentrations will decrease in the next 15-20 years, based on recent air quality monitoring by Local Authorities, Defra and other air quality scientists. Coupled with the expected change in fleet composition and shift to more efficient and environmentally friendly vehicle technologies, concentrations of most roadside pollutants are predicted to decrease. Taking these changes into account annual mean concentrations of NO_2 and PM_{10} in 2025 and 2030 (the opening year of the Proposed Development) are predicted to be lower than those monitored in 2018.

11.4 Mitigation Measures Adopted as Part of the Project

Construction Phase

11.4.1 Detailed mitigation measures to control construction traffic should be discussed with Vale of Glamorgan Council and Cardiff Council to establish the most suitable access and haul routes for the site traffic. The most effective mitigation will be achieved by ensuring that construction traffic does not pass along sensitive roads (residential roads, congested roads, via unsuitable junctions, etc.) where possible, and that vehicles are kept clean (through the use of wheel washers, etc.) and sheeted when on public highways. Timing of large-scale vehicle movements to avoid peak hours on the local road network will also be beneficial.

Operational Phase

11.4.2 The Operational Phase includes mitigation which anticipates that there will be a 10% reduction in traffic generation from the Proposed Development due to the implementation of Travel Plan measures based on published studies and the aspirations of Cardiff Council. It has not yet been confirmed what measures will be implemented but they would typically involve the promotion and incentivisation of more sustainable travel. Should there be any further mitigation, this would be associated with addressing localised traffic capacity issues (i.e. at specific junctions) and should not affect traffic forecasts used in the assessment.

11.5 Assessment of Construction Effects

Dust and PM_{10} Arising from On-Site Activities

11.5.1 Construction activities that have the potential to generate and/or re-suspend dust and PM_{10} include:

- Site clearance and preparation including demolition activities;
- Preparation of temporary access/egress to the Application Site and haulage routes;
- Earthworks;
- Materials handling, storage, stockpiling, spillage and disposal;
- Movement of vehicles and construction traffic within the Application Site;
- Use of crushing and screening equipment/plant;
- Exhaust emissions from site plant, especially when used at the extremes of their capacity and during mechanical breakdown;
- Construction of buildings, roads and areas of hardstanding alongside fabrication processes;
- Internal and external finishing and refurbishment; and
- Site landscaping after completion.

11.5.2 The majority of the releases are likely to occur during the 'working week'. However, for some potential release sources (e.g. exposed soil produced from significant earthwork activities) in the absence of dust control mitigation measures, dust generation has the potential to occur 24 hours per day over the period during which such activities are to take place.

Assessment of Potential Dust Emission Magnitude

11.5.3 The IAQM assessment methodology has been used to determine the potential dust emission magnitude for the following four different dust and PM_{10} sources: demolition; earthworks; construction; and, trackout. The findings of the assessment are presented below.

Demolition

11.5.4 Total volume of buildings to be demolished on site is less than 20,000m^3, with construction material that has a low potential for releasing dust (e.g. metal cladding or timber), and with demolition activities occurring below 10m above ground level. Therefore, the potential dust emission magnitude is considered to be **small** for demolition activities.

Earthworks

11.5.5 The total area of the Proposed Development is more than 10,000m^2, the soil type is clay, silt and sand and therefore potentially dusty, and the total material that will be moved is estimated to be more than 100,000 tonnes. It is also estimated that more than 10 heavy earth-moving vehicles will be active at any one time, and that the formation of bunds higher than 8m will occur. Therefore, the potential dust emission magnitude is considered to be **large** for earthwork activities.

Construction

11.5.6 The total volume of buildings to be constructed on the Application Site will be more than 100,000m^3, therefore the potential dust emission magnitude is considered to be **large** for construction activities.

Trackout

11.5.7 Information on the number of HDVs associated with this phase of the Proposed Development is not available and therefore professional judgement has been used, It has been assumed that given the size of the development area there will be between 10 and 50 HDV (>3.5t) outward movements in any one day travelling on potentially dusty surface materials. Due to the size of the site, it is also assumed that the length of the unpaved roads within the Proposed Development will be more than 100m. Therefore, the potential dust emission magnitude is considered to be **large** for trackout.

11.5.8 Table 11.6 below provides a summary of the potential dust emission magnitude determined for each construction activity considered.

Table 11.6: Potential Dust Emission Magnitude

Activity	Dust Emission Magnitude
Demolition	Small
Earthworks	Large
Construction Activities	Large
Trackout	Large

Assessment of Sensitivity of the Study Area

11.5.9 A windrose generated using the meteorological data used for the dispersion modelling of operational phase impacts is provided in Appendix 11.5. This shows that the prevailing wind direction is from the West. Therefore, receptors located to the East of the Application Site are more likely to be affected by dust and particulate matter emitted and re-suspended during the construction phase.

11.5.10 Under low wind speed conditions, it is likely that the majority of dust would be deposited in the area immediately surrounding the source. The Proposed Development is located in the vicinity of a large industrial estate, with very few sensitive human receptors within 350m of the site boundary and along anticipated construction routes. There are no sensitive ecological sites within 350m of the site boundary or within 50m of trackout routes so the impacts for these have been scoped out.

11.5.11 Taking the above into account and following the IAQM assessment methodology, the sensitivity of the area to changes in dust and PM_{10} has been derived for each of the construction activities considered. The results are shown in Table 11.7.

Table 11.7: Sensitivity of the Study Area

Potential Impact	Sensitivity of the Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Low	Low	Low	Low
Human Health	Low	Low	Low	Low

Risk of Impacts

11.5.12 The predicted dust emission magnitude has been combined with the defined sensitivity of the area to determine the risk of impacts during the construction phase, prior to mitigation. Table 11.8 below provides a summary of the risk of dust impacts for the Proposed Development. The risk category identified for each construction activity has been used to determine the level of mitigation required.

Table 11.8: Summary Dust Risk Table to Define Site Specific Mitigation

Potential Impact	Risk of Impacts			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Negligible	Low Risk	Low Risk	Low Risk
Human Health	Negligible	Low Risk	Low Risk	Low Risk

Construction Vehicles and Plant

11.5.13 The greatest impact on air quality due to emissions from vehicles and plant associated with the construction phase will be in the areas immediately adjacent to the site access. It is anticipated that construction traffic will access the site via Leckwith Road. Due to the size of the Proposed Development, it is considered likely that the construction traffic will be low in comparison to the existing traffic flows on these roads.

11.5.14 Final details of the exact plant and equipment likely to be used on Site will be determined by the appointed contractor, it is considered likely to comprise dump trucks, tracked excavators, diesel generators, asphalt spreaders, rollers, compressors and trucks. The number of plant and their location within the Proposed Development are likely to be variable over the construction period.

11.5.15 Based on the current local air quality in the area, the proximity of sensitive receptors to the roads likely to be used by construction vehicles, and the likely numbers of construction vehicles and plant that will be used, the impacts are therefore considered to be of **low** significance according to the assessment significance criteria.

Further Mitigation

11.5.16 Based on the assessment results, minimal mitigation will be required. However, recommended mitigation measures are given below.

General Communication

- The name and contact details of person(s) accountable for air quality and dust issues should be displayed on the site boundary. This may be the environment manager/engineer or the site manager. The head or regional office contact information should also be displayed.

General Dust Management

- A Dust Management Plan (DMP), which may include measures to control other emissions, in addition to the dust and PM_{10} mitigation measures given in this report, should be developed and implemented, and approved by the Local Authority. The DMP may include a requirement for monitoring of dust deposition, dust flux, real-time PM_{10} continuous monitoring and/or visual inspections.

Site Management

- All dust and air quality complaints should be recorded and causes identified. Appropriate remedial action should be taken in a timely manner with a record kept of actions taken including of any additional measures put in-place to avoid reoccurrence.
- The complaints log should be made available to the local authority on request.
- Any exceptional incidents that cause dust and/or air emissions, either on or offsite should be recorded, and then the action taken to resolve the situation recorded in the log book.

Monitoring

- Daily on-site and off-site inspections should be undertaken, where receptors (including roads) are nearby to monitor dust. The inspection results should be recorded and made available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of site boundary, with cleaning to be provided if necessary.
- Regular site inspections to monitor compliance with the DMP should be carried out, inspection results recorded, and an inspection log made available to the local authority when asked.
- The frequency of site inspections should be increased when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

Preparing and Maintaining the Site

- Plan the site layout so that machinery and dust causing activities are located away from receptors, as far as is practicable.
- Where practicable, erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
- Where practicable, fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover appropriately.
- Where practicable, cover, seed or fence stockpiles to prevent wind whipping.

Operating vehicle/machinery and sustainable travel

- Ensure all vehicle operators switch off engines when stationary - no idling vehicles.
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.
- A maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas should be imposed (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
- A Construction Logistics Plan should be produced to manage the sustainable delivery of goods and materials.

Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

Waste management

- Avoid bonfires and burning of waste materials.

Measures Specific to Demolition

- Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).
- Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.
- Avoid explosive blasting, using appropriate manual or mechanical alternatives.
- Bag and remove any biological debris or damp down such material before demolition.

Measures Specific to Earthworks

- Stockpile surface areas should be minimised (subject to health and safety and visual constraints regarding slope gradients and visual intrusion) to reduce area of surfaces exposed to wind pick-up.
- Where practicable, windbreak netting/screening should be positioned around material stockpiles and vehicle loading/unloading areas, as well as exposed excavation and material handling operations, to provide a physical barrier between the Application Site and the surroundings.
- Where practicable, stockpiles of soils and materials should be located as far as possible from sensitive properties, taking account of the prevailing wind direction.
- During dry or windy weather, material stockpiles and exposed surfaces should be dampened down using a water spray to minimise the potential for wind pick-up.

Measures Specific to Construction

- Avoid scabbling (roughening of concrete surfaces) if possible.
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
- All construction plant and equipment should be maintained in good working order and not left running when not in use.

Measures Specific to Trackout

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being in frequent use.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site log book.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).

11.6 Assessment of Operational Effects

11.6.1 Full results of the dispersion modelling are presented in Appendix 11.6 and a summary is provided below.

Annual Mean NO_2 Concentrations

11.6.2 The AQS objective for annual mean NO_2 concentrations is 40µg/m^3. The results of the assessment show that in the 2019 baseline case annual mean concentrations were well below the objective at all modelled receptors, including those at the Proposed Development. The highest predicted concentration is 34.8µg/m^3 at R35 along Andrew Road.

11.6.3 By 2025, the opening year of the Proposed Development, the receptors both with and without the development are well below the annual mean objective. The highest concentrations are predicted at receptor R35 where the predicted concentrations are 28.4µg/m^3 'without development', 28.5µg/m^3 'with development' and 28.5µg/m^3 'with development and mitigation'. The greatest increase in concentrations due to the Proposed Development is 0.1µg/m^3 at multiple receptors across the model extent both with and without mitigation.

11.6.4 The highest predicted NO_2 concentration in all modelled scenarios for 2030 emissions is 25.2µg/m^3 at Receptor R35. The highest increase in concentrations is 0.1µg/m^3 at multiple receptors across all modelled scenarios.

11.6.5 The predicted changes in annual mean NO_2 at all existing receptors were <0.5% of the relevant AQS objective, therefore in accordance with the EPUK/IAQM guidance, the impact of the increased emissions associated with the Proposed Development on annual mean NO_2 concentrations is considered to be negligible.

Hourly Mean NO_2 Concentrations

11.6.6 The annual mean NO_2 concentrations predicted by the model were all below 60µg/m^3, and therefore hourly mean NO_2 concentrations are unlikely to cause a breach of the hourly mean AQS objective. The impact of the Proposed Development on hourly mean NO_2 concentrations at existing sensitive receptors is considered to be negligible.

Annual Mean PM_{10} Concentrations

11.6.7 The AQS objective for annual mean PM_{10} concentrations is a concentration of 40µg/m^3. The results of the assessment show that in the 2019 baseline case concentrations at all of the receptors considered are predicted to easily meet the objective. The highest predicted concentration is 13.9µg/m^3 at R02 on Leckwith Road.

11.6.8 Predicted concentrations of PM_{10} are well below the annual mean objective at all receptors in all of the modelled future year scenarios. In 2025 the highest concentration is predicted at Receptor R02, where a concentration of 13.3µg/m^3 is predicted in all modelled scenarios.

11.6.9 In the 2030 future year scenario concentrations are highest at R01 (Broad Street) at 13.3µg/m^3 in all modelled scenarios. The greatest increase in modelled PM_{10} concentrations across all scenarios is 0.1µg/m^3 at multiple receptors.

11.6.10 The predicted changes in annual mean PM_{10} concentrations are all <0.5% of the relevant AQS objective; based on the EPUK/IAQM guidance, the impact of the increased emissions associated with the Proposed Development on annual mean PM_{10} concentrations is considered to be negligible.

Daily Mean PM_{10} Concentrations

11.6.11 The AQS objective for daily mean PM_{10} concentrations is 50µg/m^3 to be exceeded no more than 35 times a year. The results of the dispersion modelling indicate that concentrations are well within this objective.

11.6.12 The increased emissions associated with the Proposed Development result in no changes to the number of days experiencing concentrations greater than 50µg/m^3; the impact on daily mean PM_{10} concentrations is thus also considered to be negligible.

Exposure of Future Residents

11.6.13 Predicted concentrations of NO_2 and PM_{10} are all below the relevant objectives at all proposed receptors located along the Application Site boundary

11.6.14 In 2025 the highest predicted annual mean NO_2 concentration is 23.4µg/m^3, whilst the highest predicted annual mean PM_{10} concentration is 12.4µg/m^3.

11.6.15 In 2030 the highest predicted annual mean NO_2 concentration is 20.6µg/m^3, whilst the highest predicted annual mean PM_{10} concentration is 12.4µg/m^3.

Exposure of Sensitive Habitats

11.6.16 The objective for annual mean NO_x concentrations for the protection of vegetation and ecosystems is 30µg/m^3, to be achieved by the 19th July 2001 and thereafter. The results of the assessment indicate that this will not be achieved for Cwm Cydfin in any of the 2025 scenarios at the habitat boundary and 10m from the edge of the SSSI (the highest concentration being 43.37µg/m^3). For the 2030 scenarios the objective is only exceeded at the site boundary (the highest concentration being 38.19µg/m^3).

11.6.17 Total NO_2 concentrations predicted at the transect were converted to nitrogen deposition using deposition velocities for long vegetation. The percentage change between ‘do something/do something with mitigation’ and ‘do minimum’ compared to the critical load (5kgNha^{-1}yr^{-1}) was well below 1% and therefore not significant. This was the case for both 2025 and 2030 emission years.

Further Mitigation

11.6.18 The change in pollutant concentrations attributable to traffic emissions associated with the operation phase of the Proposed Development (i.e. impacts on local air quality) are negligible and therefore there is no anticipated need for mitigation.

11.7 Assessment of Cumulative Effects

11.7.1 The cumulative effects of the Proposed Development have been included in the Air Quality Assessment as it is an inherently cumulative assessment. Traffic flows related to future committed

developments, such as those listed in the methodology section of the report, have been included in both the Do Minimum and the Do Something scenarios. The Proposed Development complies with national and local policy in combination with other developments.

11.8 Summary of Effects and Conclusion

11.8.1 A qualitative assessment of the potential impacts on local air quality from construction activities has been carried out for this phase of the Proposed Development using the IAQM methodology. This identified that there is a Low Risk of dust soiling impacts and a Low Risk of increases in particulate matter concentrations due to construction activities.

11.8.2 Through good site practice and the implementation of suitable mitigation measures, the effect of dust and PM_{10} releases would be significantly reduced. The residual effects of dust and PM_{10} generated by construction activities on air quality are therefore insignificant. The residual effects of emissions to air from construction vehicles and plant on local air quality will be negligible.

11.8.3 In addition, a quantitative assessment of the potential impacts during the operational phase was undertaken using ADMS Roads to predict the changes in NO_x, NO_2 and PM_{10} concentrations that would occur due to traffic generated by the Proposed Development.

11.8.4 The results show that the Proposed Development would cause an imperceptible increase in pollutant concentrations and would not cause any exceedances of the statutory objectives.

11.8.5 All existing receptors show negligible impacts due to the Proposed Development in the years 2025 and 2030, as well as no exceedances of the objectives at future receptors as summarised in Table 11.9.

Table 11.9: Summary of Likely Environmental Effects on Air Quality

Receptor	Sensitivity of receptor	Description of impact	Short / medium / long term	Magnitude of impact	Significance of effect	Significant / Not significant	Notes
Construction phase							
Human	High	Inhalation of particulates arising from construction	Short-term	Large	Low Risk	Not significant	Majority of sensitive human receptors are >350m from site boundary
Amenities	Low	Dust soiling from construction activities	Short-term	Large	Low Risk	Not significant	
Operational phase							
Human	High	Inhalation of NO_2 and particulates	Long-term	Small	Negligible	Not significant	
Ecological	High	Deposition of nitrogen	Long-term	Small	Negligible	Not significant	

11.9 References

- Welsh Government (2018) Planning Policy Wales
- Vale of Glamorgan Council (2017) Local Development Plan 2011 – 2026
- Cardiff City Council (2016) Local Development Plan 2006 - 2026
- Defra (2018) Local Air Quality Management Technical Guidance (TG16)
- IAQM (2014) Guidance on the Assessment of Dust from Demolition and Construction
- IAQM (2017) Land-Use Planning and Development Control: Planning for Air Quality
- IAQM (2019) A Guide to the Assessment of air Quality Impacts on Designated Nature Conservation Sites
- Highways England (2008) Design Manual for Roads and Bridges.
- Defra (2019) Background Mapping
- Defra (2019) Emissions Factor Toolkit v9.0
- Air Quality Consultants (2018) Calculator Using Realistic Emissions for Diesels V3A
- Defra (2019) NOx to NO_2 Calculator v7.1