ARUP

CiNER Glass Limited

Volume I Environmental Statement

Dragon Glass Bottle Manufacturing Facility

DRAGON-ARUP-ENVZ-XX-RP-YE-000003
30th March 2022

Contents

1 Introduction

1.1 The Purpose of this Report

This Environmental Statement (ES) has been prepared by Ove Arup and Partners Ltd. (Arup) on behalf of CiNER Glass Ltd. to accompany a planning application for the Dragon Glass Bottle Manufacturing Facility development (hereafter referred to as "the proposed development"), which is seeking detailed planning permission for the development of a glass factory on the Rassau Industrial Estate.

The ES provides a description of the 1proposed development and the alternatives considered, the likely significant environmental effects of the proposed development, along with measures to avoid, reduce or offset such effects. It has been prepared in accordance with the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 (hereafter referred to as the 'EIA Regulations').

1.2 Planning application overview

The proposed development would comprise the erection of a purpose-built glass bottle manufacturing facility with associated works on worked platforms within the existing Rassau Industrial Estate. The application site is situated within the Ebbw Vale Enterprise Zone (EVEZ), with the application site being designated as employment land (EMP1.5) within the BGCBC Local Development Plan (LDP). The proposed development would include the construction of a glass manufacturing facility which would extend to an area of approximately 14.4ha occupying the western extent of the plot, with wider internal access roads and landscaping to the east, constituting a cumulative site area of approximately 21.5ha.

The proposed development would comprise the following elements:

- Two furnaces and associated filter buildings and chimney stacks;
- Two cullet buildings and stores for the storage and processing of rejected and recycled glass;
- Batch building and silos for the storage and mixing of raw materials;
- Two production lines for hot & cold processing, inspection and packaging of glass bottles including workshops and storage areas;
- Office space and welfare facilities including canteen, infirmaries and changing facilities;
- An automated warehouse for storage and distribution of glass bottles;
- Utilities building which includes plant space and workshops;
- Waste material stores;
- Substation facilities;

- Liquefied petroleum gas (LPG) stores;
- Regulating and Metering Station (RMS);
- Back up fuel storage facilities;
- Main entrance security lodges and associated weighbridge; and
- External hardstanding for the storage of materials, parking and loading.

The proposed development would also include three attenuation ponds for the control of surface water, as well as landscape planting on site to help screen the development and to offset against the vegetation loss on site, amenity space and an ecological pond.

Figure 1.1 in ES Volume III Figures shows the location of the proposed development.

1.3 Applicant

CiNER Glass Ltd. was formed in May 2019 to offer production, sale and distribution of glass container products to the UK market. CiNER Glass Ltd. forms part of the CiNER Group, an industrial conglomerate based in Turkey operating in energy, media and commerce. The CiNER Group supply raw materials to the global glass industry and operate Park Glass, a similar glass container production facility to that proposed in this application, in Turkey.

The proposed development at Rassau in Wales is part of the Applicant's expansion into Europe. Wales is recognised as one of the world's leading recyclers and the largest exporter of recycled glass in the UK, coupled with accessible port infrastructure and its proximity to a wide range of clients and a skilled local workforce made Wales an obvious choice for the Applicant's expansion.

The Applicant aims to support the production of sustainable glass containers within the UK using the strategic location at Rassau Industrial Estate for commercial, economic and local employment generation purposes. CiNER Glass Ltd. intends to make a positive and long-term contribution to the future of Wales and work constructively in partnership with the Welsh Government and key stakeholders.

1.4 The decision maker

The determining authority for the planning application is Blaenau Gwent County Borough Council (BGCBC). Consultation has been undertaken with BGCBC throughout the planning process and is detailed within relevant topic chapters (Chapters 6 to 15).

1.5 Need for EIA

The requirement to undertake an Environmental Impact Assessment (EIA) is prescribed in the Town and Country Planning (Environmental Impact

Assessment) (Wales) Regulations 2017 (the EIA Regulations). The EIA Regulations require that prior to consent being granted, for certain types of development, an EIA must be undertaken. The EIA Regulations set out the types of development which must always be subject to an EIA (referred to as Schedule 1) and other developments which may require an EIA, if they are likely to give rise to significant environmental effects (referred to as Schedule 2).

As the proposed development falls within category 5(d), 'Installation for the manufacture of glass including glass fibre', and exceeds the 1,000sqm applicable threshold of new floorspace specified in the Schedule, it is considered to be Schedule 2 development defined by the EIA Regulations.

EIA is required for Schedule 2 development where it is considered likely to have a significant effect on the environment. A Screening Opinion issued by BGCBC in 29th April 2020 confirmed that the proposed development falls within Schedule 2 of the EIA Regulations. The Welsh Ministers were requested to make a screening direction under the EIA Regulations as to whether or not the proposed development within the Rassau Industrial Estate is 'EIA development'. The Screening Direction issued by Welsh Ministers on 19th November 2020 determined the proposed development is "EIA development". The Welsh Ministers Screening Direction can be viewed on request via the BGCBC's website (PA/2020/0104) and within Appendix A1.

An EIA Scoping Report was prepared and submitted to BGCBC on 30th April 2021. The Scoping Opinion was issued by BGCBC on 24th June 2021. This can be viewed on request via the BGCBC website and within Appendix A2. The application reference is C/2021/0128.

An Environmental Statement (ES) has subsequently been prepared to accompany the planning application and is based upon the BGCBC Scoping Opinion.

1.6 ES Structure

The ES contains the environmental information that is required by the EIA Regulations (4) and comprises a number of elements that are outlined in the sections below:

Environmental Statement Volume I : Technical Assessments (this volume) includes the introductory chapters, the EIA topic chapters (5 - 16) as follows:

- Chapter 5 - Air quality;
- Chapter 6 – Climate change;
- Chapter 7 – Ecology;
- Chapter 8 – Health;
- Chapter 9 – Materials;
- Chapter 10 – Noise and vibration;
- Chapter 11 – Socio-economics;
- Chapter 12 – Transport;

- Chapter 13 – Visual;
- Chapter 14 – Water environment;
- Chapter 15 – Cumulative effects; and
- Chapter 16 – Summary.

Environmental Statement Volume II: Appendices –includes the technical reports and data that accompany the technical assessments in Volume II.

Environmental Statement Volume III: Figures –includes all the figures in Volume III that are referenced within this ES, however some figures relating to the description of development are integrated into the main text for ease of reference.

Environmental Statement Volume IV: Non-technical summary (NTS) – a report which summarises the findings of the EIA written in non-technical language. This is included as a standalone document in Volume IV.

2 Site and surroundings

2.1 Introduction

This Chapter provides an overview of the proposed development site, including its location, its current use, key features, and proximity to key environmental designations and receptors. It is intended to provide an overview of the environmental context for the proposed development. Further baseline detail on the site and surroundings is documented within the relevant topic specific chapters that follow.

2.2 Site location and context

Figure 1.1 in ES Volume III Figures shows the location of the proposed development, which is located within the Rassau Industrial Estate to the north of Ebbw Vale, Blaenau Gwent, South Wales (Grid Reference SO 15644 12795).

The site is approximately 21.5ha in size and comprises a vacant plot adjacent to the built facilities of the industrial estate.

The Rassau Industrial Estate, built in the late 1970s – early 1980s, currently comprises of purpose-built light industrial/manufacturing units with ancillary office accommodation. Tall structures are also a feature including existing pylons, electricity substation, wind turbines and industrial units with associated chimney stacks. The industrial estate is situated on the foot slopes of Mynydd Llangynidr, approximately 400m south of the Brecon Beacons National Park (BBNP) boundary as annotated on Figure 2.1 of ES Volume III Figures.

The site is currently a vacant plot on the eastern extent of the industrial estate. The groundworks for development on this part of the industrial estate were developed at the time the industrial estate was established, with the creation of the earthworks platforms, access road and utilities being brought into the site.

The original development plateaux is now overgrown and consists of grassland, scrub, broadleaved and coniferous woodland. An unadopted asphalt access road extends from the western boundary of the site which transitions into an unbound gravel track providing access to the eastern extent of the site. See Figure 2.2 of ES Volume III Figures for site context.

A tributary of the Ebbw River (Afon Ebwy) is located within the centre of the site which appears to have been diverted around the northern extent of Rassau Industrial Estate as part of the original industrial estate development. Ebbw River is part of the South East Valleys catchment which eventually flow into the Usk Estuary.

The topography of the site falls gradually from north to south, with the terrain elevation ranging from 427.5 m AOD in the north down to 390 m AOD in the south eastern corner.

The main access is located at the north-west corner of the site from within the Rassau Industrial Estate off an exit of an existing roundabout. The site assumes a prominent position in relation to the wider strategic highway network located immediately north of the A465 (Heads of the Valleys Road) dual carriageway. The A465 provides a strategically important route between the Midlands and South Wales including to areas such as Brynmawr, Ebbw Vale, Tredegar, Rhymney and Merthyr Tydfil.

Pedestrian access to the site from the west is achieved via Alan Davies Way. The footway extends around onto the northern side of the A4281 where it becomes a shared footway/cycleway into Rassau. Alternative pedestrian/cycleway access is provided via an underpass below the A465 Heads of the Valleys Road which connects between Stonebridge Road in Rassau and Rassau Industrial Estate. The site is located close to National Cycle Network Route 46. This long-distance east-west route connects between Bromsgrove (England) and Neath and passes through several residential areas in Ebbw Vale, as well as providing connections to other areas of the South Wales valleys. Within Rassau Industrial Estate there is also provision for cyclists within the carriageway in the form of road markings in the form of white dashed lines, denoting an advisory cycle lane in each direction of travel.

2.3 Site ownership

The site is currently owned by Welsh Government and BGCBC and will be purchased by the Applicant.

2.4 Site history

The Rassau Industrial Estate was prepared as a series of cut-fill platforms in the late 1970s/ early 1980s. The site was the last part of the Rassau Industrial Estate to be developed, which appeared to still be undergoing construction in 1985. In 1991, the plateaus on the site appear to be established and thus resemble the site in the present day.

2.5 The surrounding area

The site is allocated within the Ebbw Vale Enterprise Zone and occupies a strategic location adjacent to the A465 Heads of the Valleys Road in the head of the South Wales Valleys, approximately 700m to the north of Rassau Village and 3km north of Ebbw Vale Town Centre. The A465 links with the A470 at Merthyr Tydfil, which provides access to Junction 32 of the M4 motorway, approximately 25km to the south. The site is approximately 10km northeast of Merthyr Tydfil and approximately 14km west of Abergavenny, the two nearest large urban conurbations. Other smaller settlements nearby include Beaufort, Brynmawr, Dukestown and Sirhowy.

Within the surrounding area, the site is located in proximity to Usk Bat Sites / Safleoedd Ystlumod Wysg SAC and Mynydd Llangatwg (Mynydd Llangattock) SSSI. Lesser horseshoe bats (LHB) are a qualifying feature of the Usk Bat Site

SAC. Mynydd Llangatwg (Mynydd Llangattock) SSSI is designated for its habitats, notably base-rich grassland, heath blanket mire and dry heath. The site is also located close to Mynydd Llangynidr SSSI, designated for its geological interest; both this site and Mynydd Llangatwg SSSI are also designated as Regionally Important Geodiversity Sites (RIGS). These sites are presented in Figures 7.1 to 7.2 of ES Volume III. Other protected sites are also present in proximity, including Sites of Importance for Nature Conservation, the nearest located adjacent to the east of the site: ENV 3.28 – Ebbw (fawr) River North and South.

There are a number of sensitive receptors within 1km of the site within the surrounding residential areas which include the Rhos Y Fedwen Primary School, Mrs Puddleduck Day Nursery and Bank House Care Home. Other nearby sensitive receptors include residential properties, some of which are located within 500m of the site boundary. Consideration of these receptors are given throughout the ES, with specific reference to Chapter 5 Air quality, Chapter 8 Health and Chapter 10 Noise and vibration.

3 Proposed development

This chapter outlines the need for, and purpose of, the proposed development, alternatives considered and provides a description of its main components, including an outline of construction and operational requirements.

3.1 Need for the project

The proposed development will be located within Rassau Industrial Estate on a site allocated within the Ebbw Vale Enterprise Zone and is forecasted to create approximately 671 jobs associated with the operation and running of the facility and approx. 450 jobs during construction at peak times. CiNER Glass Ltd. is committed to providing training and employment opportunities for local people, boosting the local economy with the vision to build a centre of engineering excellence in glass technology in Wales.

Ebbw Vale is one of eight Enterprise Zones across Wales and focuses primarily on the advanced materials and manufacturing sector. The overall vision for the Ebbw Vale Enterprise Zone is for:

"..the creation of a vibrant, world class high technology hotspot for Welsh based manufacturing companies of all sizes spanning many key sub sectors including food and manufacturing, providing employment that is challenging, rewarding and valued." [1]

Ebbw Vale has a rich international and indigenous manufacturing heritage, contributing to Welsh productivity levels[2]. The proposed CiNER Glass Ltd's glass manufacturing facilities are high tech environments which align with the vision of the Ebbw Vale Enterprise Zone. Such a facility would support the implementation of advanced technologies in the glass packaging industry, from state of the art production and control systems, to automatic sampling and recycling systems, whilst also generating manufacturing employment within a workplace that supports the health and wellbeing of staff.

3.2 Project description

The Dragon Glass Bottle Manufacturing Facility would be a purpose-built glass bottle manufacturing plant, within the Rassau Industrial Estate. The proposed development is forecasted to create approx. 671 jobs associated with the operation and running of the facility and up to 450 jobs during construction at peak times. Due to the operating requirements of the glass furnaces, the facility will operate 24 hours a day, 7 days a week via a shift system.

[1] Ebbw Vale Enterprise Zone, Strategic Plan 2018-2021: https://gov.wales/sites/default/files/publications/2019-03/ebbw-vale-enterprise-zone-strategic-plan-2018-2021_0.pdf
[2] https://businesswales.gov.wales/enterprisezones/zones/ebbw-vale

The proposed development consists of a three-part operation to produce glass bottles; the handling of raw materials, the manufacturing of the glass containers and the product-inspection, packaging and storage process.

The illustrative plan (Image 3.1) summarises the proposal for the Dragon Glass Bottle Manufacturing Facility which forms the basis of the planning application, including:

- The planning application boundary;
- The proposed extent of manufacturing facility; and
- Access point for vehicles and car parking.

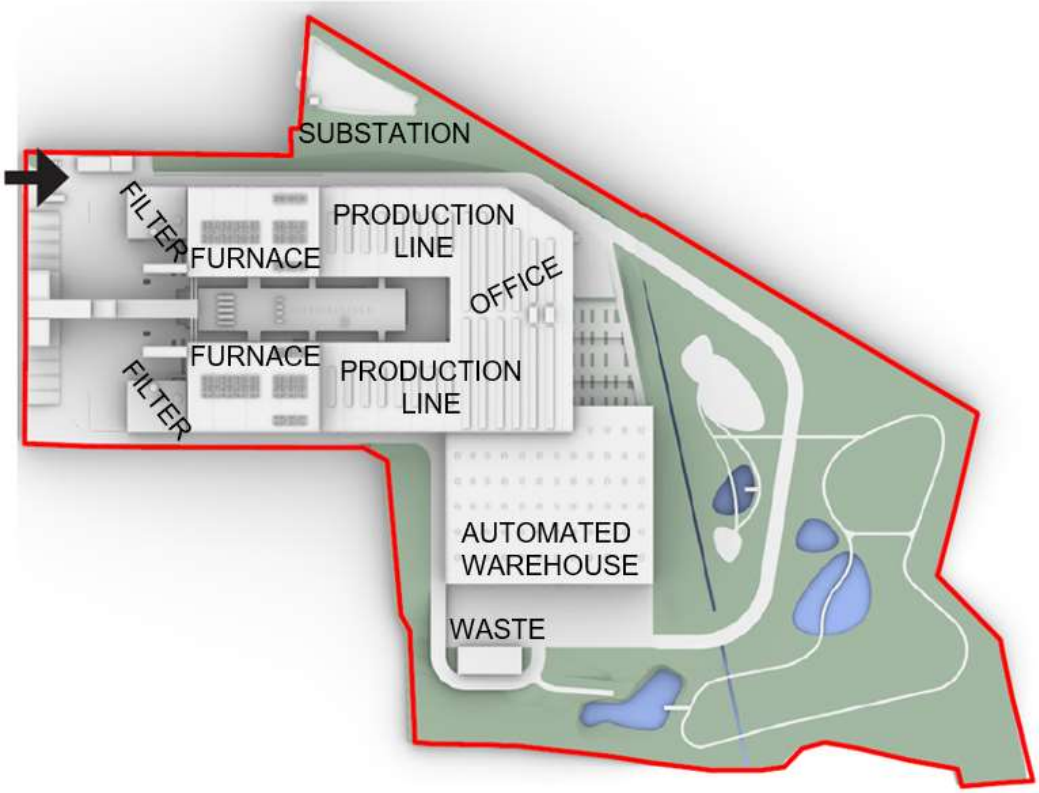


Image 3.1 Illustrative plan of proposal.

The proposed development consists of a number of distinct components which are included in the below Image 3.2.

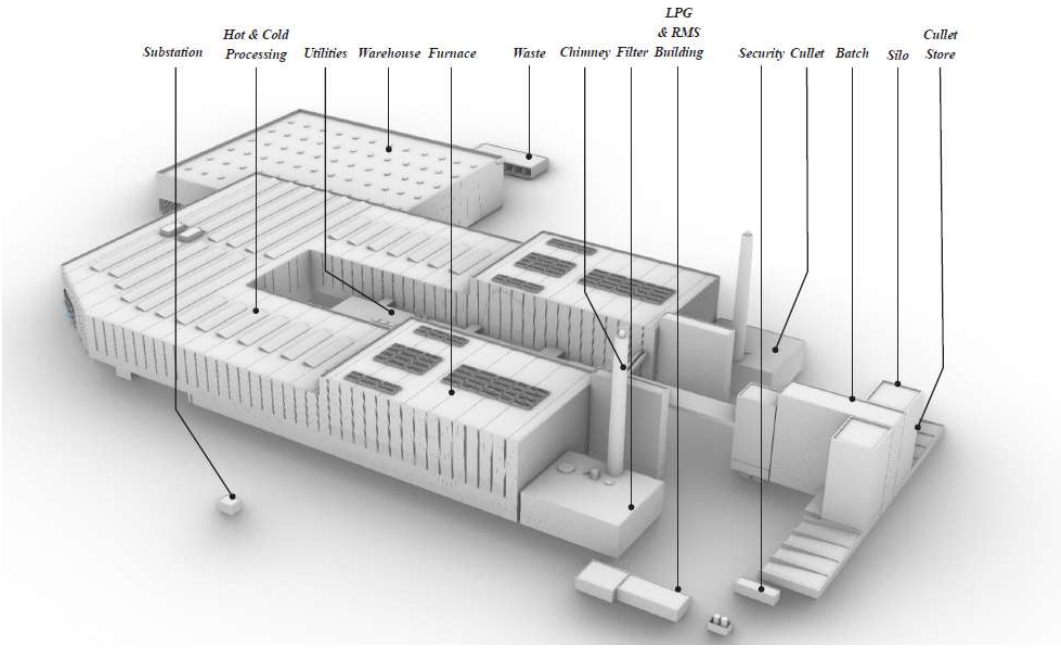


Image 3.2: Illustrative plan of proposed development

The key components of the proposed development outlined in Image 3.2 above are detailed in Table 3.1 below. The proposed development would extend to an area of approximately 14.4ha occupying the western extent of the plot, with wider internal access roads and landscaping to the east, constituting a cumulative site area of approximately 21.5ha.

Table 3.1: Components of the proposed development

Components of proposed development	**Details**
2No furnaces and associated filter buildings and chimney stacks	Furnace building dimensions: 93.7m (L) x 64.6m (W) x 35.3m (H) Filter building dimensions: 40.5m (L) x 36.35m (W) x 14.8m (H) Chimney stack height: 75m Chimney stack diameter: 7m
2No cullet buildings and stores for the storage and processing of rejected and recycled glass	Cullet building dimensions: 31.8m (L) x 7m (W) x 39.5m (H):
Batch building and silos for the storage and mixing of raw materials	Batch building dimensions: 62.7m (L) x 12.8m (W) x 39.5m (H) Silos dimensions: 17.3m (L) x 19.6m (W) x 39.5m (H)

Components of proposed development	Details
2No production lines for hot & cold processing, inspection and packaging of glass bottles including workshops and storage areas;	Process building dimensions: 181m (L) x 64.6m (W) x 28.2m (H) Approx. 80,000m2 Gross Internal Area
Office space and welfare facilities including canteen, infirmaries and changing facilities	Approx. 10,300m2 Gross Internal Area
An automated warehouse for storage and distribution of glass bottles	Warehouse building dimensions: 148m (L) x 108m (W) x 27.7m (H) Approx. 16,000m2 Gross Internal Area
Utilities building which includes plant space and workshops	Utilities building dimensions: 161.8m (L) x 25m (W) x 13.5m (H) Approx. 12,100m2 Gross Internal Area
Waste material stores	Waste materials stores dimensions: 40m (L) x 20m (W) x 4.8m (H)
Standalone buildings	
Substation facilities	Substation building dimensions: 7m (L) x 6m (W) x 4.5m (H)
Liquefied petroleum gas (LPG) stores	LPG sore dimensions: 24m (L) x 10.8m (W) x 7.65m (H)
Regulating and Metering Station (RMS)	RMS building dimensions: 15.4m (L) x 13.3m (W) x 7.65m (H)
Back up fuel storage facilities	Area dimensions: 23m (L) x 17.2m (W)
Main entrance security lodges and associated weighbridge	Area dimensions: 16m (L) x 5m (W)
External hardstanding for the storage of materials, parking and loading.	A total of 389 on-site car parking spaces are proposed comprising 325 standard spaces, 6 additional visitor spaces, 19 disabled parking spaces and 39 Ultra Low Emission Vehicle (ULEV) charging spaces. Cycle parking and associated facilities will also be provided including 21 covered Sheffield style stands as part of the

Components of proposed development	Details
	development, providing storage for up to 42 cycles.
The proposed development would also include three attenuation ponds for the control of surface water, as well as landscape planting on site to help screen the development and to offset against the vegetation loss on site, amenity space and an ecological pond.	

3.3 Key design principles

The facility has been positioned on site to meet the following criteria:

- To provide a functional connection between the principle areas, for an optimised process route;
- Provide a functional route for logistical access around the buildings within the constraints of the site boundary;
- Orientate the principle elevation of the building towards the site approach;
- Compose a rectilinear building form to create a well ordered appearance.

The key design principles have been defined through needs for the proposed development and the parameters and constraints that will influence the shape and layout of the development. These parameters have been distilled into six design principles used to inform the design of the facility in the context of the site:

- Orientation: To orientate the building in such a way that the development can benefit from as much natural light as possible. This will reduce the need for artificial lighting and will maintain a connection between the internal facility and external landscape for those working within the facility. To provide a functional connection between the principle areas, for an optimised process route and to provide a functional route for logistical access around the buildings within the constraints of the site boundary;
- Context: The layout of the development will respond to the local context. Larger building masses and louder process areas are to be distanced from the residential area and highway to the south of the site. This will minimise the visual and acoustic impact of the proposed development;
- Topography: Whilst the design of the development will be predominantly driven by the process lines, where possible the buildings will work with the natural slope of the site in order to minimise the amount of earthworks required;
- Infrastructure: Where possible the existing infrastructure on site is to be retained, reused and improved;
- Dark Skies: The Brecon Beacons National Park is an international Dark Sky reserve. Although the site is situated outside of the national park boundary, the design will aim to reduce the amount of light spill from the development; and

- Landscape: The landscape will play a key role in both invigorating the natural landscape around the site whilst also providing aspects of wellbeing for the staff. The overarching concept is to create a multifunctional and robust landscape that respects and responds to both the open moorland and the industrial context of the site. A strong landscape framework will retain and enhance the existing natural features of value and integrate green and blue infrastructure into the proposed development. The landscape spaces will be optimised to serve ecological functionality, amenity for staff members and sustainable water management.

3.4 Alternatives

Schedule 4(2) of the EIA Regulations requires the following in relation to consideration of alternatives for a proposed development:

> 'A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the applicant or appellant which are relevant to the proposed development and its specific characteristics and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects'.

This section provides an overview of reasons for the selection of the site and how the design has evolved to reach the current outline planning application design. CiNER Glass Ltd. considered alternatives for a proposed glass bottle manufacturing facility as set out in the following sections.

3.4.1 Site selection

A number of alternative sites within Wales were investigated for the development of a glass manufacturing facility. Following a review of alternative sites, the site located within the Rassau Industrial Estate was selected for this project due to number of important advantages:

- It is large enough to accommodate the needs of the glass manufacturing facility and associated infrastructure to enable an effective and efficient design;
- It is a vacant plot within the Rassau Industrial Estate, designated as part of the Ebbw Vale Enterprise Zone;
- The site offers a strategic location adjacent to the A465 Heads of the Valleys Road in the heart of the South Wales Valleys; and
- The connection onto the A465 Heads of the Valleys Road provides good transport connectivity for manufacturing facilities and the transport of goods for the proposed development, as well as existing manufacturing and industrial facilities;
- It has strong potential for local employment and training within an existing industrial area; and
- The site has good access to utility connections within the industrial estate.

Due to the scale of the project there were very few alternative site options that provided CiNER Glass Ltd. with a strategic location, a site large enough for the proposed development, connections to utilities and within an existing industrial area.

3.4.2 Site layout

Design development including the consideration of the six key design principles of Orientation, Context, Topography, Infrastructure, Dark Skies, Landscape were adopted to minimise adverse impacts on the environment and the surrounding area (see section 3.3). As part of this process, two main scenarios for the site layout were developed:

1. Production process running South to North, with the warehouse positioned to the West; and
2. Production process running West to East, with the warehouse positioned to the south.

Through consideration of the key design principles the second scenario presented was taken forwards and presents the following advantages:

- Tall chimney stacks would be positioned further away from the main road and located at a more central location in the industrial estate adjacent to other tall structures;
- The facility enables more opportunity for retention of vegetation and additional landscaping to the south of the site, adjacent to the A465 Heads of the Valleys Road;
- The materials yard is positioned next to the site entrance, allowing for more efficient raw material delivery;
- The key areas of high activity and industrial processes surrounding the furnaces, cullet stores and batch buildings are located to the west of the site adjacent to the neighbouring industrial plots and further from the residential areas to the south of the site;
- In this orientation the utilities building could be located centrally between both production lines, acting as a central hub to the facility;
- The proposed development will provide a functional connection between the principle areas, for an optimised process route; and
- This orientation has reduced overall footprint onsite enabling more space for landscaping, mitigation and retention of green areas.

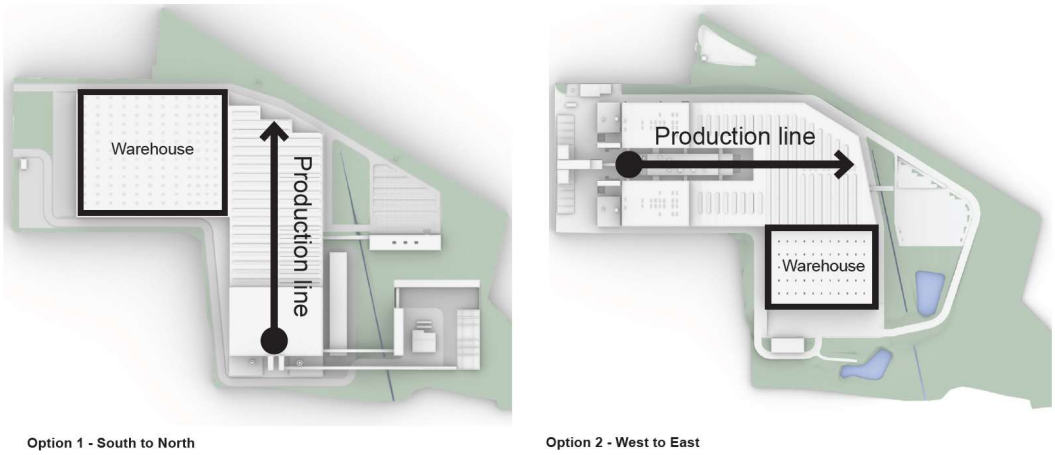


Image 3.3: Alternatives to site layout

3.4.3 Site access

A number of different strategies were developed for access into and around the site. Alternative configuration of site access were explored during design development with the consideration of practicality, cost, environmental and ecological impacts and safety.

Separate routes were considered for access by staff and visitors, and the HGV movements to and from site for the delivery of raw materials and the transportation of glass bottles away from the site. A single entry and exit point was finally proposed to simplify the design, enable greater onsite security with one secure line and the reduction in area required for the site roads.

3.4.4 Building façade

Studies were undertaken to develop a concept for the building envelope and appearance. These studies considered the structural grid, materiality, colour and appearance of the external façade of the building.

Given the overall size of the proposed development, it is important through the design process to consider how the material and finishing choices for the building disguises the overall mass of the facility on site. The approach taken embraces a bold solution which sets to create a statement building of high architectural quality. This approach was developed alongside the Planning Officer and Landscape Officer at BGCBC and the proposals now include the use of a natural anodised materials to provide a reflective finish.

Consideration of design and alternatives was given to the surroundings and local context and how the proposed development would appear in the landscape and against the skyline. The use of alternative material finishes, including the use of block colours or darker tones would highlight size and scale of the proposed development giving the appearance of a large, heavy building sat in the landscape. It was also considered that when trying to align to the colour and finish of the facility back-drop of the proposed development, the back-drop of the Brecon Beacons would vary in comparison to when the building is silhouetted against the sky or viewed alongside the built up valley.

Using a reflective metallic finish to the façade in place of block colours or darker tones, the building would be able to adapt to various viewpoints both locally and at a distance, subtly picking up on the tones of the sky, natural colours of the surrounding landscape and adjacent buildings. The finish would create a light structure and the reflective quality would change daily reflecting the weather and change of seasons. A Visual Impact Assessment of the proposed development has been undertaken in Chapter 13 and further details on the design of the proposed development can be found in the Design and Access Statement as part of the planning submission documents.

3.5 Operational processes and activities

3.5.1 Key principles

The manufacturing process for the production of glass bottles on site has two distinct principle areas:

1. Production (including furnace, hot & cold processing, and process support area; and
2. Warehouse for the storage and distribution of glass bottles.

These two principle areas of the manufacturing process are shown below in Image 3.4 below.

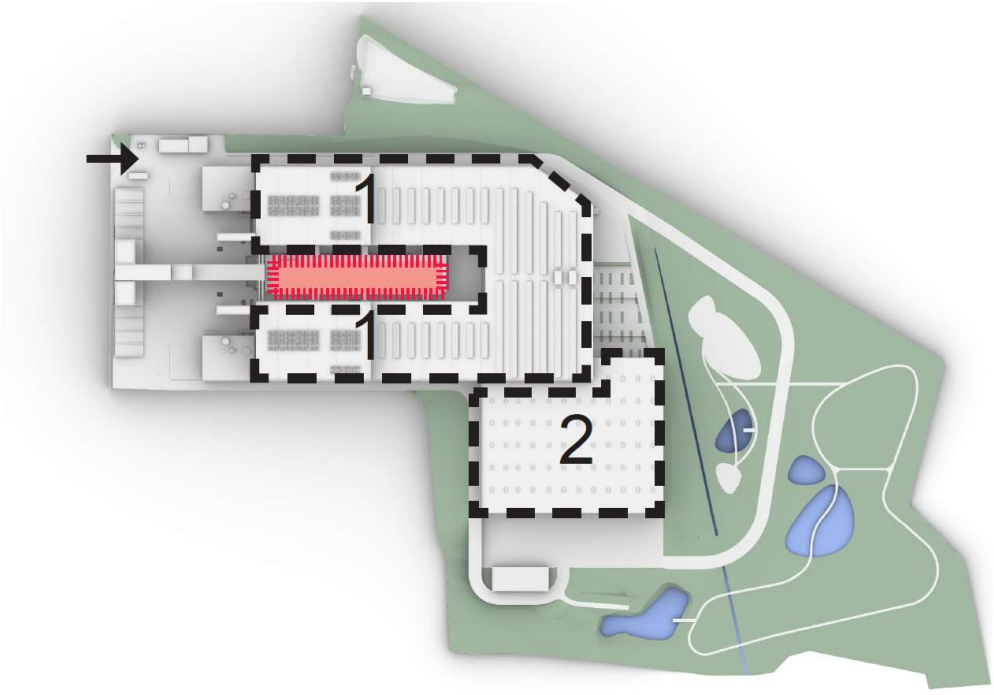


Image 3.4: Key principle areas of the proposed development

3.5.2 The process

The glass bottle manufacturing process begins with raw materials. The batch building houses the raw materials in silos, fed by trucks. These raw materials

include, silica sand, soda ash and limestone. The batch building measures and mixes the raw materials before delivering them via conveyor to the furnace building via the cullet building.

Cullet is crushed recycled glass that is ready to be remelted. The cullet building stores and mixes recycled glass with the raw material mixture. The mixture is then delivered to the furnaces via a conveyor.

The production facility is composed into two production lines. Each production line includes three principle areas: a furnace, a hot processing area and a cold processing area. Both production lines are linked to a utilities building which houses transformers to power the furnaces and back-up power generators.

The glass bottles would then leave the production line and enter the automated warehouse for storage and distribution.

Image 3.5 below outlines an illustration of the glass bottle manufacturing process through a schematic of the process.

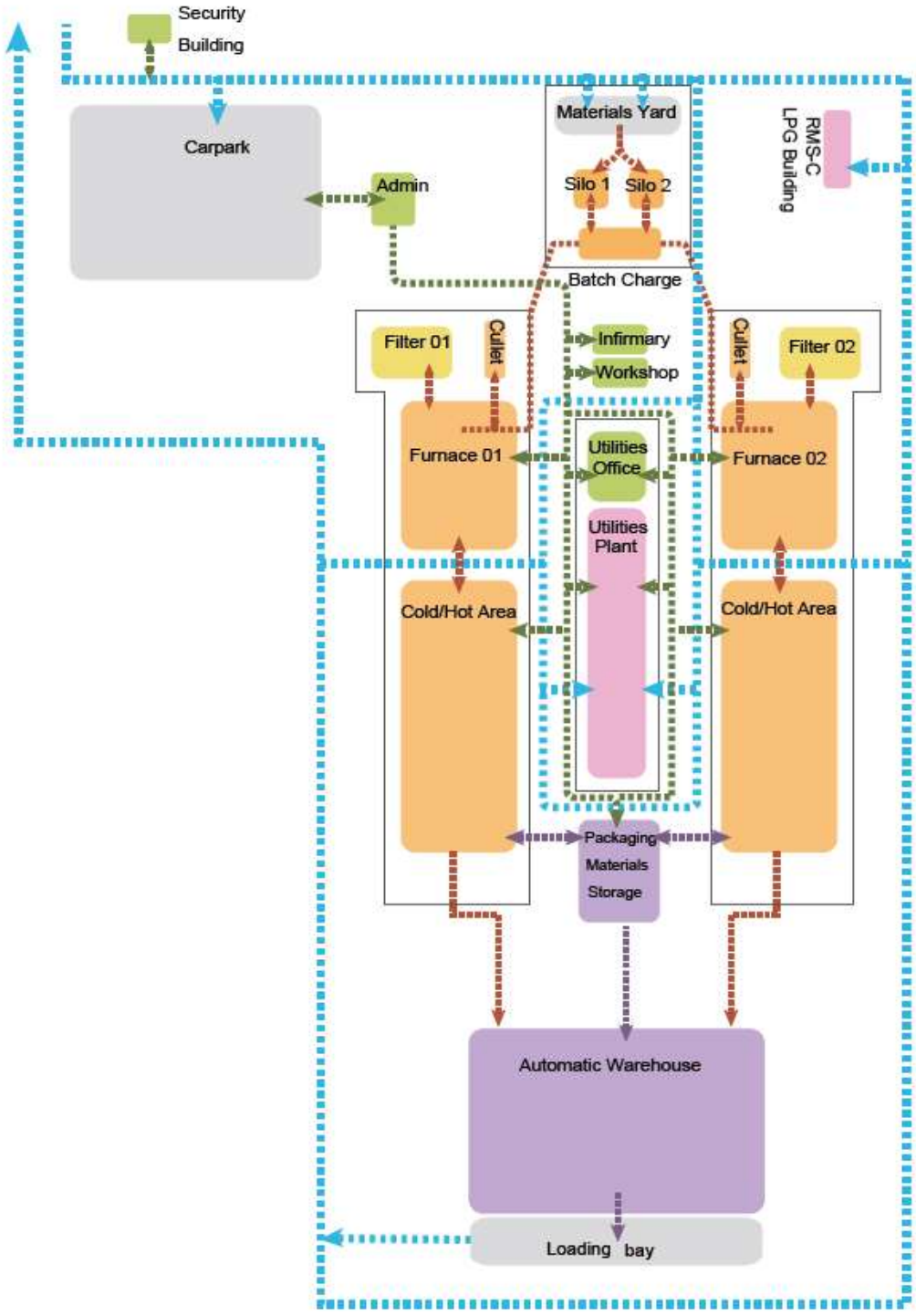


Image 3.5: Glass bottle manufacturing process illustration

3.5.3 Key components

Furnaces, associated filters and chimney stacks

Two furnaces and associated filters and chimney stacks are proposed. The chimney stacks would be circa 75m in height and located to the west of the site. A

new dedicated connection to the local gas network will be made to supply the furnaces.

Cullet buildings

Cullet is crushed recycled glass that is ready to be remelted. Two cullet buildings are proposed. These would be for the storage and processing of recycled glass with raw materials. The mixture is then delivered to the furnaces via a conveyor.

Batch building and silos

A batch building and associated silos are required for the storage and mixing of raw materials including silica sand, soda ash and limestone for the manufacturing of glass bottles.

Production lines

Two production lines for hot & cold processing, inspection and packaging of glass bottles within the main glass manufacturing facility.

Warehouse

The warehouse will utilise an autonomous stacking system for storage of finished bottles for eventual distribution. There would be a loading bay and access on the southern side of the warehouse for the distribution of glass bottles.

Utilities building

The utility building contains the majority of plant equipment which services the two furnace buildings and production lines. The utilities building would include plant space, workshops, office space and welfare facilities for staff.

Office and welfare facilities

The office and welfare facilities are located at the eastern extent of the main process building and contains facilities for plant operations and visitors including offices and meeting rooms, a reception area, a canteen, infirmaries and changing facilities.

Waste material stores

The waste stores are located to the south of the site and will segregate waste into areas with waste being stored in each section according to the waste code it falls under. This will make segregating it simple for pick-up and recycling or disposal as appropriate, as well as preventing hazardous wastes from contaminating other non-hazardous wastes.

Standalone plant and buildings

The following standalone plant buildings will be on site:

- Electricity substation;

- Regulating and metering station for the incoming gas supply (RMS-C LPG); and
- Diesel tanks.

Main entrance, security lodges and associated weigh bridge

There would be one main entrance into the site, on the west of the site and would be where all visitors (including staff) and vehicles enter. From here people would be directed to one of three locations:

- Materials yard – to deliver raw materials;
- Warehouse loading bay – to collect packaged goods; and
- Staff and visitor car park

The building entrances would be on the east of the facility; one for visitors and one for staff.

The security lodges either side of the main entrance and a perimeter fence would be present around the whole of the site area. The weigh bridges are used to weigh materials as they enter the site on trucks.

External hardstanding for the storage of materials and loading

The area of hardstanding at the western extent of the site is required for the materials yard for the delivery and storage of materials, as well as the movement of material to feed the glass manufacturing process. To the south of the site, adjacent to the warehouse, an area of hardstanding is required for the loading of glass bottles for the transportation and distribution via HGVs.

Parking provision

Car parking facilities are provided to the east of the site adjacent to and below the staff and visitor entrances with 19 accessible spaces are located below the office/welfare area within 50m of the staff entrance.

A total of 389 on-site car parking spaces are proposed comprising 325 standard spaces, 6 additional visitor spaces, 19 disabled parking spaces (5% of the total number, as per the BGCBC adopted Parking Standards) and 39 (10% of the total number) Ultra Low Emission Vehicle (ULEV) charging spaces. The car park would incorporate trees and planting throughout. There would also be provision for cycle storage for employees.

Cycle parking and associated facilities will also be provided including 21 covered Sheffield style stands as part of the development, providing storage for up to 42 cycles.

Pedestrian routes will be provided within the car park, which will be clearly marked, well-lit and will indicate a safe route towards the respective entrance. Pedestrian routes will achieve the minimum requirements regarding access for wheelchair users, and widths required for wheelchair users to pass one another. The gradient and crossfall of these paths will be 1:50.

Landscaping

The hard and soft landscape plan is presented in Figure 3.1 in ES Volume III.

An ecologically rich landscape will be created that will also support the well-being of the work force at the factory. The existing valuable flora and fauna outside of the building footprint will be protected and enhanced and supplemented with the creation of new areas of woodland and grassland habitats. Further details on the existing habitats and species on site can be found in Chapter 7 Ecology.

A series of amenity areas will be located to the east of the building and car park, accessed via a footbridge over the existing drainage channel. The area makes use of the space enclosed by the access road and provides a conveniently located space for use by the workforce during breaks. The space will include areas of seating, paths to decking at the edge of the retention pond as well as open areas for informal recreation.

Beyond the central amenity area, a 'loop' is proposed linking across the access road to the eastern and southern areas of the site which could be used as a running or walking route at break-times or outside work hours for exercise. The continuous path will allow access through different landscape areas, though in more ecologically sensitive areas access will be restricted to boardwalks. Resting places and seating will be provided along the route.

Along the northern and southern boundaries, native woodland buffers will be established to soften the appearance of the buildings within the landscape. The southern woodland will include areas of existing woodland that will be retained and managed to improve diversity and protect the locally rare fungi present in this area.

The existing culverted water channel will be retained, including the trees along it, thereby retaining the existing habitat corridor through the site.

The road corridors immediately around the building will be lined with planted raingardens which will intercept water-run off as well as providing additional habitats for wildlife. Tree planting will be integrated throughout the car park and amenity areas to visually soften the area and assist with water attenuation. Permeable paving will also within the car park to reduce run-off.

To the east of the access road the area of marshy grassland and heathland on degraded peatland will be restored through management. This would contribute to carbon-capture as well as producing a valuable habitat for uncommon wet-heath and marshy grassland plants.

Image 3.6 identifies the following distinct areas of the landscape plan shown below on the illustrative landscape plan:

1. Open grassland surrounding sub-station extension;
2. Footbridge connecting the main entrance and car park to the amenity area;
3. Car park;
4. Amenity area;

5. Decking and seating area overlooking retention basin;
6. Existing water channel with existing trees retained where possible;
7. Native woodland buffer planting – existing woodland retained where possible and enhanced through appropriate management and additional planting of native species.;
8. Ephemeral pond; and
9. Area managed to restore and enhance area of existing marshy grassland and heathland.

Image 3.6: Illustrative landscape plan

An outline landscape management strategy has been undertaken as part of the planning submission which seeks to inform the management criteria for the external spaces during the operational phase of the development which will support the establishment and long term success of the overarching aim of the landscape proposals. A fully detailed management plan for the external spaces will be submitted and agreed through detailed reserved matters proposals.

The management plan will focus in particular on how the following will be successfully delivered through long term management and maintenance activities:

- The restoration and enhancement of existing of wet marshy grassland and heathland within the east of the site though appropriate management;
- The creation of a mixture of different species rich grasslands, with the aim of re-creating those being lost with existing substrates reused to support their establishment;

- The creation of new species-rich native wooded areas and corridors through the centre and northern perimeter of the site;
- The enhancement of retained areas of existing woodland within the south of the site; and
- The creation of species-rich wetland areas with drought and water tolerant species around the retention basins and the wet pond.

Biodiversity

Enhancement measures are proposed, in addition to any mitigation and or compensatory measures, to provide further benefit to ecological receptors, beyond what is required. Biodiversity enhancement and the promotion of ecosystem resilience is a material consideration in planning decisions, due to its requirement by the Environment (Wales) Act 2016 and Planning Policy Wales (PPW11). As such, enhancement measures would be in accordance with legislation and policy.

Biodiversity enhancements are proposed on and offsite. The majority of enhancements and net gain will be provided through off-site habitat management, delivering management prescriptions as set out in existing LNR management plans.

Services and utilities

A new dedicated connection to the local gas network will be made to supply the building furnaces. The natural gas supply will enter the site boundary via a dedicated gas meter kiosk, from there it will distribute below ground to the Regulating and Metering Station (RMS) area.

Liquid Petroleum Gas (LPG) will be stored on site and utilised to provide emergency back-up supply to the forehearths within the hot end of the glass making facility.

A new connection from the WPD substation adjacent to the north of the site will be created and the existing 132kV pylons, 33kV and 11kV buried cables will be relocated.

Incoming power from the WPD owned 132kV substation located north of the site will be via buried cables where power is stepped down from 132kV to 33kV and distributed to the 2no 15MW 33kV/11kV substations. These substations will provide power to the site through an array of 11kV/400kV transformers located in the utility building.

Diesel is required to be stored to serve as backup fuel in the event of mains gas and/or electricity outages. It is essential that once powered up the furnaces are kept on for their 12-15 years lifetime. As such, a comprehensive secondary power supply system will be provided in the form of a set of standby generators to power the heating elements of the furnace and associated equipment such as the cooling systems, exhaust fans, filtering systems as well as the cullet and blending systems in the event of a power outage. 5no 2.5MW standby diesel generators (4+1 spare) will be provided. The generators will be able to maintain the furnaces and associated equipment running until the primary power is restored. These

generators and associated day tanks will be located on the ground floor of the utility building. The reminder of the diesel fuel required for the generators to provide power the factory for 48 hours will be stored in tanks outside the building.

New connections to the BT network are to be provided from BT's existing network and routed to the utility building.

Water

A new domestic water supply will be provided from the local water utility company Dŵr Cymru Welsh Water (DCWW) network. The supply will serve the potable, process and fire-fighting water tanks within the facility.

Drainage – foul water

Dŵr Cymru Welsh Water (DCWW's) foul public drainage is present within the estate road located along the western boundary of the site. The 150mm sewer extends into the site along the western boundary and continues southwards towards the A465. The development will generate domestic foul flows and trade effluent for the manufacturing process. A connection will be made with the foul drainage network in agreement with DCWW.

Drainage – storm water drainage

This application requires developers to utilise Sustainable Drainage Systems (SuDS) in their surface water management for a development. Methods of SuDS have been investigated for the development. SuDS is an approach to manage surface water run off seeking to imitate natural drainage systems. SuDS strive to and retain storm water on or near the site as opposed to traditional drainage approaches which involve conveying storm water off site as quickly as possible.

The surface water drainage strategy for the proposed development, submitted as part of the planning application, implements SuDS measures for the storm drainage in accordance with the 'Statutory standards for sustainable drainage systems - designing, constructing, operating and maintaining surface water drainage systems 2018'. New surface water networks will be required to service the new development of the site including the use of three attenuation ponds before discharging into the watercourse located within the site.

The proposed network will need to be approved by the local SuDS Approval Body (SAB). The SAB responsibility for Blaenau Gwent County Borough Council area is administrated by Caerphilly County Council.

Site terrain and topography

The site is approximately 21.5ha in area and in plan the site has an irregular polygonal shape. Overall, there is a fall in the existing topography from north to south, with the terrain elevation ranging from 427.5mOD in the north, down to 390mOD in the south-eastern corner.

Due to operational requirements, both furnaces and the utilities building are required to be positioned at the same ground level. This will require reprofiling of earthworks during construction to create a large flat plateau to the north-west of

the site with retaining walls. A reduction in earthworks is required to the north and an increase in earthworks is required to the south of the furnace buildings.

Lighting

The facility would be operational 24 hours a day and would therefore require some lighting which would be a combination of building mounted, column mounted and bollard luminaires. The strategy adopted to minimise light pollution will be careful selection and positioning of luminaires to avoid obtrusive light, light trespass beyond the boundary and to minimise glare. Luminaires will be selected and positioned to prevent light spill into neighbouring properties, residential accommodation and towards the Brecon Beacons National Park.

In addition, where required, luminaires will be fitted with necessary glare baffles/louvers to prevent light spill. Lighting will be designed and developed with due consideration to the ecology and wildlife in and around the site.

3.6 Construction works

Programme

The proposed development would be constructed over a period of approximately four years. The first phase of construction is proposed to commence in summer 2022, following approval of the planning application, with ecological mitigation, overhead line diversions and general tree clearance. The main contractor will start on site early 2023 on infrastructure works (site set up, clearance, utilities diversions and bulk earthworks) followed by the superstructure for the first furnace with an aim for it to be operational by Q4 of 2024 following an 18 month build programme. Construction of the second furnace would be undertaken in parallel although fit out of the second furnace will run sequentially with an aim of being operational by Q3 2025.

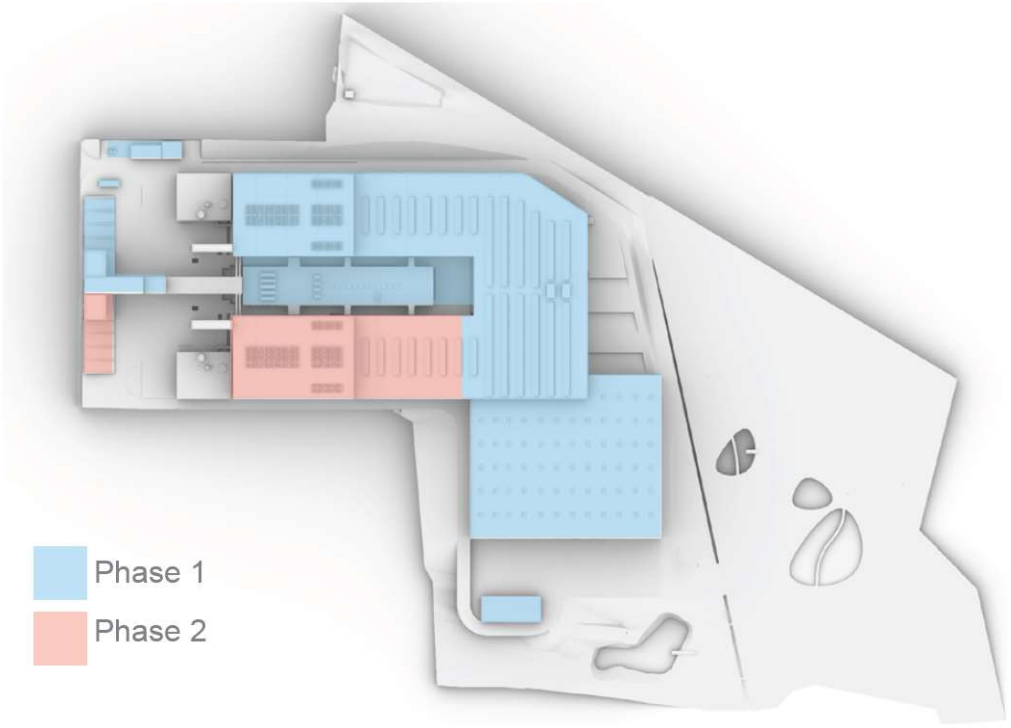


Image 3.7: Phased build

The specific location of construction compounds and welfare facilities within the site are yet to be determined, although are likely to be situated in areas that minimise disruption.

All materials are anticipated to be stored close to the area where they will be used. They will be planned for delivery "just in time" to limit the amount of materials stored on site and maximise the site areas available for operational use. Similarly, plant and equipment will be ordered and delivered to site to suit the programmed task in hand.

Environmental Management Plans

A project Site Waste Management Plan will set out the waste strategy, targets and management mechanisms and will be monitored and regularly updated to ensure its effectiveness.

An outline Construction Environmental Management Plan (CEMP) has been prepared which contains control measures, and the standards to be implemented throughout the construction of the works in order to avoid and reduce impacts during construction. Appendix A3 includes the outline CEMP and it is proposed that compliance with the CEMP is achieved through planning conditions.

Working hours during construction

Core working hours are anticipated to be Monday – Friday 08:00 – 18:00; Saturday 12:00 – 18:00 unless in exceptional circumstances which dictate evening or further weekend working.

Construction vehicle access

Construction vehicles would enter and exit the site at the western extent of the proposed facility during construction as well as operation, with movements coming off the A465 Heads of the Valley Road. Access for construction purposes (vehicular and pedestrian) would be controlled via the main entrance. Vehicular movements and deliveries would be scheduled outside of peak traffic periods unless in exceptional circumstances.

Construction vehicles are anticipated to use the same route as existing traffic to and from the industrial estate. This route uses the main signposted route to the site from the A465 Heads of the Valley Road. Vehicles would be restricted from travelling through the local Rassau residential areas.

Earthworks

Demolition of the existing access track would be undertake alongside excavation works to form the development platform. Initial calculations estimate a net export of 15,000 m3 of earthworks will be required, however further ground investigations will take place which will identify the suitability of the material that will be excavated on the site and confirm the type and quantity of material. The quantity of material that needs to be exported and disposed of will be reduced through resource efficient design, including:

- Material excavated on site will be reused to construct the development platform or for landscaping, where appropriate;
- The levels of site infrastructure, such as roadways and parking areas, will be designed to reduce reliance on imported aggregate, where appropriate;
- Seek opportunities to reuse excess materials from earthworks;
- Seek opportunities to reuse exported material off-site with other parties to reduce the amount of material being disposed of; and
- Employing Circular Economy principles, including sourcing sustainable materials and 'designing out waste' to minimise impact for the materials used in the design and to reduce the volume of waste produced during construction;

3.7 Operational phase

It is anticipated that the proposed development will commence operation of the first furnace in 2024, with the proposed development expected to be fully operational in 2026 with both furnaces in operation. For the purpose of the assessment, the operational phase is assumed to run from 2024-2084, with the first full year of operation commencing in 2026.

The facility is forecasted to create approx. 671 jobs associated with the operation of the facility that will run 24 hours a day, 7 days a week via a shift system.

The proposed works will require the delivery of raw materials to the site including sand and soda ash to produce glass alongside other raw materials required for the production process, including the use of recycled glass. This will require approximately 60 daily HGV movements to and from site (Monday-Friday).

The facility will also require the transportation of finished product glass bottles following production. During the low season months (October to April) the transportation of finished product would result in approximately 65 daily HGV movements. During peak months (May to September, and December) movements are likely to increase to approximately 130 daily HGV movements to and from site due to increased demand.

Incoming deliveries will take place between 08:00 and 17:00, with outgoing deliveries between 06:00 and 22:00. Deliveries are likely to be higher in the first half of the day to accommodate the transportation and delivery of glass bottles before 09:30.

3.7.1 Site access

All vehicles will access the site via the main entrance to sign in with security at the gate. The gate will be operated 24 hours a day. As with construction, vehicles are anticipated to use the same route as existing traffic to and from the Rassau Industrial Estate.

3.7.2 Decommissioning

The facility has been designed to a 60-year design life and whilst the facility currently has a planned 30-year operational life, it is possible that the Applicant would look to continue operation beyond this.

Based on this operational/design life, any environmental assessment of decommissioning would be difficult, as it is not known what the environmental baseline conditions will be at that time. As a result, decommissioning has been scoped out of the assessment and would be considered at the time of decommissioning. Notwithstanding, it is likely that any impacts would be similar to those identified within this EIA as construction impacts.

4 Approach to the EIA

4.1 Introduction

Environmental Impact Assessment (EIA) is required for certain categories of projects (as identified in the EIA Regulations) and involves a process of drawing together, in a systematic way, an assessment of a project's likely significant environmental effects which must be considered before development consent (planning permission) is granted.

The EIA process leads to the presentation of information about the proposed development, along with its associated environmental effects, within an ES for the consideration by the determining authority in deciding whether planning permission should be granted.

The EIA process itself includes key characteristics:

- Systematic – the EIA is comprised of a series of tasks that are defined by regulation and practice;
- Analytical – the EIA must be used to inform the decision making rather than promote the project itself;
- Consultative – the EIA process must allow for and provide opportunity for interested parties and statutory consultees to provide feedback on the project and assessments undertaken; and
- Iterative – the EIA process should allow for environmental concerns to be addressed during the planning and design stages of the project.

4.2 Regulatory context

The requirement to undertake an EIA is prescribed in the EIA Regulations.

Having regard to the characteristics of the proposed development, it is considered to fall within category 5 (d) 'Installation for the manufacture of glass including glass fibre' of Schedule 2 of the Regulations.

As the proposed development falls within category 5 (d), and exceeds the 1,000sqm applicable threshold for this category specified in the Schedule, it is considered to comprise Schedule 2 development.

EIA is required for Schedule 2 development where it is considered likely to have a significant effect on the environment. The Welsh Ministers were requested to make a screening direction under the EIA Regulations as to whether or not the proposed development within the Rassau Industrial Estate is 'EIA development'. The Screening Direction issued by Welsh Ministers on 19th November 2020 determined the proposed development is "EIA development".

The ES presents the findings of the EIA undertaken for the proposed development. Schedule 4 of the EIA Regulations lists the information that should

be included in an ES. This is outlined in Table 4.2 below together with details of where this information can be found in the ES.

Table 4.2 Schedule 4 Requirements for inclusion with EIA

Schedule 4 Requirement	**Where assessed/ included in the ES**
A description of the development, including details of the location, the physical characteristics of the whole development and the land use requirements during the construction and operational phases, a description of the main operational phase characteristics and an estimate of the type and quantities of emissions and residues.	Chapter 2 & Chapter 3
A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the applicant with an indication of the main reasons for the choice, taking into account a comparison of environmental effects	Chapter 3
A description of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the development.	Chapters 5-15
A description of factors likely to be significantly affected by the proposed development. To include consideration of population, human health, biodiversity, land, soil, water, air, climate, material assets, cultural heritage, and landscape.	Chapters 5-15
A description of the likely significant effects of the development on the environment and, where appropriate, any proposed monitoring arrangements.	Chapters 5-15
A description of forecasting methods or evidence used to identify and assess the effects on the environment including any details of difficulties encountered compiling the information.	Chapters 5-15
A description of measures designed to avoid, reduce or, if possible, offset any significant adverse effects on the environment along with a description of measures designed to enhance beneficial effects.	Chapters 5-15
A non-technical summary.	This has been prepared for submission with the ES
A reference list detailing the sources used for the descriptions and assessments included in the EIA.	References have been included in each of the ES chapters as footnotes.

4.3 EIA Scoping

Scoping is the process of identification, at the early stages of a project, of the likely potential significant issues that may arise as a result of a proposed development. Scoping establishes what assessments will be carried out for the EIA and for what phases of the development they would apply to. As part of this process, a request for a scoping opinion was submitted to BGCBC. Scoping helps to ensure that issues and potential effects are assessed at the appropriate level of detail within the EIA. Where a scoping opinion has been issued, the ES must be based on the most recent scoping opinion so far as the proposed development remains materially the same as the proposed development which was subject to the opinion.

A request for a scoping opinion was submitted to BGCBC Planning Department on 30th April 2021. This request also formally informed BGCBC that an ES would be submitted along with the planning application for CiNER Glass Ltd. Dragon Glass Bottle Manufacturing Facility.

As part of the scoping opinion process, BGCBC consulted with a number of statutory consultees to inform their scoping opinion. These included:

- Natural Resources Wales (NRW)
- Public Health Wales
- Welsh Government Roads
- Glamorgan Gwent Archaeological Trust (GGAT)
- Welsh Water (DCWW)
- Utilities
- Health and Safety Executive (HSE)

A scoping opinion was received from BGCBC on the 24th June 2021 and can be viewed in Appendix A2. The scoping opinion is positive, i.e. BGCBC agreed that the proposed development is EIA development and therefore requires an EIA to be prepared for submission with the planning application. BGCBC agreed that the Scoping Report provided an acceptable basis for preparing the EIA.

The full Scoping Report can be viewed on request to BGCBC; however, the topics that were agreed by BGCBC to be scoped in and scoped out of the ES are presented in Table 4.3.

Table 4.3 Agreed scope of topics

Topic	Construction	Operation
Air Quality	ü	ü
Climate change	ü	ü
Ecology	ü	ü
Health	ü	ü
Materials and waste	ü	ü
Noise and vibration	ü	ü
Socio-Economics	ü	ü
Transport	ü	ü
Visual	ü	ü
Water environment	ü	ü
Cumulative effects	ü	ü
Cultural heritage	û	û
Geology, soils and contaminated land	û	û
Major accidents and disasters	û	û

The responses from statutory consultees raised in the scoping opinion have been taken into account where relevant in the ES topic chapters. Each topic chapter provides a summary on how the scoping opinion responses have been addressed within the assessments and the design development (see chapters 5 to 16).

The scoping process is a beneficial stage in the EIA process. As described in Section 4.4, EIA is an iterative process, therefore as design has evolved the scope of the EIA has been reviewed and discussions held with BGCBC planners, and statutory consultees to ensure that the scope of the assessment remains appropriate.

4.4 EIA process

EIA is a staged, iterative process. The assessment of the proposed development has been undertaken in accordance with the EIA Regulations.

Once the scope of the EIA had been established, individual environmental topics were subject to survey and investigation to establish the baseline conditions. This was followed by assessment to identify and predict the significance of the likely environmental effects of the proposed development. The assessment methodologies applied are based on recognised best practice and topic specific guidance; relevant details of assessment methodologies are provided in the appropriate topic assessment chapters of this ES.

The technical studies that have been undertaken for each topic have generally followed the same approach, as follows:

- Scope of assessment – describing the considerations taken when determining the scope of the assessment, including effects that have been scoped-out.
- Determining the assessment methodology – Defining the methods used to define the environmental baseline, and the prediction and assessment of likely significant effects on identified receptors and setting out any assumptions and limitations applicable to the assessment.
- Collection and collation of existing baseline information of the study area in addition to any supplementary survey work required to fill any data gaps or to update any outdated information;
- Frequent consultation with both internal specialists within the team and relevant external consultees. This has been both within and across topic areas;
- Consideration of the potential effects of the proposed development on the existing baseline, followed by identification of possible design changes that would lead to the avoidance or reduction of predicted adverse effects (and likewise the enhancement of any positive effects);
- Assessment of the final scheme design and evaluation of the significance, identification of any further mitigation requirements, and an assessment of any residual and cumulative effects; and
- Compilation of the relevant ES chapter.

The approach to each of these key stages is discussed in more detail below.

Many of the environmental impacts are relevant to more than one topic area and therefore, attention has been paid to the interrelationship between them where they exist. A cumulative assessment has been undertaken and the approach described in Chapter 15.

4.5 Consultation

Consultation with BGCBC and other key statutory stakeholders has been undertaken throughout the pre-application process in order to agree and refine the scope of the EIA and any baseline surveys or investigations required to inform the assessment, agree approaches to assessment, and the need for mitigation through the design or by other means.

Key consultees and consultation undertaken to date for each of the environmental topics are set out within each of the topic chapters.

4.6 Baseline gathering and assessment approach

Baseline data on the existing environmental conditions within and around the site has been obtained based on data sources that include:

- survey information as defined within each topic section;
- aerial photographs and maps of the site and surroundings;

- published documentary information on environmental conditions in the vicinity of the site; and
- environmental data provided by consultees.

The baseline data used in the assessment is detailed in each of the topic sections of this ES and outlines where any baseline surveys have needed to be modified during the Covid-19 pandemic, and limitations and assumptions associated with the data.

4.7 Embedded mitigation measures

Embedded mitigation measures are measures which are inherent to the project and have been incorporated into the detailed design following the iterative EIA process. Examples may include the inclusion of pollution prevention measures within the drainage design, the retention of certain areas of more valuable habitat, or the locating of certain activities away from more sensitive receptors.

Embedded mitigation measures relevant to each topic have been identified within each chapter as well as in Chapter 3: Proposed Development. The assessments presented in this ES have been based on the embedded design mitigation measures. The assessment approach and identification of additional mitigation measures are outlined below.

4.8 Assessment, mitigation and residual effects

Schedule 4 of the EIA Regulations sets out the information that must be included within an ES. This includes aspects of the environment likely to be affected by the development; a description of the likely significant effects on the environment; and a description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment.

Developments may affect different environmental elements / receptors to varying degrees, and as agreed at Scoping, not all impacts arising from a development are of sufficient concern to require detailed investigation or assessment within the EIA process.

Within each chapter of this ES, definitions are given for what environmental receptors (or receiving environments) are being assessed along with a description of those receptors, and what changes the proposed development is likely to cause the affected receptors. This represents the scope of the assessment.

Once an impact of a proposed development on the environment has been identified, it is necessary to consider the nature and characteristics of the impact and the sensitivity or importance of the environmental receptor that is affected, in order to determine whether this impact would result in a significant environmental effect.

In broad terms, significance of an effect is defined to be a function of:

- resource value (international, state or local level importance)/receptor sensitivity;

- magnitude of effect (either adverse or beneficial); and
- temporal scale (temporary or permanent).

Each topic chapter defines what criteria have been used to establish resource value/sensitivity and magnitude of effect. The topic-specific assessment methodologies are outlined in each topic section with the full methodologies. Methodologies refer to key relevant legislation, planning policy and guidance and set out the significance criteria applied to the assessment. Where the methodology varies between construction and operational effects, this is explained.

The assessment considers the likely effects of the proposed development on the current (and where relevant, the future) environmental baseline. The baseline is defined based on a range of data and survey findings. Each topic has described the baseline environment considered within the assessment, and has defined the current baseline according to the relevant guidance and the survey work undertaken for that topic.

For each topic included in the assessment, the likelihood of significant effects arising has been considered in terms of:

- construction effects, i.e. typically temporary effects likely to arise from construction activities;
- operational effects, i.e. those which arise from the physical presence of the development and effects from operational activities.

Professional judgement, along with relevant and accepted guidance is used within each assessment chapter to assess the interaction between receptor value (i.e. its importance or sensitivity) and the predicted magnitude of change to identify whether an effect is significant and what level of significance should be assigned (e.g. high, medium, low or negligible significance). In some cases, this is based on quantitative assessment whereas in others, it is only possible to use professional judgement and qualitative descriptions. In all cases, clear justification for the assessment approach has been set out along with all assumptions and limitations.

Where there are no topic specific standards/guidance for assessing significance, the criteria set out in Table 4.4 for sensitivity of receptor, and Table 4.5 for magnitude of effect, have been combined to provide an assessment of significance as defined in Table 4.6 below.

Table 4.4 Definitions of sensitivity

Level of sensitivity	Definition of sensitivity examples
High	Environment is subject to major change(s) due to impacts: e.g. species present in nationally important numbers, or globally threatened; Special Area of Conservation; National Park; World Heritage Site; a panoramic viewpoint
Medium	Environment clearly responds to effect(s) in a quantifiable and/or qualifiable way: e.g. species present in locally important numbers; people travelling on roads; lowland agricultural landscape; an archaeological feature that is not unusual but cannot be considered common.
Low	Environment responds in a minimal way, or not at all, to effect(s) such that only minor, or no, changes are detectable: views from softwood commercial plantation; an archaeological feature that is common, or has been mostly destroyed; common, widespread species

The magnitude of the effect on the baseline can then be assessed considering the scale, extent of change, nature and duration of effect.

Table 4.5 Definition of magnitude

Level of magnitude	Definition of magnitude
High	Total loss or major alteration to key elements/ features/ characteristics of the baseline (pre-development) conditions such that post development character/composition/attributes of baseline will be fundamentally changed.
Medium	Partial loss or alteration to one or more key elements/ features/ characteristics of the baseline (pre-development) conditions such that post development character/ composition/ attributes of baseline will be partially changed
Low	Minor loss of or alteration of the baseline. Change arising from the loss/alteration will be discernible but underlying character/composition/attributes of the baseline condition will be similar to pre development circumstances/patterns
Negligible	Very minor loss or alteration to one or more key elements/features/characteristics of the baseline (pre-development) conditions. Change barely distinguishable, approximating to the “no change” situation.

Using these definitions, a combined assessment of sensitivity and magnitude can then be undertaken to determine how significant an effect is, as demonstrated in Table 4.6. Where the table presents two potential conclusions, professional judgement has been applied.

Where effects are classified as being of moderate and/or major significance (either beneficial or detrimental), the effect is considered significant in EIA terms. Table 4.7 provides a description for each of these criteria definitions.

The majority of assessments have used these criteria; however, where there is deviation, this is explained and justified within each of the topic assessment chapters.

Table 4.6 Significance matrix

		SENSITIVITY		
		Low	Medium	High
MAGNITUDE	High	Moderate	Major or Medium	Major
	Medium	Minor or Moderate	Moderate	Major or Moderate
	Low	Minor	Minor or moderate	Moderate
	Negligible	Negligible	Negligible	Negligible

Table 4.7 Indicative significance criteria for use within the EIA

Significance	Criteria
Major	These effects are likely to be important considerations at a international/national, regional or district scale and, if adverse, are likely to constitute key considerations for the project, depending upon the relative importance attached to the issue during the decision-making process. Mitigation measures and detailed design work are unlikely to remove all of the effects upon the affected receptors, communities or interests.
Moderate	These effects, if adverse, while important at a local scale, are not likely to be key decision-making issues. Nevertheless, the cumulative effect of such issues may lead to an increase in the overall effects on a particular area or on a particular resource. They represent issues where effects will be experienced but mitigation measures and detailed design work may ameliorate/enhance some of the consequences upon affected receptors, communities or interests. Some residual effects may still arise.
Minor	These effects may be raised as local issues but are unlikely to be of importance in the decision-making process. Nevertheless, they are of relevance in the detailed design of the project and in the consideration of mitigation or compensation measures.
Negligible	No effects or those which are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

Should an adverse impact be of moderate significance or greater be identified, mitigation measures are considered for these impacts in order to reduce significance. Mitigation measures are identified within each topic chapter of the ES, as appropriate, and any impacts remaining following mitigation are considered as residual impacts.

Any requirement for additional/supplementary mitigation to mitigate any potentially significant effects is outlined in each topic. The residual effects remaining following the implementation of proposed mitigation measures are then outlined for each topic.

An appraisal summary matrix is provided at the end of each topic section. This summarises the key environmental effects on a receptor basis and whether they are beneficial or adverse, and significant or not significant.

Each assessment presented in this ES is based on the project description provided in Chapter 3. The format for presenting the assessment is generally the same for each topic to allow for ease of navigation through the ES.

4.9 Cumulative effects

The EIA Regulations require that the ES includes a description of the cumulation of effects with other existing or approved projects. Cumulative effects are effects that, in combination with each other, may be more (or less) than the sum of the individual effects. These may result from incremental changes caused by other existing or approved projects together with the proposed development.

The purpose of undertaking a cumulative assessment is to identify whether other developments may lead to an elevated effect on the environment during construction, or once a development is built and in use. Other developments need to be of a sufficient scale and/or proximity to the proposed development for potential cumulative effects to be likely. Other developments may also precede the development being assessed thereby changing future baseline conditions, or in some cases introducing new sensitive receptors. The zone of influence will vary on a topic-by-topic basis.

A review of consented and planned development within a radius of 5km (based on the maximum extent of the study areas of each topic) of the site was undertaken in June 2021. Chapter 15 provides the approach and assessment of cumulative effects for each topic that was undertaken, along with a list of cumulative developments within the study area. The approach to the cumulative assessment was also agreed by BGCBC within their scoping opinion and they provided an initial list of other developments considered potentially cumulative developments.

The topic assessments also integrate within their assessments interactive effects or in-combination effects of the different topic effects on a single receptor.

4.10 Limitations and assumptions

In accordance with the EIA Regulations, difficulties encountered during assessment work and limitations and assumptions used for individual assessment areas are set out in each individual topic chapter.

4.11 Project team

Arup has led the preparation of this ES and has undertaken the topic assessments with the exeption of the ecology assessment which was undertaken in partnership with Dalcour Maclaren.

Arup is a registrant of the Institute of Environmental Management and Assessment's EIA Quality Mark scheme. Arup is committed to excellence in EIA activities and has agreed to have this commitment independently reviewed through review of ESs prepared by the company.

Regulation 18(5) of the EIA Regulations states that the developer must ensure that the environmental statement is prepared by competent experts and the

environmental statement must be accompanied by a statement from the developer outlining the relevant expertise or qualifications of such experts.

This ES has been prepared by a team of competent experts. The team comprises technical specialists who have extensive experience in the field of EIA. The details (including their experience and qualifications) of these competent experts are presented in Appendix A4. The individual experts can demonstrate their competence through a mix of academic qualifications, membership of relevant professional institutions and practical experience in undertaking EIAs.

5 Air quality

5.1 Introduction

Air quality studies are concerned with the presence of airborne pollutants in the atmosphere. This chapter describes the relevant air quality legislative and policy context and presents the methodology used in the assessment of the proposed development. It assesses the existing air quality conditions in the vicinity of the proposed development and likely changes that would arise as a result of the construction and operation phases. It also examines changes in air pollutant concentrations in the local area including potential effects on designated wildlife sites and on human health. The effects have been assessed in the context of relevant national, regional and local air quality policies and guidance. Mitigation measures are proposed which (where necessary) would be implemented to reduce the effect of the proposed development on air quality.

The main sources of pollutants to air associated with the proposed development will come from construction activities, operation of the site and additional vehicle movements on the local road network.

5.2 Legislation, policy context and guidance

5.2.1 Legislation

Environment Act 2021

The Environment Act 2021 amends the Environment Act 1995[3]. It also amends the Clean Air Act 1993[4] to give local authorities more power at reducing local pollution, particularly that from domestic burning. It also amends the Environmental Protection Act 1990[5] to reduce smoke from residential chimneys by extending the system of statutory nuisance to private dwellings.

The following sections of the Environment Act 1995[3] have been transposed into the Environment Act 2021:

For the Secretary of State to develop, implement and maintain an Air Quality Strategy. This includes the statutory duty, also under Part IV of the Environment Act 1995, for local authorities to undergo a process of local air quality management and declare an AQMA where pollutant concentrations exceed the national air quality objectives. Where an AQMA is declared, the local authority needs to produce an Air Quality Action Plan (AQAP) which outlines the strategy for improving air quality in these areas.

The Act will implement key parts of the government's Clean Air Strategy and include targets for tackling air pollution in the UK.

[3] Environment Act 1995, Chapter 25, Part IV Air Quality
[4] Clean Air Act 1993. Available at: https://www.legislation.gov.uk/ukpga/1993/11/contents. Accessed 23/11/2021.
[5] Environmental Protection Act 1990. Available at: https://www.legislation.gov.uk/ukpga/1990/43/contents. Accessed 23/1/2021.

Relevant to air quality[6]:

- For the Secretary of state for DEFRA to set long-term legally binding targets on air quality. These targets must be of at least 15 years in duration, and be proposed by late 2022;
- For the Secretary of State to publish a report reviewing the Air Quality Strategy every five years;
- For the government to set two targets by October 2022: the first on the amount of $PM_{2.5}$ pollutant in the ambient air (the figure and deadline for compliance remain unspecified) and a second long-term target set at least 15 years ahead to encourage stakeholder investment;
- For the Office for Environmental Protection to be established[7] to substitute the watchdog function previously exercised by the European Commission;
- For local authorities' powers to be extended under the current Local Air Quality Management framework, including responsibilities to improve local air quality and to reduce public exposure to excessive levels of air pollution;
- For "air quality partners" to have a duty to share responsibility for dealing with local air pollution among public bodies; and
- Introduces a new power for the government to compel vehicle manufacturers to recall vehicles and non-road mobile machinery if they are found not to comply with the environmental standards that they are legally required to meet.

Air quality objectives and limit values

Air quality limit values and objectives are quality standards for clean air. Some pollutants have standards expressed as annual average concentrations due to the chronic way in which they affect health or the natural environment, i.e. effects occur after a prolonged period of exposure to elevated concentrations. Other pollutants have standards expressed as 24-hour, 1-hour or 15-minute average concentrations due to the acute way in which they affect health or the natural environment, i.e. after a relatively short period of exposure. Some pollutants have standards expressed in terms of both long and short-term concentrations.

The ambient air quality standards and objectives are given statutory backing in England through the Air Quality Standard Regulations 2010, amended in 2016. Following the UK exist from the European Union The Air Quality Standards Regulations were retained EU-derived domestic legislation under s.2 of the European Union (Withdrawal) Act 2018. Practical amendments to ensure air quality management would continue were made via the Air Quality (Amendment of Domestic Regulation) (EU Exit) Regulations 2019[8]. In this assessment, the term 'air quality standard' has been used to refer to both the UK objectives and limit values. Table 5.8 sets out the air quality limit values and national air quality objectives for the pollutants used in this assessment for human health.

[6] Environment Act 2021. Part 4 Air Quality and Environmental Recall.
[7] Environment Act 2021. Chapter 2. The Office for Environmental Protection.
[8] The Air Quality (Amendment of Domestic Regulations) (EU Exit) Regulations 2019 https://www.legislation.gov.uk/uksi/2019/74/made

Table 5.8: Air quality standards

Pollutant	Averaging period	Environmental standard
NO_2	1-hour mean	200µg/m^3 not to be exceeded more than 18 times a year (99.79th percentile)
	Annual mean	40µg/m^3
Oxides of nitrogen (NOx) as NO_2	Annual mean	30µg/m^3 (for protection of vegetation & ecosystems)
	24-hour mean	75µg/m^3
Sulphur dioxide (SO_2)	15-minute mean	266µg/m^3 Not to be exceeded more than 35 times a year
	1-hour mean	350µg/m^3 Not to be exceeded more than 24 times a year
	24-hour mean	125µg/m^3 Not to be exceeded more than 3 times a year
	Annual mean	20µg/m^3 (for protection of vegetation & ecosystems)
Fine particulates (PM_{10})	24-hour mean	50µg/m^3 Not to be exceeded more than 7 times a year
	Annual mean	40µg/m^3
Very fine particulates ($PM_{2.5}$)	Annual mean	20µg/m^3
Carbon monoxide	Running 8-hour mean	10mg/m^3
Cadmium (Cd)	Annual mean	5ng/m^3
Arsenic (As)	Annual mean	6ng/m^3
Lead (Pb)	Annual mean	0.25µg/m^3
Nickel (Ni)	Annual mean	20ng/m^3

Regulated (or prescribed) industrial processes are classified as Part A or Part B processes and are regulated through the Pollution Prevention and Control (PPC) system[9,10]. The proposed development will be permitted under the part A2 regulations. For other pollutants which will be emitted by the site and regulated under the part A2 regulations there are no air quality objectives. For these pollutants, assessment criteria in the form of Environmental Assessment Levels (EALs) provided by the Environment Agency (EA)[11], the Expert Panel on Air Quality Standards (EPAQS)[12] and the Health and Safety Executive[13], have been used as the latest guidance in the UK. For the trace metals emitted, there are limit values for Pb, As, Cd and Ni

[9] Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control)
[10] The Environmental Permitting (England and Wales) (Amendment) Regulations 2013, SI 2013/390
[11] EA (2016) Air emissions risk assessment for your environmental permit
Available at: [https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit]
[12] Expert Panel on Air Quality Standards Guidelines for metals and metalloids in ambient air for the protection of human health. 13th Report May 2009 ISBN 978-085521-185-1
[13] Health and Safety Executive (2011) EH40/2005 Workplace exposure limits (Second edition, published 2011)

and for other trace metals EALs are provided. A summary of the appropriate EALs considered for short-term (hourly mean) and long-term (annual mean) averaging periods, for all pollutants not included in Table 5.8, are presented in Table 5.9.

The air quality objectives and limit values as set out in Table 5.8 and Table 5.9 are the air quality standards used within this assessment for human health and the protection of vegetation and ecosystems. Where there is more than one standard, the most stringent has been used.

Table 5.9: Environmental Assessment Levels (EALs)

Pollutant	Averaging period	Value (µg/m^3)	Source
Ammonia (NH_3)	Annual mean	180	Environment Agency (EA)
	1-hour mean	2,500	EA
Antimony (Sb)	Annual mean	5	EA
	1-hour mean	150	EA
Arsenic (As)	Annual mean	0.003	EA
	Annual mean	0.006	UK target
Carbon monoxide (CO)	1-hour mean	30,000	EA
Chromium, Chromium (III) and Chromium (III) compounds (as Cr)	Annual mean	5	EA
	1-hour mean	150	EA
Chromium (VI) oxidation state in the PM_{10} fraction	Annual mean	0.0002	EA
Cobalt (Co)	Annual mean	100	Derived from HSE EH40
Copper (Cu)	Annual mean	10	EA
	1-hour mean	200	EA
Hydrogen chloride (HCl)	1-hour mean	750	EA
Hydrogen fluoride (HF)	Monthly mean	16	EA
	1-hour mean	160	EA
Manganese (Mn)	Annual mean	0.15	EA
	1-hour mean	1,500	EA
Selenium and compounds, except hydrogen selenide (as selenium)	Annual mean	1	EA
	1-hour mean	30	EA
Vanadium (V)	Annual mean	5	EA
	1-hour mean	1	EA
Tin (Sn)	Annual mean	2000	Derived from HSE EH40
	15-minute mean	4000	

Local Authority Industrial Pollution Prevention and Control (LA-IPPC)

The Industrial Emission Directive (IED) (2010/75 /EU)[14] has been transposed into UK regulation through the Pollution Prevention and Control (PPC) system defined in the Environmental Permitting regulations[15]. The PPC system defines processes to be regulated as Part A1 (regulated by the Environment Agency or Natural Resource Wales), Part A2 (regulated by Local Authorities) and Part B for smaller processes (regulated by Local Authorities). Part A2 processes are sectors regulated under integrated pollution prevention and control, known as Local Authority Industrial Pollution Prevention and Control (LA-IPPC).

Glass manufacturing is an A2 activity under the LA-IPPC regime, sector guidance which sets out the best available techniques (BAT) for glass manufacturing as published in October 2006[16]. This guidance sets emission limits to air following BAT for the glass manufacturing sector. These have been taken into consideration in this assessment.

Industrial Emissions Directive

The IED[14] brought seven separate directives, into a single directive. The legislation contains the Emission Limit Values (ELVs) applicable to new glass furnaces. Whilst the site will not be permitted by Natural Resource Wales as a Part A1 process under the IED the ELVs set within the directive have been taken into consideration in this assessment. Where an ELV in the IED guidance is more stringent than set in the IPPC BAT document the most stringent limit has been taken. This is to account for potential future updates to UK BAT guidance to align with the IED.

Emission Limit Values

Having reviewed the BAT guidance for glass manufacture[16] and the IED[14] ELVs this assessment has used ELVs which reflect the most stringent permitted levels from the guidance to take a conservative approach to the sites impact. The ELVs for the furnace considered in this assessment have been set out in Table 5.10. This is a worst-case assessment as the ELVs are the maximum concentrations the development can emit. It is expected that typical emissions would be well below the ELVs. In order to provide mitigation due to potential impacts being identified certain pollutants have been assessed at an ELV below BAT, as highlighted in the table.

Table 5.10: Furnace Emission Limit Values (ELVs)

Substance	**Daily mean (mg/Nm^3)**
Particles	20
NO_x	**80**
SO_x	**50**
HF	5
HCl	20

[14] The best available techniques (BAT) conclusions under Directive 2010/75/EU of the European Parliament of the Council on industrial emissions for the manufacture of glass
[15] Environmental Permitting (England and Wales) Regulations 2016
[16] Glass Manufacture: sector guidance note IPPC SG2 October 2006 [Available at: https://www.gov.uk/government/publications/glass-manufacture-sector-guidance-note-ippc-sg-2]

Substance	Daily mean (mg/Nm^3)
NH_3	**2**
CO	100
Total metals – As, Co, Ni, Cd, Se, CrVI	**1**
Total metals – As, Co, Ni, Cd, Se, Cr VI, Sb, Pb, CrIII, Cu, Mn, V, Sn	**1**
Note: Units are in Nm^3 (273K, dry and 8% O_2) **Bold** denotes lower ELV (comparing to the BAT guidance[16]and IED[14]) used in the assessment	

Ecological legislation

The Conservation of Habitats and Species Regulations 2010[17] requires measures be introduced for the protection of habitats and species.

There are specific objective pollutant concentrations for vegetation called 'critical levels', which are shown in Table 5.11. These are concentrations below which harmful effects are unlikely to occur. The limit value applies to locations more than 20km from towns with more than 250,000 inhabitants or more than 5km from other built-up areas, industrial installations or motorways. However, the EA guidance states that "*the critical levels should be applied at all locations as a matter of policy, as they represent a standard against which to judge ecological harm*".

There are also critical loads for habitats which are defined as: "*a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge*". The critical loads used in this assessment are those for nutrient nitrogen deposition and acid deposition and are detailed in Appendix B4, Volume II.

The critical loads are set as ranges, reflecting the uncertainty in the present scientific knowledge and evidence-base on the effects of air pollution on sensitive species. If the upper limit critical load is being exceeded, it is likely that there is harm to the relevant habitat/features arising from the current level of nitrogen deposition. If the deposition level is below the lower limit critical load, it is unlikely that the feature/habitat is being harmed. If the deposition level lies between the lower and upper critical load values, it is not possible to be certain that harmful effects are, or are not, occurring.

The relevant critical levels for this assessment have been derived from the most up-to-date information on the Air Pollution Information System (APIS) website[18].

The objectives within the legislation have been used to assess the effects upon any sensitive ecosystems.

Table 5.11: Critical levels for the protection of ecosystems

Pollutant	Averaging period	Standard
Nitrogen oxides (expressed as NO_2)	Annual mean	30µg/m^3
	Daily mean	75µg/m^3

[17] UK The Conservation of Habitats and Species Regulations (2010) No. 490
[18] APIS (Air Pollution Information System) www.apis.ac.uk, accessed June 2017

Pollutant	Averaging period	Standard
Sulphur Dioxide (SO_2) for ecosystems where lichens and bryophytes are present	Annual mean	10µg/m^3
Sulphur Dioxide (SO_2) for all other ecosystems	Annual mean	20µg/m^3
Ammonia (NH_3) for ecosystems where lichens and bryophytes are present	Annual mean	1µg/m^3
Ammonia (NH_3) for all other ecosystems	Annual mean	3µg/m^3
Hydrogen fluoride (HF)	Weekly mean	0.5µg/m^3
	Daily mean	5µg/m^3

Non-Road Mobile Machinery regulations

The Non-Road Mobile Machinery (NRMM) (Emission of Gaseous and Particulate Pollutants) (Amended) Regulations 2014 (SI 2014/1309)[19], which implement Regulation (EU) 2016/1628[20], requires that NRMM engines meet certain emissions standards for different engine types. It also aims to reduce emissions from NRMM through the fitting of devices to engines, to help meet the Stage V emissions standard, where applicable.

Dust nuisance

Dust is the generic term used in the British Standard document BS 6069 (Part Two) to describe particulate matter in the size range 1–75µm in diameter. Dust nuisance is the result of the perception of the soiling of surfaces by excessive rates of dust deposition. Under provisions in the Environmental Protection Act 1990[21], dust nuisance is defined as a statutory nuisance.

There are currently no standards or guidelines for dust nuisance in the UK, nor are formal dust deposition standards specified. This reflects the uncertainties in dust monitoring technology and the highly subjective relationship between deposition events, surface soiling and the perception of such events as a nuisance. In law, complaints about excessive dust deposition would have to be investigated by the local authority and any complaint upheld for a statutory nuisance to occur. However, dust deposition is generally managed by suitable on-site practices and mitigation rather than by the determination of statutory nuisance and/or prosecution or enforcement notice(s).

[19] Non-Road Mobile Machinery (Emission of Gaseous and Particulate Pollutants) (Amendment) Regulations 2014, SI 2014/1309
[20] Regulation (EU) 2016/1628 of July 2016 amending Directive 97/68/EC of the European Parliament and of the Council on the approximation of the laws of the Member States relating to measures against the emission of gaseous and particulate pollutants from internal combustion engines to be installed in non-road mobile machinery
[21] Environmental Protection Act 1990, Chapter 43, Part III Statutory Nuisances and Clean Air

5.2.2 Policy context

National planning policy

The land-use planning process is a key means of improving air quality, particularly in the long term, through the strategic location and design of new developments. Any air quality consideration that relates to land-use and its development can be a material planning consideration in the determination of planning applications, dependent upon the details of the proposed development.

Well-being of Future Generations (Wales) Act 2015

The Act[22] has well-being goals and objectives to achieve through implementation of sustainable development. Changes in air quality can have an impact on the health of ecological habitat and humans. As such, the goals relevant to air quality are:

- A resilient Wales that maintains and enhances a biodiverse natural environment which has the capacity to adapt to change; and
- A healthier Wales in which people's physical and mental well-being is maximised and in which choices.

In order for Welsh Ministers to understand the progress being made to achieving the well-being goals, national indicators have been set. One of these national indicators relates to levels of NO_2 in the air. The Well-being of Future Generations Act aims to reduce pollution exposure by assessing a weighted population average to NO_2 on an annual basis.

Planning Policy Wales, Edition 11

PPW11[23] was published in February 2021. It sets out land-use and planning policy for Wales. The primary objective of PPW11 is to ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales required by Planning (Wales) Act 2015.

The policy document is set out in themes, with air quality predominantly addressed in the Distinctive and Natural Places theme, it states:

'National air quality objectives are not 'safe' levels of air pollution. Rather they represent a pragmatic threshold above which government considers the health risks associated with air pollution are unacceptable. Air just barely compliant with these objectives is not 'clean' and still carries long-term population risks. Nitrogen dioxide and particulate matter, which are the pollutants of primary national concern from a public health perspective, currently have no safe threshold defined and therefore the lower the concentration of those pollutants the lower the risks of adverse health effects. It is desirable to keep levels of pollution as low as possible.'

The PPW has also provided a framework for addressing air quality in the planning system, especially for new development. It also emphasises that proposed development should be designed wherever possible to prevent adverse effects to amenity, health and the environment but as a minimum to limit or constrain any effects that do occur. In circumstances where

[22] Wellbeing of Future Generations (Wales) Act 2015
[23] Welsh Government (2021) Planning Policy Wales Edition 11

impacts are unacceptable, for example where adequate mitigation is unlikely to be sufficient to safeguard local amenity in terms of air quality it will be appropriate to refuse permission.

Future Wales: The National Plan 2040

Future Wales: The National Plan 2040[24] (Future Wales) is a national development framework, setting the direction for development in Wales to 2040. It is a development plan with a strategy for addressing key national priorities through the planning system, including sustaining and developing a vibrant economy, achieving decarbonisation and climate-resilience, developing strong ecosystems and improving the health and well-being of communities.

The framework provides clear direction related to air quality and how that should be managed and improved through existing policy (e.g. PPW11) and sets out how air quality should be improved within the regional plans.

The Clean Air Plan for Wales

The Welsh Government, The Clean Air Plan for Wales, Healthy Air, Healthy Wales[25] plan was published in August 2020 and sets targets for improving air quality across the country. It includes actions for reducing emissions from various sources, such as transport, domestic activities, farming and industry. There is also a long-term target for reducing population exposure to $PM_{2.5}$ concentrations to meet the World Health Organisation's (WHO) target of $10\mu g/m^3$ as an annual mean. In particular, the Clean Air Plan states the Welsh Government will:

"Develop a Clean Air Act to enhance existing legislation and bring forward new legislation to deliver air quality improvements in Wales. The aim of the Act will be to deliver this commitment and reduce the burden of poor air quality on human health, our economy, biodiversity and natural environment. The Act could also support wider actions to address the climate emergency."

Local planning policy

Blaenau Gwent County Borough Council

Blaenau Gwent County Borough Council's current LDP was adopted in November 2012. The LDP sets out land use policies and proposals to control development in the county borough up to 2021.

Section 7 of the LDP includes policy which is related to air quality, Policy DM1 New Development, which states;

"Development proposals will be permitted provided:

- *The proposal does not result in airborne emissions which have an unacceptable effect on health, amenity or natural environment of the surrounding area, taking into account cumulative effects of other proposed or existing sources of air pollution in the vicinity;*

[24] Future Wales: The national plan 2040 [Available at: https://gov.wales/sites/default/files/publications/2021-02/future-wales-the-national-plan-2040.pdf]
[25] Welsh Government (2020) The Clean Air Plan for Wales, Healthy Air, Healthy Wales [Available at: https://gov.wales/sites/default/files/publications/2020-08/clean-air-plan-for-wales-healthy-air-healthy-wales.pdf]

- *There would be no unacceptable risk of harm to health and/or local amenity from unacceptably high levels of noise, vibration, odour or light pollution*

Development likely to result in emissions to air of any of the pollutants identified in the UK's National Air Quality Strategy and/or any other pollutant which may have an adverse impact upon the air quality within the Borough or has the potential to cause harm to human health and/or the environment should therefore provide a full and detailed assessment of the likely impact of these emissions. This should also demonstrate that there has been consideration of the cumulative effects of other proposed or existing sources of air pollution within the vicinity of the proposed development.

Development will not be permitted where it is considered that the resultant emissions to air will have an unacceptable impact on the existing and/or future air quality within the Borough or where there will be an unacceptable adverse impact on public health and/or the environment, taking into account the cumulative effects of other proposed or existing sources of air pollution in the vicinity."

A revised Delivery Agreement for a Replacement LDP was agreed by Welsh Government on 6th October 2020. The Revised LDP will cover the period 2018-2033, with the plan expected to be adopted in autumn 2022.

Brecon Beacons National Park Local Development Plan[26], December 2013

Statutory Purposes of the National Park are to:

"to conserve and enhance the natural beauty, wildlife and cultural heritage of the National Park

to promote opportunities for public enjoyment and understanding of the special qualities of the National Park"

One relevant Special Qualities of the BBNP is:

"A feeling of vitality and healthfulness that comes from enjoying the Park's fresh air, clean water, rural setting, open land and locally produced foods."

Policy SQ1 Special Qualities sets out "to conserve and enhance the special qualities of the Brecon Beacons National Park"

The proposed development is located outside of the BBNP but would be situated within close proximity to the National Park's boundary at approximately 400m.

The air quality assessment considers the potential impacts on both human and ecological receptors in proximity to the proposed development. It is considered that nearby receptors are closer to the emission sources in comparison to the users of the BBNP and will therefore represent a worst case.

[26] Brecon Beacons National Park, Local Development Plan, December 2013. Microsoft Word - Brecon text print.doc (beacons-npa.gov.uk)

5.2.3 Guidance and standards

Other relevant guidance to air quality assessment that has been used in this assessment is detailed in this section.

Institute of Air Quality Management (IAQM) Guidance on the Assessment of Dust from Demolition and Construction

The IAQM provide guidance to development consultants and environmental health officers (EHO) on how to assess air quality impacts from construction. The IAQM document[27] provides a method for classifying the significance of effect from construction activities based on the 'dust magnitude' (high, medium or low) and proximity of the proposed development to the closest receptors. The guidance recommends that once the significance of effect from construction is identified, the appropriate mitigation measures are implemented. Experience has shown that once the appropriate mitigation measures are applied, in most cases the resulting dust impacts can be reduced to negligible levels.

Local Air Quality Management Policy and Technical Guidance

The 2016 policy note from Defra, LAQM.PG(16)[28], provides additional guidance on the links between transport and air quality and the links between air quality and the land-use planning system. It summarises the main ways in which the land-use planning system can help deliver compliance with the air quality objectives. This is relevant to any external organisations who may wish to engage with the local authority to assist in the delivery of their statutory duties on managing air quality.

The LAQM Technical Guidance 16 (LAQM TG(16))[29] is designed to support local authorities in carrying out their duties to review and assess air quality in their area. LAQM TG(16) is published at the UK level and is relevant to England, Scotland, Wales and Northern Ireland with the exception of London. It provides detailed guidance on how to assess the impact of measures using existing air quality tools. Where relevant, this guidance has been taken into account in this assessment.

EPUK/IAQM Land-Use Planning and Development Control

The 2017 Land-Use Planning & Development Control guidance document[30] produced by the Environmental Protection UK (EPUK) and IAQM provides a framework for professionals operating in the planning system to provide a means of reaching sound decisions, with regards to the air quality implications of development proposals.

The document provides guidance on when air quality assessments are required by providing screening criteria regarding the size of a development, changes to traffic

[27] IAQM (2016) Guidance on the Assessment of Dust from Demolition and Construction (Version 1.1)
[28] Defra (2016) Local Air Quality Management Policy Guidance. PG(16)
[29] Defra (2016) Local Air Quality Management Technical Guidance.TG(16)
[30] EPUK/ IAQM (2017) Land-Use Planning & Development Control: Planning for Air Quality

flows/composition energy facilities or combustion processes associated with the development.

Institute of Air Quality Management (IAQM) Guidance on the Assessment of Odour for Planning

The Institute of Air Quality Management (IAQM) produced guidance in 2014[31] with the specific intention to provide advice for "assessing odour impacts for planning purposes". It recommends various assessment techniques including the use of a Source, Pathway, Receptor (SPR) model. The risk of an adverse odour impact is determined by examining the source characteristics, how effectively the odours can travel from the Source to a receptor (i.e. the Pathway) and examining the sensitivity of the Receptor. This guidance has been followed for the assessment of odour risk from the site.

5.3 Methodology

This section provides a summary of the methodology used for the air quality assessment. The full methodology is presented in Appendix B2 in Volume II, Appendices. The assessment method takes into account all relevant policy and guidance presented in Section 2.

The overall approach to the air quality assessment comprises:

- A review of the existing air quality conditions at the site and in the vicinity of the site;
- Identification of human and ecological receptors in the vicinity of the site;
- Sensitivity testing of modelling options;
- An assessment of the impact on air quality from the construction phase;
- An assessment of the impact on air quality from the future operation of the site, including abnormal operation;
- Assessment of the significance of the potential impact; and
- Formulation of mitigation measures, where appropriate, to ensure any adverse effects on air quality are minimised.

Pollutants

The assessment of air quality effects has considered the pollutants included in the LA-IPPC BAT document and IED and those included within the UK quality standards, namely:

- nitrogen oxides (NO_x) and nitrogen dioxide (NO_2);
- sulphur dioxide (SO_2);
- fine particulate matter (PM_{10} and $PM_{2.5}$);
- carbon monoxide (CO);

[31] Bull M, IAQM, Guidance on the assessment of odour for planning, v1,1 July 2018.

- hydrogen fluoride (HF);
- hydrogen chloride (HCl);
- ammonia (NH_3); and
- Trace metals: lead (Pb), arsenic (As), cadmium (Cd), nickel (Ni), antimony (Sb), chromium (Cr and Cr VI), cobalt (Co), copper (Cu), manganese (Mn), selenium (Se) tin (Sn) and vanadium (V).

For the assessment of impacts on sensitive habitats, the potential impacts of NH_3, HF, HCl, NOx and SO_2 have been assessed, both through the impacts directly to air and through deposition of acidic compounds and nutrient nitrogen.

5.3.1 Methodology for establishing baseline conditions

Existing or baseline ambient air quality refers to the concentration of relevant substances that are already present in the environment. These are present from various sources, such as industrial processes, commercial and domestic activities, traffic and natural sources.

The baseline has considered background air pollutant concentrations from sources including:

- Local authority review and assessment reports and local air quality monitoring data[32];
- Defra UK Air Information Resource website[33] for details on air quality monitoring and Air Quality Management Areas (AQMA); and
- Ammonia, Acid Gases and Aerosols, and Heavy Metals Monitoring Networks for the UK[34].

5.3.2 Assessment methodology for construction phase

Construction dust assessment

The assessment of construction dust has been carried out following IAQM guidance[27] by assessing the magnitude of impact from earthworks, demolition, construction and trackout and identifying the risk of impacts at sensitive receptors within 350m of the works or 500m of site entrances in relation to trackout. The full method of assessment has been detailed in Appendix B2.1 in Volume II Appendices.

Assessment of traffic emissions

The air quality assessment includes screening of potential impacts of vehicle emissions during construction. Traffic flows during construction have been

[32] Provided by BGCBC
[33] Defra (2017). Air quality data. Available online at https://uk-air.defra.gov.uk/data/ [accessed June 2021]
[34] Centre for Ecology and Hydrology (2017). Ammonia, Acid Gases and Aerosols, and Heavy Metals Monitoring Networks for the UK. Available online at http://www.pollutantdeposition.ceh.ac.uk/networks

assessed against the screening criteria in the guidance[30] produced by the Environmental Protection UK (EPUK) and the IAQM.

If these thresholds are not triggered, then a detailed air quality assessment can be scoped out. The construction traffic data shows that as the change in traffic is well below 100 heavy duty vehicles (HDVs) or 500 light duty vehicles (LDVs) per day so impacts would be considered to be negligible and no further assessment is required.

5.3.3 Assessment methodology for operational phase

Assessment of point source emissions

The assessment has examined the changes in air pollutant concentrations in the surrounding area that would result from the operation of the site at full capacity. The proposed development comprises a phased operational approach whereby the first furnace will be operational prior to the completion of the second furnace. The assessment has been carried out for a worst-case scenario when both furnaces are operational at the same time along with other onsite sources of emissions (generators). This assessment considers likely significant effects on human health and on designated wildlife sites against the first full year of operation as a worst-case.

Emissions data for the point sources assessed (both from the proposed site and cumulatively) are shown in Appendix B2.4 in Volume II Appendices along with details of selected receptors, model inputs and sensitivity testing.

The assessment provides a comparison of ambient concentrations to the relevant standards or guidelines. The standard and guidelines are intended to protect human health from the inhalation of pollutants. Impacts on sensitive habitats have been assessed including; the likely significant effects of acid species (NH_3, NOx, HCl and SO_2), both through the effects directly to air and through deposition of acid species and nutrient nitrogen.

Assessment of abnormal operation

The assessment has considered abnormal operating scenarios for the new furnaces, which could lead to higher pollutant emissions over short periods. Abnormal event scenarios are only expected to include periods when the filters are being maintained or replaced. The maintenance and replacement time for the selective catalytic reduction (SCR) and dust reduction systems will only take five days at a maximum during a year. There are not expected to be any other periods where abnormal emissions would occur. Modelled emissions are provided in Appendix B2.4 in Volume II Appendices.

Assessment of traffic emissions

The air quality assessment includes an assessment of potential impacts of vehicle emissions during operation. Traffic flows during operation have been assessed against the screening criteria in the guidance[30] produced by the Environmental Protection UK (EPUK) and the IAQM. If these thresholds are not triggered, then a detailed air quality assessment can be scoped out. The operational traffic data

shows that as the change in traffic is greater than 100 heavy duty vehicles (HDVs) per day. Therefore, an assessment has been carried out using detailed modelling. The method of assessment is provided in Appendix B2.6 in Volume II Appendices and details of model verification and receptors have been provided in Appendix B4 in Volume II Appendices.

Plume visibility assessment

Water in the emitted gases can condense in the air and form a visible plume if conditions are suitable. There are no formal or informal standards for visible plume lengths although visible plumes that are long enough to reach ground level should be avoided. A plume visibility assessment has been carried out using the ADMS 5 dispersion model. The frequency of visible plumes has been predicted. Further detail of the plume modelling is provided in Appendix B2.4 in Volume II Appendices.

Assessment of odour

The source pathway receptor approached detailed in Appendix B2.7 in Volume II Appendices has been carried out to determine the potential risk of odour from the proposed site reaching sensitive receptors.

5.3.4 Assessment and significance of effects

Human receptors

The IAQM and EPUK guidance[30] provides a framework for reaching sound decisions, having regard to the air quality implications of development proposals.

The guidance has been applied on this assessment and provides an approach to determining the effects on local air quality at individual receptors and the overall significance of local air quality effects resulting from a proposed development. The first step was to define the impact descriptors at each sensitive receptor. These are based on the magnitude of the change in predicted concentrations and the total predicted concentrations in relation to the air quality standard, as shown in Table 5.12.

Table 5.12: Impact descriptors for air quality assessment (applicable for annual mean concentrations)

Total predicted annual mean concentrations	**% Change in concentrations relative to air quality standard**			
	1%	**2 – 5%**	**6 – 10%**	**> 10%**
< 75% of standard	Negligible	Negligible	Slight	Moderate
76 – 94% of standard	Negligible	Slight	Moderate	Moderate
95 – 102% of standard	Slight	Moderate	Moderate	Substantial
103 – 109% of standard	Moderate	Moderate	Substantial	Substantial
> 110% of standard	Moderate	Substantial	Substantial	Substantial

The guidance also notes that where the change in concentrations is less than 0.5% of the assessment level, only negligible effects would be anticipated. For short term concentration, the impact descriptors are presented in Table 5.13.

Table 5.13: Impact descriptors for air quality assessment (applicable for short term concentrations)

Change in total predicted concentrations (short term)	Magnitude of change	Impact descriptor
< 10% of standard	Imperceptible	Negligible
11 – 20% of standard	Small	Slight
21 –50% of standard	Medium	Moderate
>51% of standard	Large	Substantial

The second step was to make a judgement on the overall significance of effect for the proposed development. The impact descriptors at each individual receptor were used along with a set of qualitative factors such as:

- the existing and future air quality in the absence of the proposed development;
- the extent of current and future population exposure to the effects; and
- the influence and validity of any assumptions adopted when undertaking the prediction of effects.

Professional judgement has been used to determine the overall significance of effects. However, in some circumstances where the proposed development can be judged in isolation, it is likely that a 'moderate' or 'substantial' effect would give rise to a significant effect, while a 'negligible' or 'slight' effect would not result in a significant effect.

Ecological receptors

The EA's Air Emissions Risk Assessment[11] provides the screening criteria to determine significance of emissions associated with industrial premises. They have been adopted in this assessment, as follows:

- For SPAs, SACs, Ramsar sites for SSSIs:
  - The long-term process contribution (PC) is less than 1% of the long-term environmental standard for protected conservation area;
  - The short-term PC is greater than 1% but the PEC is less than 70% of the long-term environmental standards.
- For local nature sites:
  - The long-term and short-term PC is less than 100% of the environmental standards

Predicted PC or PEC that meet the above criteria are deemed to be insignificant. When impacts cannot be screened out as being negligible using the thresholds above, the evaluation of the significance of results requires advice from an ecologist.

5.3.5 Limitations and assumptions

Air quality dispersion modelling has inherent areas of uncertainty, including:

- simplification in model algorithms and empirical relationships that are used to stimulate complex physical and chemical processes in the atmosphere;
- spatial variability of model background concentrations;
- spatial variability of meteorological data;
- effects of terrain; and
- emissions concentrations due to varied raw material inputs.

To reduce uncertainty, sensitivity testing has been carried out as detailed within this chapter. A number of conservative assumptions have also been made and are detailed throughout this report. The methodology used within this assessment is designed to provide a robust assessment, reducing uncertainty caused by the above limitations.

5.3.6 Consultation undertaken

Consultation was carried out with the BGCBC environmental health team. A 'face to face' meeting via Teams was held on the 3rd June 2020 to discuss the high-level scope with the local authority. For air quality, the meeting highlighted the local authority concerns about emissions from the main stacks, odour and location of human and ecological receptors.

Following the above meeting, Arup issued a detailed methodology to BGCBC which detailed the following items proposed to be used in this assessment in order to gather feedback prior to submission for planning:

- Baseline;
- Construction assessment methodology;
- Operational phase methodology;
    - Receptors;
    - Assessment scenarios, model inputs pollutants and ELVs;
    - Traffic assessment;
- Significance criteria.

A copy of the consultation document provided has been included in Appendix B1. The local authority replied to the document stating they were in agreement with the method provided. Some additional questions were provided, and the response is included in Appendix B1 in Volume II Appendices.

At the time of providing the methodology note the final design had not been completed and Table 5.14 below highlights additional elements relevant to air quality which will have changed since the note and provides a link to where to find the assessment of impacts within this chapter.

Table 5.14: Changes to the air quality assessment following early consultation

Change following formal consultation	Reference to updated information
BGCBC requested that CO was assessed with an ELV of 10mg/Nm^3	CO has been included in the assessment. The ELV of 10mg/Nm^3 has been included in the modelling as shown in Table 5.10.
An additional existing STOR facility located a few 100m west of the site was identified from a review of planning documents.	The impacts from this facility have been included in the cumulative impact assessment due to the impact it will have on local air quality. The parameters taken from the ES and included in this assessment are provided in Appendix B2.4 in Volume II Appendices.
Additional discrete receptor points have been added for on-site receptor locations and for ecological SINCs.	Receptor locations are detailed in Appendix B2.3 in Volume II Appendices, Table B2.7 and shown in Figures 5.1 and 5.3 in Volume III Figures.
On site building configuration and stack location has changed slightly.	The onsite building configuration included in the modelling has been updated to reflect the latest design and the stack locations moved slightly. Building locations are detailed in Appendix B2.4 in Volume II Appendices and the stack location is provided in Appendix B2.4 in Volume II Appendices, Table B2.10. The location of modelled buildings and stack are shown in Figures 5.6 and 5.7 in Volume III Figures.
The proposed ELVs for NOx, SOx, NH_3 and total metals have been reviewed and updated.	The assessed daily mean ELV for NOx and SOx are provided in Table 5.10.

Consultation was carried out in 2022 with BGCBC and their independent reviewer Ricardo AEA following the submission of the ES which led to updates being provided to this chapter, including:

- Consideration of cumulative effects and how to quantitatively assess impacts from the two Part A facilities, see Table 5.15, with limited information being available. It was agreed with BGCBC to complete a screening assessment using the EA H1 screening tool. The results are provided in Appendix B8 in Volume II Appendices.
- BGCBC also requested additional receptor points were added on the Rassau Industrial Estate to assess short term impacts. This has been completed, with results being provided in Appendix B5 in Volume II Appendices.

5.4 Baseline environment

5.4.1 Sources of air pollution

The main sources of air pollution near the proposed development are road traffic emissions from vehicles using the A465 and existing industrial sites.

Industrial process

Industrial air pollution sources are regulated through a system of operating permits or authorisations, requiring stringent emission limits to be met to ensuring that any releases to the environment are minimised or rendered harmless.

Arup requested the details of NRW regulated sites within 1km from the site, see Table 5.15, from NRW. No information was available in 2021 and limited information was provided in 2022, or available on the public register. Therefore emissions from these sites could not be included in the dispersion modelling used in the cumulative impact assessment.

It was therefore assumed background concentrations from nearby monitoring stations are represented in the background air quality data. A screening exercise to confirm that this was a reasonable assumption was agreed with BGBCB. The screening method used is provided in Appendix B2.9 in Volume II Appendices.

Table 5.15: NRW regulated sites within 1km

Site	Permit number	Approximate distance from site (km)	Releases to air[35]
Rassau Recycling Facility. Enviro Wales Ltd	EP3230BE	0.2	Sulphur acid mist, total particulate, cadmium and compounds, copper, lead, nickel, zinc and their compounds, antimony, tin, tellurium and their compounds, cadmium, arsenic, thallium, selenium and their compounds , sulphur dioxide (SO_2), hydrogen chloride (HCl) dioxins and furans, oxides of nitrogen (NOx), volatile organic compounds. carbon monoxide (CO), mercury and lead
GD Yuasa Battery Manufacturing UK Ltd	BV5361Z	0.6	Lead

Short-Term Operating Reserve (STOR) sites

There are two short-term operating reserves (STOR) located on the Rassau Industrial Estate. The STOR sites comprise gas-fired generators with individual flues. The permitted STOR plant data[36],[37] were provided by BGCBC and predicted impacts from the STOR sites are included in the cumulative impact assessment by taking the maximum predicted impacts at nearby receptors and adding to the total concentrations predicted in this assessment. They have been

[35]Releases to air data are taken from the permits provided by NRW
[36]Amec Foster Wheeler (2015) Air Quality Assessment of Peak Supply Generator for Eider Reserve Power Limited at Rear of Unit 26A site on Rassau Industrial Estate, Ebbw Vale
[37] Amec Foster Wheeler (2015) Air Quality Assessment of Peak Supply Generator for Eider Reserve Power Limited at Brecon/ Techboard site on Rassau Industrial Estate, Ebbw Vale

explicitly modelled and details of the emissions data for each gas-fired generator are detailed in Appendix B2.4 in Volume II Appendices.

Other sources of industrial emissions

There are other sources of industrial emissions in the local area, the STOR assessment[36] included a cumulative impact assessment from the following industrial sites:

- U26/ Beaufort and Techboard/ Brecon;
- Circuit of Wales development;
- Biomass Plant at Unit 21 and;
- Ogmore Power Rassau.

The predicted impacts from the sites are included in the cumulative impact assessment by taking the maximum predicted impacts, as detailed in previous planning applications, at nearby receptors and adding to the total concentrations predicted in this assessment. They have not been explicitly modelled, however this is considered a conservative assessment as these sites are not all confirmed developments.

Local air quality

The Environment Act 2021 requires local authorities to review and assess air quality with respect to the objectives for seven pollutants specified in the National Air Quality Strategy. Where objectives are not predicted to be met, local authorities must declare the area as an AQMA. In addition, local authorities are required to produce an Air Quality Action Plan (AQAP) which includes measures to improve air quality within the AQMA.

There are no declared AQMAs in BGCBC or in the vicinity of the proposed CiNER site.

Local air quality monitoring

A review of local air quality monitoring in the vicinity of the CiNER site has been carried out and shows that BGCBC carries out passive diffusion tube monitoring in the vicinity of the site. Details of the nearest monitoring locations are outlined in Appendix B3.1 in Volume II Appendices, Table B3.1. The locations of the monitoring sites are shown in Figure 5.9 in Volume III Figures.

Annual mean NO_2 concentrations for 2015 to 2019 are shown in Appendix B3.1, Table B3.2. Results show that concentrations were well below the 40µg/m^3 objective at all monitoring locations in all years.

Defra background pollutant concentrations

Background concentrations refer to the existing levels of pollution in the atmosphere, produced by a variety of stationary and non-stationary sources, such

as roads and industrial processes. The Defra website[38] includes estimated background pollutant concentrations for NOx, NO_2, PM_{10} and $PM_{2.5}$ for each 1km by 1km OS grid square in the UK.

Background pollutant concentrations for the existing baseline year of 2020 have been obtained for the two grid squares in which the site red line boundary lies and are shown in Table 5.16. It can be observed that the annual mean background concentrations are below the relevant air quality standards for all pollutants.

Table 5.16: NRW regulated sites within 1km

OS grid square		**Annual mean concentrations (µg/m³)**			
X	**Y**	**NOx**	**NO_2**	**PM_{10}**	**$PM_{2.5}$**
315500	212500	12.9	9.8	11.7	7.5
316500	212500	9.1	7.2	11.4	7.4
Average		11.0	8.5	11.6	7.5

A comparison against monitored background concentrations has also been undertaken, using urban background monitoring site BGBC-04 with the latest year of available monitoring data, 2019. Table 5.17 presents the comparison of the monitored NO_2 concentrations against the Defra backgrounds for 2018. It can be observed that there is good agreement between Defra modelling and observed concentrations.

Table 5.17: NRW regulated sites within 1km

Site	**Defra OS grid square**	**Monitored NO_2 (µg/m³)**	**Defra background NO_2 (µg/m³)**
BGBC-04	317500, 211500	7.7	7.2

Selected background concentrations

A full set of background concentrations has been provided in Appendix B2 in Volume II Appendices. The selected baseline concentrations and justification behind the choice for each pollutant are shown in Table 5.18.

[38] Defra LAQM background maps - https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html [Accessed November 2020]

Table 5.18: Summary of selected baseline air quality concentrations

Pollutant	Long term conc. [(a)]	Units	Year(s)	Reasoning behind the selection of the long-term concentration
Nitrogen oxides (NOx)	9.8	µg/m^3	2018	Based on annual mean NO_2 concentration measured at the nearest urban background monitoring site, BGBC-04. Data for 2018 as the last year of measured concentrations. The ratio from the Defra mapped concentrations for NO_2 to NO_x has been applied.
Nitrogen dioxide (NO_2)	7.7	µg/m^3	2018	Annual mean NO_2 concentration measured at the nearest urban background monitoring site, BGBC-04. Data for 2018 as the last year of measured concentrations. As shown in Table 5.18 this provides a slightly conservative assessment if compared to the Defra mapped backgrounds. 1-hour mean concentration will be calculated as twice the long-term concentration.
Sulphur dioxide (SO_2)	3.5	µg/m^3	2006	Annual mean concentration measured at the Cwmbran automatic monitoring site in 2006. Cwmbran is the closest urban background monitoring site which measured for SO_2. 2006 is the latest year with monitoring results with a data capture rate >70%. Monitored results are higher than estimated Defra maps, therefore will be applied as a conservative (pessimistic) assumption. 15-min mean, 1-hour mean and 24-hour mean concentrations will be calculated as twice the long-term concentration.
Fine particulate matter (PM_{10})	Location dependent	µg/m^3	2020	In the absence of local monitoring data, it is proposed to use the Defra background map data for PM_{10}, for the location where the discrete or gridded receptor is located. 24-hour mean concentration will be calculated as twice the long-term concentration.
Fine particulate matter ($PM_{2.5}$)	Location dependent	µg/m^3	2020	In the absence of local monitoring data, it is proposed to use the Defra background map data for $PM_{2.5}$, for the location where the discrete or gridded receptor is located.
Hydrogen chloride (HCl)	0.28	µg/m^3	2013	Annual mean concentration measured at the Narbeth rural background monitoring site (nearest monitoring site which monitors for HCl). Review of results from 2006 to 2014 showed 2013 with the highest concentration and 100% data capture, therefore this has been applied as a conservative (pessimistic) assumption.
Hydrogen fluoride (HF)	0.04	µg/m^3	1984-1986	No background monitoring is carried out in the UK so historical data close to a brickworks in Bedfordshire have been used to give an indication. Actual values are likely to be lower than this as there are no local sources of HF.

Pollutant	Long term conc. [(a)]	Units	Year(s)	Reasoning behind the selection of the long-term concentration
Ammonia (NH_3)	2.34	ug/m^3	2016	Concentration measured at Narbeth rural background monitoring site (nearest monitoring site which monitors for NH_3). Review of results in 2016, 2017, 2018 and 2019 showed that 2016 had the highest concentrations, therefore this has been applied as a conservative (pessimistic) assumption.
Cadmium (Cd)	0.33	ng/m^3	2019	Concentration measured at the Swansea Coedgwilym urban background monitoring site (nearest monitoring site which monitors for Cd). Review of results in 2017, 2018 and 2019 showed that 2019 had the highest concentrations, therefore this has been applied as a conservative (pessimistic) assumption.
Copper (Cu)	3.98	ng/m^3	2017	Concentration measured at Swansea Coedgwilym urban background monitoring site (nearest monitoring site which monitors for Cu). Review of results in 2017, 2018 and 2019 showed that 2017 had the highest concentrations, therefore this has been applied as a conservative (pessimistic) assumption. The 1-hour mean concentration will be calculated as twice the long-term concentration.
Arsenic (As)	0.71	ng/m^3	2019	Concentration measured at the Swansea Coedgwilym urban background monitoring site (nearest monitoring site which monitors for As). Review of results in 2017, 2018 and 2019 showed that 2019 had the highest concentrations, therefore this has been applied as a conservative (pessimistic) assumption.
Lead (Pb)	6.47	ng/m^3	2019	Concentration measured at the Swansea Coedgwilym urban background monitoring site (nearest monitoring site which monitors for Pb). Review of results in 2017, 2018 and 2019 showed that 2019 had the highest concentrations, therefore this has been applied as a conservative (pessimistic) assumption.
Nickel (Ni)	13.26	ng/m^3	2019	Concentration measured at the Swansea Coedgwilym urban background monitoring site (nearest monitoring site which monitors for Ni). Review of results in 2017, 2018 and 2019 showed that 2019 had the highest concentrations, therefore this has been applied as a conservative (pessimistic) assumption.
Cobalt (Co)	0.52	ng/m^3	2019	Concentration measured at the Swansea Coedgwilym urban background monitoring site (nearest monitoring site which monitors for Co). Review of results in 2017, 2018 and 2019 showed that 2019 had the highest concentrations, therefore this has been applied as a conservative (pessimistic) assumption.
Chromium (Cr)	2.79	ng/m^3	2018	Concentration measured at the Swansea Coedgwilym urban background monitoring site (nearest representative monitoring site which monitors for Cr). Review of results in 2017, 2018 and 2019 showed that 2018 had the highest concentrations, therefore this has been applied as a conservative (pessimistic) assumption. For Cr the 1-hour mean concentration will be calculated as twice the long-term concentration. Hexavalent chromium (CrVI) will be calculated as 20% of the total Cr annual mean concentration.

Pollutant	Long term conc. [(a)]	Units	Year(s)	Reasoning behind the selection of the long-term concentration
Manganese (Mn)	3.69	ng/m^3	2018	Concentration measured at the Swansea Coedgwilym urban background monitoring site (nearest monitoring site which monitors for Mn). Review of results in 2017, 2018 and 2019 showed that 2018 had the highest concentrations, therefore this has been applied as a conservative (pessimistic) assumption. The 1-hour mean concentration will be calculated as twice the long-term concentration.
Vanadium (V)	0.76	ng/m^3	2017	Concentration measured at Swansea Coedgwilym urban background monitoring site (nearest monitoring site which monitors for V). Review of results in 2017, 2018 and 2019 showed that 2017 had the highest concentrations, therefore this has been applied as a conservative (pessimistic) assumption. The 1-hour mean concentration will be calculated as twice the long-term concentration.
Selenium (Se)	0.60	ng/m^3	2017	Concentration measured at Swansea Coedgwilym urban background monitoring site (nearest monitoring site which monitors for Se). Review of results in 2017, 2018 and 2019 showed that 2017 had the highest concentrations, therefore this has been applied as a conservative (pessimistic) assumption.
Tin (Sn)	0.26	ng/m^3	2011	Concentration measured at Cymystwyth rural background site (nearest monitoring site that measures Sn). Review of results from 2010 to 2013 showed 2011 with the highest concentration with over 75% data capture, therefore this has been applied as a conservative (pessimistic) assumption.
Antimony (Sb)	0.32	ng/m^3	2011	Concentration measured at Cymystwyth rural background site (nearest monitoring site that measures Sb). Review of results from 2010 to 2013 showed 2011 with the highest concentration with over 75% data capture, therefore this has been applied as a conservative (pessimistic) assumption.

(a) The Long Term Concentration is the value that is used to generate the concentration that will be added to the predicted concentration from the plant.

5.5 Embedded mitigation

The proposed development would include best practice air quality controls for emissions from the chimney and generators. The best practice controls are detailed within the Part A2 Glass Manufacturing guidance[16].

In accordance with BAT, the following controls are proposed to be installed:

- a chimney 75m in height for each of the main furnaces to allow sufficient dispersion of emissions;
- secondary abatement measures (Selective Catalytic Reduction) to control emissions of gasses from the furnaces; and
- filtration of particulate matter from furnace.

5.6 Assessment of effects

5.6.1 Assessment of construction effects

The proposed development will be constructed on vacant brownfield land. Dust can be generated due to activities such as earthworks, construction and trackout. There will be no demolition other than some road removal, the effect of which is considered under earthworks. The proposed development would be constructed over a period of approximately four years. The first phase of construction is proposed to commence in early 2022, following approval of the planning, with the first furnace operational by the end of 2023. Construction of the second furnace would be undertaken alongside the operational aspects of the first furnace which will be operational by the end of 2025 following a 12 month build programme.

Sensitive receptors

Receptors are defined as those properties that are likely to experience a change in pollutant concentrations and/or dust nuisance due to the construction of the proposed development.

There are no ecological designated sites within 50m of the site. Following IAQM guidance[27] impacts on ecological receptors have therefore not been considered further in this assessment.

Dust emission magnitude

Each dust-generating activity has been assigned a dust emission magnitude using a conservative approach. The dust emission magnitude for each activity are shown in Table 5.19.

Table 5.19: Dust emission magnitude for construction activities

Activity	Dust emission magnitude	Reasoning
Earthworks	Large	Estimated total site area where earthworks might occur >10,000m2, clay soil at the site, total material moved will be >100,000 tonnes.
Construction	Large	The total volume of buildings to be constructed is >100,000m3.
Trackout	Large	Potentially dusty surface material as concrete forms part of the topsoil, the length of the unpaved road is approximately 500m.

Sensitivity of area

The site is located at the eastern extent of Rassau Industrial Estate. There are 10-100 high-sensitivity receptors within 350m of the site boundary. High sensitivity receptors can be defined as where users would expect enjoyment of a high level of amenity and where the people would reasonably be expected to be present continuously, or at least regularly for extended periods. There are no residential receptors within 100m of the site.

As such, the areas sensitivity to dust soiling has been classified as Low in accordance with IAQM guidance. The construction dust distance buffers are shown in Figure 5.10 in Volume III Figures.

The average Defra background PM_{10} concentrations for the grid squares where the site is located all fall below the 24µg/m^3 threshold. Therefore, the sensitivity of the area to human health has been assigned as Low as there are 10-100 high sensitivity receptors within 350m of the site.

Risk of impacts

Taking into consideration the dust emission magnitude and the sensitivity of the area, the proposed development has been classified as Low risk to dust soiling and Low risk to human health impacts from demolition, earthworks, construction and trackout (see Table 5.20).

Specific mitigation to minimise risk of dust soiling and human health impacts of the proposed development is described in section 5.7.1. Overall, the mitigation measures for low risk sites mitigation will be considered for the proposed development. As noted in section 5.3.2 the effects from construction traffic are considered to be negligible as they are below the EPUK/IAQM screening thresholds.

Table 5.20: Summary dust risk table prior to mitigation

Activity	Risk of dust soiling	Human health risk
Earthworks	Low Risk	Low Risk
Construction	Negligible	Negligible
Trackout	Negligible	Negligible

5.6.2 Assessment of operation effects

Human receptors

- Normal operation – long term

This section presents the predicted onsite combustion impacts as process contribution (PC) and predicted environmental concentrations (PEC) resulting under normal operating conditions. Where relevant, receptor results are presented as the cumulative total impact from onsite combustion and change in traffic emissions.

It should be noted that a number of pessimistic assumptions have been considered within the assessment to account for variables and assumptions taken within the assessment, this approach is considered best practice for air quality assessment, and so the results are likely to be an overestimate of the actual impact.

Detailed results at each receptor are provided in Appendix B5 in Volume II Appendices. Figure 5.13 show contour plots of the predicted PC of the Proposed Development (associated with proposed furnaces and backup generators only) for key long-term and short-term pollutants.

The long-term impacts have been predicted to be negligible for all pollutants, excluding CrVI.

Impacts from CrVI are predicted as being moderate adverse at three receptors (9, 10 and 13). The moderate adverse impacts are a result of existing background concentrations which are above the objectives already. The actual change in concentrations is less than 1% at all human receptors (0.0000014µg/m3). The assessment has been carried out on the basis that green glass is produced and the three moderate adverse impacts are considered to be not significant.

In addition, this assessment is considered pessimistic as the applicant and the furnace designer have confirmed that the release of the CrVI is only associated with green bottle production, which is not initially intended to be part of the production of the Proposed Development. If the Proposed Development only produces flint and amber bottles the impacts from CrVI would be negligible.

- Normal operation – short term

The total short term concentrations at existing human receptor locations have been predicted to be below all the relevant objectives and short-term impacts are also negligible for all pollutants.

The impact at on-site receptors has been assessed by comparing total short-term concentrations with the relevant air quality objectives. No exceedances of the short-term objectives at locations relevant to the objective have been predicted in areas where people would be exposed to the pollutants for the duration of the objective.

- Abnormal operation

Detailed results at each receptor are provided in Appendix B6 in Volume II Appendices. The total short-term concentrations at existing human receptor and on-site locations have been predicted to be below all the to relevant objectives during the abnormal operation of the Proposed Development. Therefore, short-term impacts are negligible for all pollutants.

Ecological receptors

Detailed results showing the impact at all ecological receptors assessed are provided in Appendix B7 in Volume II Appendices.

The impacts at all ecological receptors when compared to relevant critical levels have been determined to be insignificant for all relevant pollutants (except for the weekly average for HF at receptor E11, Safleodd Ystlumod SAC), this is in accordance with the criteria detailed in the EA's Risk Assessment[11]. For weekly HF, the PC at receptor E11 is 0.051µg/m3, which is marginally above the screening criteria for the short term PC (0.05µg/m3, 10% of the weekly HF objective of 0.5µg/m3). Given the total PEC is 0.13µg/m3 and well below the objective, the weekly HF emissions are considered to be insignificant.

The impact when compared with site relevant critical loads for nitrogen deposition have been shown as being insignificant for all designated habitats other than at receptor E11, Safleodd Ystlumod Wysg SAC. At this location the total nitrogen deposition is 1.06% of the lower critical load (5 kg N/ha/yr). This marginal exceedance of the 1% screening thresholds means the results have been passed to the project ecologists to determine significance (Chapter 8 provides commentary on the potential significance). The critical load at the SAC is 5-10 kg N/ha/yr and the APIS website[18] for the feature notes that in areas of high precipitation the higher value can be used. Metrological data (2015-2019) indicated that it rained on 43% of days at the met station location. Should the higher critical load be applied the impact would be screened out as being insignificant.

The impact when compared with the site relevant critical loads for total acidity are shown as being insignificant for all designated habitats other than at receptor E8, Mynydd Llangynidr SSSI and E10, E11 Safleodd Ystlumod Wysg SAC. At these locations the total acidity impact is greater than 1% of the lower critical load function and the results have been passed to the project ecologists to determine significance (Chapter 8 provides commentary on the potential significance). At all three sites the impact is less than 1% of the maximum critical load function.

5.6.3 Odour SPR Assessment

There is no single source from the site which is expected to result in a strong odour concentration. Therefore the site as a whole has been included in an odour risk assessment following the SPR approach detailed in the IAQM Odour Guidance[31], this is shown in Table 5.21 below.

Table 5.21: SPR assessment results

Source	Source Odour Potential	Pathway Effectiveness	Receptor	Odour Risk and Justification
Whole site	Stack emissions are not expected to contain any significant odour, no VOCs will be emitted. Moderate levels of odours released as a conservative assumption. Raw material is not expected to have any significant odour content.	Exhaust discharge vertically at 75m allowing sufficient dispersion. Raw materials will be managed on site and stored within the facility.	The nearest residential properties are located approximately 400m away from the site.	The odour risk is considered to be low. The distance from emission point to receptor is sufficient to allow dispersion of any odours emitted to a level with is negligible.

As can be seen, the outcome of the SPR odour risk assessment is that there is a low risk of adverse odour impacts from the current arrangements at the site and therefore no further odour assessment or mitigation measures are required.

5.6.4 Plume visibility

Water in the emitted gases can condense and form a visible plume. The ADMS model calculates the occurrence of visible plumes and their length using the efflux parameters including the water content of the emissions, i.e. kg of water in the plume per kg of dry air in the plume. The values used in the modelling was 0.07 kg/kg

The proposed stack is predicted to have a visible plume of less than 1m for 97% of the year based on results from the worst case meteorological year (2016). Other years had a visible plume of less than 1m for 100% of the year.

There is no guidance available from an air quality perspective for the assessment of significance of a visible plume. The data shows there is a low risk of visible plumes over 5m based on worst case met conditions.

5.6.5 Assessment of significance

Taking into consideration the existing air quality conditions in the area, the predicted changes in pollutant concentrations due to the Proposed Development and any associated cumulative effects, it is likely that effects on local air quality that would arise from the operation of the proposed development would be not significant for all human receptors.

The effect of the development at ecological sites is considered to be not significant for the majority of sites and those where effects could not be screened out as being insignificant have been discussed with the project ecologists who determined the overall effect to be not significant, further information on the assessment of significance at ecological sites in Chapter 7.

5.7 Mitigation and enhancement

5.7.1 Mitigation of effects from construction

Construction phase mitigation

The dust emitting activities assessed can be greatly reduced or eliminated by applying the site-specific mitigation measures for the site according to the IAQM guidance[27]. The guidance notes that it is anticipated that with the implementation of effective site-specific mitigation measures, the environmental effect will not be significant in most cases.

Low risk mitigation measures for the general site and measures specific to the risks identified for demolition activities, are identified following the assessment. The following measures from the guidance are relevant and should be considered in the Construction Environmental Management Plan (CEMP) for the site.

Communications

- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
- Display the head or regional office contact information.
- Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site.

Site management

- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
- Make the complaints log available to the local authority when asked.
- Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book.

Monitoring

- Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log 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 100 m of site boundary, with cleaning to be provided if necessary.

- Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site 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 site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
- Fully enclose site or specific operations where there is a high potential for dust production and the site is actives 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 as described below.
- Cover, seed or fence stockpiles to prevent wind whipping.

Operating vehicle/machinery and sustainable travel

- Ensure all vehicles 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.
- Impose and signpost a maximum speed limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (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).

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 earthworks

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- Use Hessian, where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
- Only remove the cover in small areas during work and not all at once.

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.

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 continuously in use.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Record all inspections of haul routes and any subsequent action in a site log book.

5.7.2 Mitigation of effects from operation

The effects from point source emissions from the site have been predicted to be not significant. The controls detailed in section 5.5 are sufficient.

The effects from traffic movements are predicted to be not significant, however it would be recommended to minimise emissions from vehicles by considering the following mitigation measures in the detailed design:

Installation of electric vehicle parking chargers;

Working with haulage companies to encourage use of HDVs meeting the latest Euro standards; and

Encourage staff to travel to site via sustainable methods by providing incentives and changing facilities for cyclists.

5.8 Residual effects

There are no predicted significant residual effects as a result of the operation of the proposed development.

Table 5.22 Residual Air quality effects during construction

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Human and ecological receptors	Dust impacts	Slight adverse	Dust suppression measures and CEMP	Not significant
Human and ecological receptors	Increased air pollution concentration from construction vehicles	Not significant – Screened out of assessment	None proposed	Not significant

Table 5.23 Residual Air quality effects during operation

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Human receptors	Increased air pollutant concentrations	Not significant	None	No change
Ecological receptors	Increased air pollutant concentrations and deposition	See Table 16.10 for further Ecology details	See Table 16.10 for further Ecology details	Not Significant
Human receptors	Odour introduced by the proposed development	Not significant	None	Not significant

6 Climate change

6.1 Introduction

The climate change chapter assesses the impact of the proposed development on climate and the vulnerability of the proposed development to climate change, as per the requirements of EU Directive 2014/52 and the 2017 EIA Regulations.

This chapter details the methodology followed for the assessments, summarises the legislative and policy framework related to climate change and describes the existing and projected future local and regional baseline environment in the area surrounding the proposed development. Following this, an assessment of the potential effects of the proposed development has been made. Additionally, the design, mitigation and residual effects of the proposed development are discussed, along with any limitations to the assessment. The climate change topic consists of two elements:

- Impact of the development on climate – this considers the impact relating to greenhouse gas (GHG) emissions from the proposed development; and
- Vulnerability of the development to climate change – this considers the resilience of the proposed development in the context of projected future changes in climate variables (e.g. temperature and precipitation).

To take account of the potential impacts of future climate conditions on the environment combined with the impacts of the proposed development, the future projected climate conditions for the area has been considered within relevant topic assessments of likely significant effects. This means that environmental receptors that are vulnerable to impacts from both the development and climate factors are fully considered in the context of the changing climate. This assessment is presented within each topic chapter.

6.2 Legislation, policy context and guidance

6.2.1 Legislation

The Paris Agreement (2015)

The Paris Agreement is an international climate agreement aiming to limit global temperature increase this century to less than 1.5 degrees Celsius above pre-industrial levels. It was adopted into UK law in 2015 and was enforceable as of November 2016. Additionally, it is to establish a goal on enhancing adaptive capacity[39], strengthening resilience and reducing vulnerability to climate change. The guidelines for implementing the Paris Agreement were adopted at the 24th Conference of the Parties (COP24), in Katowice, Poland.

[39] Adaptive capacity relates to the capacity of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences.

Climate Change Act (2050 Target Amendment) Order 2019

The Climate Change Act 2008[40] committed the UK to its first statutory carbon reduction target to reduce carbon emissions by at least 80% from 1990 levels by 2050. The Climate Change Act 2008 (2050 Target Amendment) Order 2019 amended the legislated target to net zero emissions by 2050 in June 2019, following advice from the Committee on Climate Change. The Act requires that five-yearly carbon budgets are set and not exceeded. It also established a requirement to undertake a climate change risk assessment every five years and development of a programme for adaptation action in response to the risks identified.

UK Climate Change Risk Assessment (2017)

The Climate Change Act also established a requirement for government to undertake a climate change risk assessment (CCRA) every five-year period and develop a programme for adaptation action in response to the risks identified. The CCRA identifies significant risks to national infrastructure from embankment and bridge failure, river, surface/ groundwater and coastal flooding, erosion, and increases in the frequency and severity of extreme weather such as high winds, high temperatures, lightening, storms, and high waves. It highlights the need for infrastructure to be located, planned, designed, and maintained to be resilient to climate change, including severe weather events. It also recognises that more action is needed to encourage information sharing between infrastructure operators to improve overall risk management.

Industrial Emissions Directive

The IED[41] brought seven separate directives, into a single directive. The legislation contains the Emission Limit Values (ELVs) applicable to new glass furnaces. Whilst the site will not be permitted by Natural Resource Wales as a Part A1 process under the IED the ELVs set within the directive have been taken into consideration in this assessment. Where an ELV in the IED guidance is more stringent than set in the IPPC BAT document the most stringent limit has been taken. This is to account for potential future updates to UK BAT guidance to align with the IED. More information on ELVs can be found in Chapter 6 Air Quality.

6.2.2 Policy Context

National planning policy

The Climate Change: second national adaptation programme (2018 – 2023)

The second UK Climate Change Risk Assessment was published in 2017, as required under the Climate Change Act 2008. It establishes the six priority risk areas for action over the following five years. It is based on the independent

[40] UK Government, Climate Change Act 2008. Statute Law Database, 2008
[41] Environmental Permitting (England and Wales) Regulations 2016

evidence report published by the Committee on Climate Change. The priority areas applicable to the proposed development are:

- Risks to health, wellbeing and productivity from high temperatures;
- Risks of shortages in the public water supply for agriculture, energy generation and industry;
- Risks to natural capital including soils and biodiversity
- New and emerging pests and diseases, and invasive non-native species affecting people, plants and animals.

Clean Growth Strategy

In 2017, the UK Government published the Clean Growth Strategy, which is a plan for meeting the legislated carbon budgets[42] as set out in the Carbon Budget Order 2016. The strategy includes a key policy to improving business and industry efficiency and supporting clean growth, which primarily focuses on reducing energy and deploying more innovative technologies such as carbon capture, usage and storage (CCUS).

Well-being of Future Generations (Wales) Act 2015

The Well-being of Future Generations (Wales) Act 2015 requires public bodies to, via their decision making processes and powers, improve the economic, social, environmental, and cultural well-being of Wales by taking action aimed at achieving the well-being goals.

The Act establishes seven well-being goals, which specifically reference climate change. As such, the Act requires all public bodies to embed climate change into their decision making.

Planning Policy Wales (Edition 11)

PPW11 sets out the land use planning policies of the Welsh Government. The primary objective of PPW is to ensure the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales, as required by the Planning (Wales) Act 2015 and the Well-being of Future Generations (Wales) Act 2015.

Within the publication, the Welsh Government's policy objective is reported as *'to avoid the continued extraction and consumption of fossil fuels'* due to the *'challenging targets for decarbonisation'* set by the Government. Further, it states that precautionary action should be taken to prevent commitments being made to high carbon developments.

Environment (Wales) Act 2016

The Environment (Wales) Act 2016 requires Welsh Government to meet greenhouse gas reduction targets for Wales and establishes a 2050 emission target of 80% reduction in net emissions from the baseline year (1990 or 1995

[42] UK Government, "The Clean Growth Strategy Leading the way to a low carbon future," 2017

depending on the specific greenhouse gas). Progress to this target is supported by interim emissions targets set out for every 10 years until 2050 and carbon budgets established for five-yearly periods. In June 2019, Welsh Government committed to adopting the Committee on Climate Change's recommendation to change the emissions reduction target to 95% by 2050, with an ambition to reach net zero emissions by 2050. In March 2021, the Welsh Parliament approved a net-zero emissions target for 2050[43].

Future Wales: The National Plan (2040)

Future Wales is a plan promoting the development that enhances wellbeing and quality of life. The framework will help focus on achieving ambitions when developing and regenerating Wales' cities, towns and villages. The planning system has a key role in making Wales healthier, fairer and more prosperous. Addressing climate change, it is recognised as one of the biggest issues Wales faces. Changes to climate and weather patterns will have impacts on well-being of current and future generations, with extreme temperatures and weather events putting pressure on ecosystems, infrastructure, built environment, landscape and cultural heritage. Future Wales together with planning will ensure the planning system focuses on delivering a decarbonised and resilient Wales.

Prosperity for all: A Low Carbon Wales and Prosperity for all: A Climate Conscious Wales

Prosperity for all: A low carbon Wales was published in March 2019. It sets out how Wales aims to meet the first carbon budget (2016-2020) and consequently the 2020 interim target through 100 polices and proposals across Ministerial Portfolios. A low carbon Wales sets out aims to increase energy efficiency within the industrial sector through various policies including a climate change levy and climate change agreements applying to most business users across industry sectors.

Prosperity for all: A Climate Conscious Wales (2019) to influence partners in Wales to act. The document aims to raise awareness of climate adaptation and offers knowledge and best practice to improve climate resilience.

A stronger, greener, fairer Wales for everyone

A stronger, greener, fairer Wales for everyone is a 5-year plan showing how the Welsh Government will deliver following the Senedd 2021 election. The programme for Government highlights the cross-cutting commitments and the Welsh Government's wellbeing objective goals including:

'Build a stronger, greener economy as we make maximum progress towards decarbonisation

- Launch a new 10-year Wales Infrastructure Investment Plan for a zero-carbon economy;

[43] Welsh Government, "Net Zero Wales Carbon Budget 2 (2021-25)" 2021

- Work towards our new target of 45% of journeys by sustainable modes by 2040, setting more stretching goals where possible.

And

Embed our response to the climate and nature emergency in everything we do

- Legislate and abolish the use of commonly littered, single-use plastics;
- Create a National Forest to extend from North to South Wales;
- Introduce legislation to deal with the legacy of centuries of mining and ensure coal tip safety; strengthening local authority powers to protect the public and the environment'.

Net Zero Wales

Net Zero Wales Carbon Budget 2 (2021 to 2025) is the Welsh Government's second emissions reduction plan following Prosperity for all: A low carbon Wales. It sets out Carbon Budget 2 and builds the foundations for Carbon Budget 3 and Wales' 2030 target, as well as the target of net zero by 2050[43].

Local planning policy

Blaenau Gwent County Borough Council Local Development Plan 2006 – 2021

Within the BGCBC LDP the policies of relevance to this chapter include:

- Policy SP7 – Climate Change
- This policy states that the council will seek to address climate change and reduce energy demand to improve the sustainability of the valley communities by:
- Addressing the causes of climate change through:
- Encouraging more of the County Borough's electricity and heat requirements to be generated by renewable and low/zero carbon technologies;
- Supporting development proposals that incorporate decentralised heating, cooling and power networks powered by renewable energy sources, or that connect to existing communal/district heating networks; and
- Promoting efficient use of land through giving preference to brownfield land and development at higher densities on sites located close to transport corridors or town centres and mixed-use allocations.
- Adapting to direct and indirect impacts of climate change through:
- Ensuring that developments accord with objectives of sustainability and good design;
- Directing new development away from those areas which are at high risk of flooding; and

- Managing flood risk through incorporating measures in design and construction to reduce the effects of flooding.
- Policy DM4 – Low and Zero Carbon Energy

This policy states that the council will encourage major development proposals to incorporate schemes which generate energy from renewable and low/zero carbon technologies. These technologies include onshore wind; landfill gas; energy crops; energy from waste; anaerobic digestion; sewage gas; hydropower; biomass; combined heat and power; and solar.

Blaenau Gwent County Borough Council Local Development Plan 2018 – 2033

Blaenau Gwent will revise the LDP which will cover the period 2018-2033. The Plan is expected to be adopted in the autumn of 2022.

Other Relevant Sectoral Policy and Guidance

Glass Sector, Industrial Decarbonisation and Energy Efficiency Roadmap Action Plan, 2017

The UK glass sector produces over 3 million tonnes of glass per year and is an essential part of the supply chain for many of the country's most important manufacturing sectors including food and drink, construction, and renewable energy. Container glass accounts for around 60% of all UK glass production.

Glass manufacturing is an energy intensive sector, with high temperature melting furnaces accounting for around 85% of the fossil fuels used on site. In the UK, glass factories emitted 2.2 million tonnes of CO2 in 2012.

The Plan identifies the important role of collaboration between industry, government, and others to take that could enable industry sectors to make deeper emissions reductions over the long term. Following the publication of the Industrial Decarbonisation and Energy Efficiency Roadmaps, the government and British Glass have agreed to the glass sector action plan that sets out voluntary commitments to enable the glass factory to make deeper emissions reductions over the long term. The 10 actions are listed below:

- Action 1: Create a leadership group tasked with reducing energy and carbon in the UK glass sector to ensure that the industry is fit for the future;
- Action 2: British Glass and Government to work together to deliver industrial decarbonisation;
- Action 3: Increase glass recycling in the UK to improve the supply of recycled glass (cullet) to produce new glass products;
- Action 4: Increase adoption of the most effective existing energy-efficiency technologies and practices;
- Action 5: Explore the feasibility of using lower-carbon energy sources in glass manufacturing;

- Action 6: Increase the use of low carbon glass products by removing barriers to adoption and creating market pull;
- Action 7: Increase communication and collaboration with the supply chain;
- Action 8: Optimise public and private sector finance to support the uptake of energy-efficiency and decarbonisation activities;
- Action 9: Put in place mechanisms to develop skills and share learning; and
- Action 10: Increase activity in research, innovation, and demonstration.

Best Available Techniques (BAT) for Manufacture of Glass, Industrial Emissions Directive 2010/75/EU: (Integrated Pollution Prevention and Control)

The BAT for manufacture of glass forms part of a series presenting the results of an exchange of information between EU Member States, the industries concerned, non-governmental organisations promoting environmental protection in the manufacture of glass.

The BAT report states that "the main environmental issue associated with container glass production is that it is a high temperature, energy-intensive process" that results in "the emission of combustion products and the high-temperature oxidation of atmospheric nitrogen" including carbon dioxide. The report goes on to mention that the most significant technological advances in this sector involve "primary emission reduction techniques for oxides of nitrogen" and include "low-NOX burners, staged combustion and flue-gas recirculation".

6.2.3 Guidance and standards

Best practice guidance for assessing the impact of the development on climate (GHG emissions) in EIA

- Institute of Environmental Management and Assessment (IEMA) (2017) Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance. It outlines the process for undertaking the carbon assessment as it relates to the EIA stages[44];
- The Publicly Available Specification 2080 (PAS 2080) on carbon management in infrastructure[45]; and
- RICS (2017) Whole life carbon assessment for the built environment (1st edition)[46].

[44] Institute of Environmental Management and Assessment (IEMA) (2017) Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance. Available online: https://www.iema.net/assets/newbuild/documents/IEMA%20GHG%20in%20EIA%20Guidance%20Document%20V4.pdf

[45] British Standards Institution, "PAS 2080:2016 Carbon Management in Infrastructure," 2016

[46] RICS professional Statement (2017) Whole life carbon assessment for the built environment (1st edition). Available online at: https://www.rics.org/globalassets/rics-website/media/news/whole-life-carbon-assessment-for-the--built-environment-november-2017.pdf

Best practice guidance for assessing the vulnerability of the development to climate change in EIA

Institute of Environmental Management and Assessment (IEMA) (2020) Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation[47].

6.3 Methodology

6.3.1 Methodology for establishing baseline conditions

Impact of the development on climate (GHG emissions)

The baseline (do-minimum scenario) is the reference point against which the impact of the proposed development can be compared and assessed. This is often referred to as 'business as usual' where assumptions are made on projected cumulative GHG emissions over the study period. The do-minimum scenario for the proposed development comprises the cumulative GHG emissions within the agreed physical and temporal boundary (see Section 6.4) of the proposed development but without implementation of the proposed development.

The GHG emissions without implementing the proposed development represent the current and future baseline (do-minimum scenario). In this scenario it is assumed that no construction activity would take place and the site would continue to operate in its current configuration over the study period. The baseline therefore includes cumulative use phase emissions[48]. The site is currently undeveloped and is located on the north-east extent of the existing Rassau Industrial Estate. The site in its existing form consists of scrubland, a mixture of broadleaved and coniferous woodland therefore the site will have a store of historic carbon and will be sequestering carbon from the atmosphere.

The assessment of GHG emissions compares the 'do-something' scenario against the 'do-minimum' baseline. The 'do-something' scenario considers that the proposed development is implemented, considering embedded GHG mitigation measures.

Vulnerability of the development to climate change

The baseline environment for the CCR assessment includes consideration of the following:

- Current climate conditions; and
- Future climate conditions.

[47] Available online at: https://www.iema.net/assets/newbuild/Policy%202020/IEMA%20EIA%20Climate%20Change%20Resilience%20June%202020.pdf
[48] This represents the carbon emitted directly from the fabric of the site.

Current climate conditions

Baseline climate variables for the local area has been obtained for the current climate conditions. The Meteorological Office (Met Office) generates climatologies for different areas of the UK, known as climate districts, including historical regional climate information. The proposed development is located within the South Wales and England South West climate district49.

Future climate conditions

The description of future climate conditions and extreme weather events has been based upon climate change projection data from the United Kingdom Climate Projections 2018 (UKCP18)50. UKCP18 data is the most comprehensive and widely used data set of climate projections covering the UK.

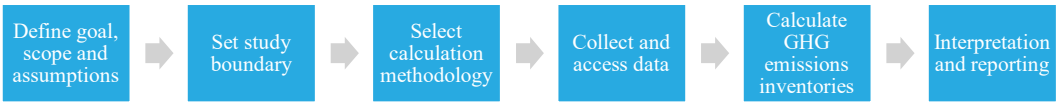
6.3.2 Assessment methodology

Impact of the development on climate (GHG emissions)

The GHG assessment quantifies and reports the GHG emissions anticipated to be generated or avoided by the proposed development in the form of a 'carbon footprint'. The carbon footprint has been reported in tonnes of carbon dioxide equivalent (tCO2e)[51].

The GHG emissions are quantified using the principal steps outlined in Publicly Available Specification 2080:2016 Carbon Management in Infrastructure (PAS 2080), as shown in Figure 6.2.

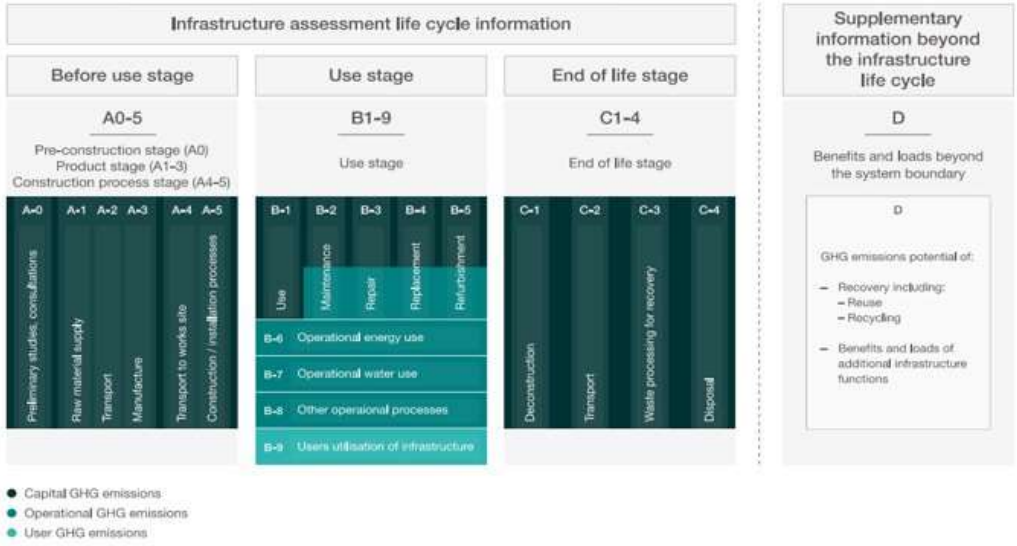
Figure 6.2 Principal steps of GHG emissions quantification



To adequately capture direct and indirect emissions associated with the proposed development, a lifecycle approach has been adopted. The lifecycle stages are defined in Figure 6.3. The GHG emissions assessment scope includes the before use stage (A) and the use stage (B). To maintain consistency with other chapters in the EIA the before use stage is the construction phase and the with use stage is referred to as the operational phase.

[49] UK climate districts map. Available online: https://www.metoffice.gov.uk/research/climate/maps-and-data/about/districts-map
[50] Meteorological Office UK Climate Projections 2018. Available online: https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/index
[51] This measure considers the six Kyoto Protocol gases: Carbon dioxide (CO_2); Methane (CH_4); Nitrous oxide (N_2O); Sulphur hexafluoride (SF_6); Hydrofluorocarbons (HFCs); and Perfluorocarbons (PFCs), converted into tonnes of carbon dioxide equivalent (tCO_2e). This calculation normalizes the global warming potential of the main GHG into one measure, based on the global warming potential of CO_2.

Figure 6.3: The GHG emissions assessment scope includes the before use stage (A) and the use stage (B)



The temporal boundary for GHG emissions assessment constitutes the construction phase (assumed to commence in summer of 2022 for a duration of approximately four years) and assumed operational phase of 60 years (furnace one is assumed to commence in 2024, and furnace two in 2026). End of life emissions, including those associated with demolition, transportation and treatment of waste are excluded from the assessment since planning approval for decommissioning is not being sought at this stage. In practice, the end of life emissions would be expected to be lower than the construction emissions, as for example, in 60 years' time, construction-related activities are expected to be much more efficient[52].

The GHG emissions from the proposed development has been calculated by converting 'activity data' (such as material quantities, energy consumption and transport kilometres travelled) into quantities of GHG emissions through the application of emissions conversion factors.

The data sources and assessment methodology for each aspect of the development included in the GHG emissions assessment are summarised in Table 6.1. The accompanying assumptions and emissions conversion factors are included in Appendix C1 in Volume II Appendices.

Table 6.1 Methodology for estimating emissions sources included in the GHG emissions assessment.

Emissions stage	Emissions source	Assessment methodology	Data sources
Construction			
A1-A3	Substructure, superstructure,	Materials emissions factors have been taken from the Inventory of Carbon and Energy (ICE) version 2 and 3.	Gleeds - CiNER Glass - Stage 2

[52] According to the CCC's Balanced Net Zero Pathway Scenario set out in the Sixth Carbon Budget, emissions in the Manufacturing and Construction (M&C) sector are projected to decrease by 95% by 2050 from a 2020 baseline.

Emissions stage	Emissions source	Assessment methodology	Data sources
	externals and drainage	Where specific material quantities are not available, benchmarks have been taken from the Arup Carbon Insights Platform - a library of "typologies" based on completed embodied carbon calculations from Arup projects. Where there is neither a carbon factor or benchmark available for a specific item, that item has been excluded from the assessment based on the PAS2080 cut-off rule53.	Construction Material Quantities
	Factory equipment (e.g. furnaces, processing lines and back-up generators etc)	These components have been excluded from the construction materials emissions assessment due to their material complexity and the lack of information available on their embodied carbon content.	N/A
A4	Substructure, superstructure, externals and drainage	Transport emissions factor has been taken from the BEIS UK Government GHG Conversion Factors for Company Reporting (2020). The emissions factor is based on tonne-km's of building materials.	Gleeds - CiNER Glass - Stage 2 Construction Material Quantities See assumptions in Appendix C1 in Volume II Appendices
	Factory equipment (e.g. furnaces, processing lines and back-up generators etc)	These components have been excluded from the construction transport emissions assessment due to a lack of available information at the time of the assessment.	N/A
	Construction worker commuting	Transport emissions factor has been taken from the BEIS UK Government GHG Conversion Factors for Company Reporting (2020). The emissions factor is based on distance travelled (km) by construction workers.	See assumptions in Appendix C1 in Volume II Appendices
A5	Installation/plant equipment	Power ratings for plant machinery taken from BSI British Standards BS 5228-1:2009. For emissions factor see assumptions in Appendix C1 in Volume II Appendices.	Construction noise assumptions (see Appendix C1 in Volume II Appendices) Assumed construction plant programme provided by the Project Manager
Operational			

[53] PAS2080 cut-off rule: The total excluded emissions shall be a maximum of 5% of those for that Stage.

Emissions stage	Emissions source	Assessment methodology	Data sources
B6	Facility – Natural Gas	Emissions from factory operations have been estimated using the BEIS UK Government GHG Conversion Factors for Company Reporting (2020). The emissions factor utilised is that for Natural Gas used as fuel for the furnaces.	Park Cam Glass Packing Production Facility Project: EIA Report (2011)
	Facility – Electricity	Emissions from operational energy consumption of buildings have been estimated using the Green Book data tables (2019). The emissions factor utilised is that for Industrial Grid Average kWh which takes decarbonisation of the grid into consideration.	Arup (2020) CiNER Glass Limited Stage 2 Report: Dragon Glass Bottle Manufacturing Facility
B2-B5	Factory equipment (e.g. furnaces, processing lines and back-up generators etc)	The embodied emissions from maintenance and refurbishment over the life of the buildings have been excluded from the assessment on the basis of the PAS2080 cut-off rule53.	N/A
	Buildings		
B8[54]	Transport emissions	The emissions from operational traffic were calculated using the BEIS UK Government GHG Conversion Factors for Company Reporting (2020). These emissions assume no improvement in driving efficiency or uptake of electric vehicles.	See operational traffic assumptions in Appendix C1 in Volume II Appendices.
B1	Land-use change	Carbon sequestration rates gained/lost per unit of habitat. This is the carbon per year per hectare absorbed from the atmosphere by a specific habitat type.	Chapter 7 Ecology Table 7.13 Natural England Research Report (2021) Available at: http://publications.naturalengland.org.uk/publication/5419124441481216

GHG emissions in each scenario, outlined in Table 6.2, have been compared in order to assess the contribution of the proposed development to climate change. Measures embedded within the design to reduce GHG emissions as far as practicable have been recorded in Section 0.

[54] Reasoning: Represents processes that carbon emissions arise from that enable the development to operate and deliver its service, as per PAS2080.

Table 6.2 GHG Assessment Scenarios

Scenario	Description
Baseline 'Do-minimum' (Existing recorded)	'Business as usual' – the proposed development is not implemented.
'Do-something' (Existing recorded + proposed development)	The proposed development is implemented, considering embedded GHG mitigation measures.

Significance criteria

The IEMA guide to assessing the significance of GHG emissions[55] and evaluating their significance publishes the over-arching principle:

"The GHG emissions from all projects will contribute to climate change; …as such any GHG emissions or reductions from a project might be considered to be significant…"

In accordance with this guidance, any carbon emissions associated with the proposed development can be deemed significant. The guidance however does not provide significance criteria to assess potential effects against a scale of significance in the context of the EIA Regulations. The GHG assessment has been evaluated with reference to the UK carbon budgets (Table 6.3) and Welsh national carbon budgets and projected carbon budgets (Table 6.4)[43], in order to contextualise the emissions and develop further appropriate mitigation measures.

Table 6.3 UK carbon budgets[56]

Carbon budget	Carbon budget level - million tonnes of carbon dioxide equivalents (MtCO2e)
3rd carbon budget (2018 - 2022)	2,544 MtCO2e
4th carbon budget (2023 - 2027)	1,950 MtCO2e
5th carbon budget (2028 - 2032)	1,725 MtCO2e
6th carbon budget (2033 - 2037)	965 MtCO2e

Table 6.4 presents the Welsh national carbon budgets. Carbon Budget 2 and a preliminary Carbon Budget 3 are set out in Net Zero Wales Carbon Budget 2 (2021-25) [43], whereas Carbon Budgets 4 to 7 are projected based on preliminary emissions reduction targets set out in the Net Zero Wales report.

Table 6.4 Welsh national carbon budgets

Carbon budget	Carbon budget level - million tonnes of carbon dioxide equivalents (MtCO2e)
Carbon Budget 2 (2021 - 2025)	178.0 MtCO2e
Carbon Budget 3 (2026 - 2030)	118.7 MtCO2e
Carbon Budget 4 (2031 - 2035)	82.5 MtCO2e

[55] IEMA (2017) Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance
[56] As legislated by the Climate Change Act 2008 and set out in the Carbon Budgets Order 2009, the Carbon Budget Order 2011, the Carbon Budget Order 2016 and the Carbon Budget Order 2021.

Carbon Budget 5 (2036 - 2040)	45.8 MtCO2e
Carbon Budget 6 (2041 - 2045)	21.8 MtCO2e
Carbon Budget 7 (2046 - 2050)	6.2 MtCO2e

Accordingly, initiatives to further mitigate GHG emissions has been discussed in Section 6.7.

Vulnerability of the proposed development to climate change

The approach and methodology for the climate change resilience assessment is as follows:

- analysis of relevant climate change and weather data, emissions scenarios, and probability levels;
- assessment of climate hazards;
- identification of potential risks from these climate hazards to the assets and occupants of the proposed development;
- consideration of the resilience of the proposed development within the context of any incorporated mitigation measures, including resilience measures which are embedded within the design due to regulations and design guidelines; and
- identification of need for any further resilience measures to protect the proposed development against the effects of climate change.
- The CCR assessment is composed of three main parts: the identification of climate hazards and benefits; the assessment of likelihood and consequences; and the evaluation of significance. The potential likelihood and consequence of impacts on the proposed development will be scored using a qualitative five-point scale, as set out in Table 6.5 and Table 6.6.

Table 6.5 Qualitative five-point scale of likelihood of hazard impact

Descriptor	Description
Very unlikely	Event only occurs in exceptional circumstances and would not be expected to occur in the lifetime of the development
Unlikely	Based on the current design, engineering and maintenance standards, the event is not expected to occur more than once during the lifetime of the development
As likely as not	Event may occur at least once during the lifetime of the development
Likely	Event is expected to occur several times during the lifetime of the development
Very likely	Event is expected to occur many times during the lifetime of the development

Table 6.6 Qualitative five-point scale of consequences of hazard impact

Descriptor	Description
Negligible	Minor cuts/abrasions requiring minimal treatment; Causing minimal work interruption; No financial loss or costs; No environmental consequence.

Descriptor	Description
Slight	Injury requiring first aid treatment; Causing interruption of work for 3 days or less; Slight financial loss or cost; Slight environmental consequence.
Moderate	4 - 14 day lost-time injury(s). Medical treatment required; Substantial work interruption; Considerable financial loss; Moderate environmental implications.
Major	Major injuries, including permanent disabling injuries of over 14 days; Major work interruption; Serious financial loss; Severe environmental implications.
Catastrophic	Single or multiple deaths involving any persons; Disastrous work interruption; Huge financial loss; Devastating environmental implications.

Issues related to climate predominantly concern the operational phase and how buildings and infrastructure have been designed and developed to integrate climate change resilience. Flood risk has been assessed within the water resources assessment of the EIA and is therefore cross-referenced rather than duplicated in the climate change resilience assessment.

The impacts of climate change are already being experienced, particularly in terms of increased frequency and severity of extreme weather events such as storms and heatwaves. Due to the short temporal phase of construction, it is anticipated that good construction practice measures will appropriately address climate change risks during the construction phase. The construction phase has therefore been scoped out of the CCR assessment.

Significance criteria

The significance of the risks identified in the CCR assessment is based on the likelihood of a hazard having an impact on the proposed development and the consequence of the impact as set out in Table 6.7.

Table 6.7 Significance matrix

		Measure of consequence				
		Negligible	Slight	Moderate	Major	Catastrophic
Measure of likelihood	Very likely	Medium	Medium	High	Very high	Very high
	Likely	Low	Medium	Medium	Very high	Very high
	As likely as not	Low	Low	Medium	High	High
	Unlikely	Very low	Very low	Low	Medium	Medium

		Measure of consequence				
	Very unlikely	Very low	Very low	Low	Low	Medium

Significant effects are defined as those that are of medium, high, or very high significance. Significance conclusions for each impact will incorporate confirmed design and mitigation measures.

6.3.3 Limitations and assumptions

The limitations of the GHG emissions assessment are as follows:

- The GHG assessment is used to estimate the carbon output of the proposed development and will have a degree of uncertainty (e.g. the assessment is subject to the level of detail currently available and the benchmarking tools (e.g. Arup Carbon Insights Platform) create an average carbon output for development types);
- Embodied emissions of factory equipment (e.g. furnaces and back-up generators) have been excluded from the assessment as detailed in Table 6.1. In the context of the whole-life emissions of the project, these emissions are likely to be minimal[57]; and
- Some bulk infrastructure has also been excluded, which includes lighting infrastructure and communication lines as this information is currently unavailable.

The CCR assessment is based on the current design as presented in this EIA and the following assumptions:

- the assessment has assumed that mitigation measures for effects assessed by other topics will be implemented effectively;
- a Construction Environmental Management Plan will be developed for the construction phase that will be effectively implemented and provide appropriate mitigation for extreme weather-related effects during construction.

The limitations of the CCR assessment are as follows:

- there is uncertainty in the climate change projections used – the UKCP18 Weather Generator is subject to certain limitations which are addressed in detail in the Weather Generator Report published by UKCP58;

[57] As set out in Section 6.6, the construction emissions of the proposed development comprise of an estimated 2% of the total emissions over the design life of the project, under the current assumptions. Considering the embodied carbon of factory equipment has the potential to increase the construction stage emissions significantly, however, this will still comprise a very small fraction of the overall figure due to the large scale of operational emissions in comparison.
[58] UKCP09 (2010) UK Climate Projections science report: Projections of future daily climate for the UK from the Weather Generator, http://ukclimateprojections.metoffice.gov.uk/media.jsp?mediaid=87944&filetype=pdf [Accessed April 2021]

- the evidence base relating to climate change impacts for some assets and environmental topics is limited due to material uncertainty in projections for specific climate variables (extreme wind and storm events).

Assumptions made in the GHG emissions assessment are included in Appendix C1 in Volume II Appendices.

6.3.4 Consultation undertaken

An EIA Scoping Report was prepared and submitted to BGCBC on 20th May 2021. The EIA Scoping Report sets out the proposed scope for the assessment of climate change.

In general, there are no specific statutory or non-statutory consultation bodies on climate change within the EIA process. However, with the growing importance of climate change on political and public agendas, the EIA Scoping Report facilitates consultation with the local authority, Blaenau Gwent County Borough Council (BGCBC), within which the development is located, providing the opportunity to comment on the scope and methodology of assessment.

Table 6.8 below summarises the response to relevant comments raised in the Scoping Opinion and how comments have been incorporated into the assessment.

Table 6.8 BGCBC's response on the proposed scope of the climate change assessment

Comment	Response
There are likely significant impacts on climate change which are linked to the assessment of flood risk, traffic emissions, transport modes and air quality in both the construction and operational phases of the development. The relevant topic areas need to be cross referenced to climate change effects.	Topic areas cross reference their impacts with climate change impacts within their topic chapters.
Will the causes and impacts of climate change be fully considered through the location, design, build, operation, decommissioning and restoration	Causal links and impacts of climate change have been fully considered in the ES Chapter. Decommissioning of the proposed development is not proposed, this was scoped out in the Scoping Report.
Does the proposed facility support decarbonisation and transition to a low carbon economy?	GHG emission mitigation has been embedded in the design, the scale of which has been outlined in the ES Chapter as well as suggested further mitigation for construction and operational emissions. The results of the GHG assessment have been compared against UK and Welsh National carbon budgets, reported in the ES Chapter.

6.4 Baseline environment

Impact of the development on climate (GHG emissions)

The baseline (do-minimum scenario) is the reference point against which the impact of the proposed development can be compared and assessed. This is often referred to as ‘business as usual’ where assumptions are made on projected cumulative GHG emissions over the study period. The do-minimum scenario for the proposed development comprises the cumulative GHG emissions within the agreed physical and temporal boundary of the proposed development but without implementation of the proposed development.

The GHG emissions without implementing the proposed development represent the current and future baseline (do-minimum scenario). In this scenario it is assumed that the construction and operation of the factory would not take place and therefore includes those emissions associated with the operation of the existing mixed grassland within the defined redline boundary. Table X below outlines those existing habitats and their associated carbon flux.

The existing site, if undeveloped, would sequester 5,775 tCO2e over the 60-year assessment period. This is the baseline for the GHG assessment.

Table 6.9 The GHG assessment baseline (see Appendix C1 in Volume II Appendices for assumptions)

Habitat	Area (ha)	Carbon flux (tCO2e over the 60-year assessment period)
Conifer plantation (local)	3.42	-2,975
Mixed plantation woodland (Local)	1.46	-1,270
Dense/continuous scrub (local)	1.3	-155
Semi-improved acid grassland (county)	2.99	-65
Marshy grassland - species rich (county)	2.73	+9
Marshy grassland - species poor (local)	5.45	+18
Ephemeral/short perennial vegetation (county)	0.16	+1
Line of mixed scattered trees (local)	1.37	-1,192
Scattered scrub (local)	1.17	-140
Line of scattered scrub (local) and earth bank	0.0427	-5
Standing water – ditches and ephemeral waterbodies (local)	0.16	+/-0
Acid/neutral flush (local)	0.0088	+/-0
Amenity planting – none currently on site	0	+/-0
Total (baseline)		-5,775

Vulnerability of the development to climate change

Current climate conditions

The proposed development is located within the South Wales and England South West climate district[49]. Baseline climate variables for the local area are provided in Table 6.10 and Table 6.11.

Future climate conditions

This section presents future projected climate conditions and extreme weather events for the area encompassing the proposed development for the 2020s and 2080s. These time periods cover the assumed construction period, commencing 2022, and assumed 60-year operational life.

Using the historical baseline data, two methods were implemented to establish the future climate baseline:

- The changes in average climate conditions were obtained from the UKCP18 probabilistic projections of climate change59; and
- The changes in extreme weather events were obtained using UKCP18 regional projections.

Climate change projections for a range of meteorological parameters are presented for different probability levels within the Representative Concentration Pathway 8.5 (RCP8.5) high emission scenario60 for the near-term and long-term future time periods.

Temperatures in the area are projected to increase both in winter and summer. The largest increase in temperature is projected to be in the mean daily maximum temperature in summer, which is expected to increase by 5.5°C to 23.9°C in the 2080s, relative to the baseline in the RCP8.5 high emissions scenario.

Mean precipitation rates in the region are anticipated to change, in the winter there is a projected increase by 5.4% to 21.3% and a decrease by 9.9% to 40.0% in summer during the 2020s and 2080s.

The mean number of hot days, when the maximum temperature is above 25°C is anticipated to increase from 4.2 days to 36.4 days per year in the 2070s for the high emissions scenario. The average number of days each year when the mean daily temperature is below 0°C is anticipated to decrease from 60.0 days to 25.8 days in the 2070s under the high emissions scenario.

[59] Met Office, "UK Climate Projections (UKCP) - Met Office," 2018. [Online]. Available: https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/index.

[60] The RCP8.5 global warming scenario represents a very high baseline emission scenario, representing the 90th percentile of no-policy baseline scenarios available at the time. '8.5' represents 8.5 watts per metre squared, which is a measure of the end-of-century radiative forcing increase relative to pre-industrial conditions. The four RCP scenarios include "one mitigation scenario leading to a very low forcing level (RCP2.6), two medium stabilisation scenarios (RCP4.5/RCP6.0) and one very high baseline emission scenarios (RCP8.5)". The high emissions baseline scenario is chosen to represent a potential worst-case outcome, allowing sensitivity testing of critical features of the proposed development. This is also representative of the trajectory that global emissions have been on. Additionally, the future climate baseline forms part of other EIA topics' respective future baselines for assessment. Use of the high emissions scenario ensures that any very vulnerable, high-value receptors are considered.

Table 6.10 UKCP18 climate change projections for extreme weather events for the local area (based on 12km grid square, 312500, 212500) for the 2020s and 2080s (under the RCP 8.5 high emissions scenario)

Parameter		Observed baseline (1981-2010)	2020s (2010-2039)			2080s (2070-2099)a		
			Min.	Mean	Max.	Min.	Mean	Max. 61
Temperature	Number of frost days (daily minimum temperature equal or lower than 0°C)	60.0	-6.7	-18.3	-24.6	-18.3	-34.2	-45.9
	Heatwaves (2 days with maximum temperature higher than 29°C and minimum temperature higher than 15°C)	0.7	0.4	2.2	6.9	3.0	8.3	14.8
	Number of hot days (daily maximum temperature higher than 25°C)	4.2	3.0	9.7	26.9	13.6	32.2	53.9
Precipitation	Dry spells (10 days or more with no precipitation)	3.6	-0.2	0.3	1.0	0.6	1.1	2.0
	Annual number of days per year when precipitation is greater than 25mm per day (Met Office definition of 'heavy rain')	12.1	0.0	0.8	2.3	0.2	2.2	3.9

aN.B. The highest projection available is 2050-2079, this has been used to project climate scenarios for the 2080s.

[61] 12 regional models are used in UKCP18 to project the variables for extreme weather events. The min. (minimum) and max. (maximum) values shown here are the minimum projection from the 12 models and maximum projection from the 12 models for the given parameter.

Table 6.11 UKCP18 climate change projections for average climate variables for the local area (based on 25km grid square, 312500, 212500) for the 2020s and 2080s (under RCP 8.5 high emissions scenario)

Parameter		Observed baseline (1981-2010)	Anomalies from baseline for 2020s (2010-2039)			Anomalies from baseline for 2080s (2070-2099)		
			10th percentile	50th percentile	90th percentile	10th percentile	50th percentile	90th percentile
Temperature (°C) (change from baseline)	Mean winter daily temperature	3.4	-0.1	0.6	1.4	1.0	2.9	4.9
	Mean summer daily temperature	14.2	0.2	0.9	1.6	1.9	4.8	7.9
	Mean daily summer maximum temperature	18.4	0.3	1.1	2.0	2.1	5.5	9.1
	Mean daily winter minimum temperature	0.7	-0.1	0.6	1.4	1.0	3.0	5.3
Precipitation (% change from baseline)	Winter mean precipitation rate	5.8	-4.1	5.4	15.3	1.5	21.3	44.6
	Summer mean precipitation rate	3.2	-27.2	-9.9	6.9	69.7	-40.0	-9.5

6.5 Embedded mitigation

Impact of the development on climate (GHG emissions)

The following measures have been integrated into the design of the CiNER Glass factory to increase the energy efficiency and reduce the emissions intensity of the facility:

- A passive design: the building will be constructed to high thermal and air tightness standards to minimise heating and ventilation energy as much as possible. The buildings energy loads will be dominated by the process equipment, but all MEP plant will be optimised to maximise efficiency and reduce energy loads from the onset. Examples of this include energy efficient lighting/controls and hybrid adiabatic cooling units for process cooling;
- Heat recovery from furnace exhaust gases: Preliminary calculations indicate that as much as 7 MW of heat can be recovered from the furnace exhaust system. This is a significant amount of energy and it is expected that this will cover the non-process heating and hot water demands for the entire building. This means there is no requirement for additional heating plant and that the rest of the building is effectively heated using 'free' heat;
- Renewable energy generation: A small PV array will be located on the roof to offset electrical energy used in the main building; and
- A rainwater harvesting system will be included to serve the welfare facilities.

Further suggested mitigation to minimise GHG emissions during the construction and operational phases are summarised in Section 6.7.

Vulnerability of the development to climate change

Detail of the embedded mitigation measures associated with each identified climate change risk is included in the CCR Assessment provided in Appendix C2 in Volume II Appendices. These include building standards which consider climate change, the operational (climate) ranges of equipment and maintenance standard for roads.

6.6 Assessment of effects

Impact of the development on climate (GHG emissions)

The predicted GHG emissions associated with the construction and operation of the proposed development are summarised in Table 6.12.

Table 6.12 Total estimated GHG emissions by emission sources

Emissions source	Baseline (do-minimum)		Do-something	
	Emissions over appraisal period (ktCO2e)	Annual emissions in opening year (ktCO2e/year)	Emissions over appraisal period (ktCO2e)	Annual emissions in opening year (ktCO2e/year)
Construction				
Materials and Buildings (A1-A3)	0	0	148.5	0
Transport (A4)	0	0	16.5	0
Construction activity (A5)	0	0	2.8	0
Operation				
Land-use (B1)	-5.8	-0.1	-2.8	-0.05
Energy consumption (B6)	0	0	6,875.2	86.1
Transport (B8)	0	0	668.9	7.3
Total				
	-5.8	-0.1	7,709.1	93.3

Table 6.3 presents the relevant carbon budgets during which the proposed development will operate. Table 6.13 presents the estimated GHG emission contribution of the project to each of the carbon budgets. This approximation assumes an even distribution of emissions across quarters for the assumed overall construction period of approximately 3 years.

Construction is planned to start in Q2 of 2022 and is due to be completed in mid-2025. Therefore, the construction period for the scheme falls within the 3rd and 4th carbon budgets. Operation is assumed to be over a 60-year period commencing in 2024 and is assessed against the UK 4th, 5th, and 6th carbon budgets up to 2037 and the published and projected Welsh carbon budgets up to 2050. Operational and maintenance emissions are not assessed against UK carbon budgets after 2037 since no carbon budget has yet been set after this date.

Table 6.13 Assessment of scheme net change in emissions (up to 2037) against UK Government carbon budgets. See Table 6.3 for UK Carbon Budgets.

Project stage	**Estimated net (cumulative) change in scheme GHG emissions per relevant carbon budget (ktCO2e)**			
	3rd (2018 - 2022)	**4th (2023 - 2027)**	**5th (2028 – 2032)**	**6th (2033 – 2037)**
Construction (over a period of 3 ¼ years commencing in 2022)	38.7	129.0	0	0
Operation (2024 through to 2037)	0	467.3	673.3	624.4
Total	39.0	597.2	673.3	624.4

Table 6.14 Assessment of scheme net change in emissions (up to 2050) against Welsh national carbon budgets. See Table 6.4 afor Welsh national Carbon Budgets.

Project stage	**Estimated net (cumulative) change in scheme GHG emissions per relevant carbon budget (ktCO2e)**					
	2 (2021 - 2025)	**3 (2026 - 2030)**	**4 (2031 – 2035)**	**5 (2036 – 2040)**	**6 (2041 – 2045)**	**7 (2046 – 2050)**
Construction (over a period of 3 ¼ years commencing in 2022)	167.7	0	0	0	0	0
Operation (2024 through to 2037)	186.9	692.3	638.6	617.7	612.3	603.2
Total	355.8	692.3	638.6	617.7	612.3	603.2

Assessment of construction effects

Emissions related with construction are predicted to make up 2% of the proposed development's total emissions and comprised of:

- 148.5 ktCO2e from the embodied carbon within buildings and earthworks materials;
- 16.5 ktCO2e from transport of materials and workers to site during construction; and
- 2.8 ktCO2e from construction and installation related activities.

Construction of the facility is predicted to contribute an estimated 0.008% of the 3rd UK carbon budget and 0.007% of the 4th UK carbon budget. Further, the construction phase is predicted to contribute an estimated 0.094% of Wales' Carbon Budget 2. In accordance with IEMA guidance[55], any carbon emissions associated with the proposed development can be deemed significant.

Assessment of operation effects

The operational phase of the proposed development is predicted to result in 7,541.3 ktCO2e of GHG emissions over the 60-year appraisal period, based on the scope of the assessment outlined in this chapter. This equates to 98% of the total predicted whole-life emissions. This is comprised of:

- 7,544.1 ktCO2e from the energy consumption of factory infrastructure and transport-related emissions during operation; and
- -2.8 ktCO2e from habitat carbon sequestration.

In the first year of operation (2024), the annual emissions from energy consumption and transport is estimated to be 93.4 ktCO2e.

Operation of the facility will contribute an estimated 0.024% of the 4th UK carbon budget, 0.039% of the 5th UK carbon budget and 0.065% of the 6th UK carbon budget. Further, the operational phase is predicted to contribute 0.105%, 0.584%, 0.774%, 1.350%, 2.815% and 9.706% of Wales' Carbon Budgets 2 to 7, respectively. In accordance with IEMA guidance[55], any carbon emissions associated with the proposed development can be deemed significant.

Vulnerability of the development to climate change (climate change resilience assessment)

Assessment of operation effects

Climate change risks to infrastructure assets designed and constructed as part of the scheme have been assessed during operation. All climate change risks to assets during the operation of the scheme are found to be 'not significant' because of mitigation measures already built into the design. Details of these mitigation measures and the significance assessment are contained in Appendix C2 in Volume II Appendices.

These non-significant climate resilience impacts, identified using criteria set out in the assessment methodology, are presented in detail in Appendix C2 in Volume II Appendices and summarised in Table 6.15.

Table 6.15 CCR summary

Risk ID	Climate Hazard	Potential climate change risk to scheme	Existing or embedded mitigation measure	Hazard impact likelihood	Hazard impact consequence	Evaluation of significance
1	High temperatures	Increased temperatures leads to increased HVAC system power demand and increased energy consumption to cool buildings.	Expected temperature increase is within operational range of systems designed to current standards for the design life of HVAC system. Energy efficient systems to be selected.	Unlikely	Slight	NS
2	High temperatures	Increased temperatures and extreme heat events lead to reduced thermal performance of buildings and reduce thermal comfort of occupants	Expected temperature increase is within operational range of systems designed to current standards for 20-year design life of HVAC system.	As likely as not	Slight	NS
3	High temperatures	Increased temperatures lead to accelerated degradation of building facade materials	Design of external building materials to current standards, monitored and maintained as per standard maintenance procedures.	Unlikely	Slight	NS
4	High temperatures	Extreme heat events lead to failure of sensitive equipment at high temperatures	Sensitive equipment to be located in temperature-controlled areas of buildings. Building design to meet guidance in Health Technical Memoranda.	Unlikely	Moderate	NS
5	High temperatures	Extended periods of hot days may lead to a risk of spontaneous grassland fires, causing building damage	The site only includes managed amenity grassland which is very unlikely to combust. There is a fire strategy for the site in place, including a network of hydrants for use in the event of a fire.	Very unlikely	Major	NS

Risk ID	Climate Hazard	Potential climate change risk to scheme	Existing or embedded mitigation measure	Hazard impact likelihood	Hazard impact consequence	Evaluation of significance
6	High temperatures	Fewer frost days leads to decreased energy consumption to heat buildings	No mitigation required	Very unlikely	Negligible	NS
7	High temperatures	Fewer frost days leads to improved thermal comfort of building occupants	No mitigation required	Very unlikely	Negligible	NS
8	High precipitation	Extreme rainfall events lead to localised flooding, causing damage to building structure, internal fit-out, and equipment	Masterplan design is based on detailed flood risk assessment which incorporates projected climate change.	Unlikely	Moderate	NS
9	High precipitation	Extreme rainfall events lead to opportunity for rainwater harvesting	No mitigation required	Very unlikely	Negligible	NS
10	High precipitation	Increased rainfall and flooding effects can damage internal building contents.	Masterplan design is based on detailed flood risk assessment which incorporates projected climate change. The drainage strategy is to implement SuDS components that manage surface runoff close to the source and treat surface water run off on the surface. The selected SuDS components are sized for a 1:1-year return period. The piped network will be sized to ensure no flooding occurs on-site up to a 100-year rainfall event.	Unlikely	Moderate	NS
11	High precipitation	Extreme rainfall events lead to localised flooding of infrastructure, causing disruption to services	Masterplan design is based on detailed flood risk assessment which incorporates projected climate change. The drainage strategy is to implement SuDS components that manage surface runoff close to the source and treat	Unlikely	Moderate	NS

Risk ID	Climate Hazard	Potential climate change risk to scheme	Existing or embedded mitigation measure	Hazard impact likelihood	Hazard impact consequence	Evaluation of significance
			surface water run off on the surface. The selected SuDS components are sized for a 1:1-year return period. The piped network will be sized to ensure no flooding occurs on-site up to a 100-year rainfall event.			
12	High precipitation	Extreme rainfall events lead to sewer flooding and resulting effects	Masterplan design is based on detailed flood risk assessment which incorporates projected climate change. The drainage strategy is to implement SuDS components that manage surface runoff close to the source and treat surface water run off on the surface. The selected SuDS components are sized for a 1:1-year return period. The piped network will be sized to ensure no flooding occurs on-site up to a 100-year rainfall event.	Very unlikely	Moderate	NS
13	High precipitation	Extreme rainfall events leading to debris and sediment runoff, causing blockage to drainage systems. Blockage may result in flooding and resulting effects.	Masterplan design is based on detailed flood risk assessment which incorporates projected climate change. The drainage strategy is to implement SuDS components that manage surface runoff close to the source and treat surface water run off on the surface. The selected SuDS components are sized for a 1:1-year return period. The piped network will be sized to ensure no flooding occurs on-site up to a 100-year rainfall event.	Unlikely	Moderate	NS
14	Low precipitation	Decreased average rainfall leads to drier soil conditions and soil shrinkage, causing damage to building foundation and possible ground movement.	Shrinkage considered in foundation design	Very unlikely	Moderate	NS

Risk ID	Climate Hazard	Potential climate change risk to scheme	Existing or embedded mitigation measure	Hazard impact likelihood	Hazard impact consequence	Evaluation of significance
15	Low precipitation	Dry spells lead to desiccation of soils, causing reduced slope stability and potential earthworks failure following subsequent rainfall events	Shrinkage considered in foundation design	Very unlikely	Moderate	NS
16	Low precipitation	Decreased average rainfall and dry spells lead to disruption to water supply to building	Buildings connected to mains water supply. Capacity checks have been undertaken with utilities to confirm capacity within network.	Very unlikely	Slight	NS
17	Low precipitation	Decreased average rainfall leads to increased reliance on mains water for landscape irrigation during summer	Landscape Management Plan includes procedures for irrigation during establishment and ongoing maintenance. Resilience of plants chosen for the design is considered	Very likely	Slight	NS
18	Low precipitation	Decreased average rainfall leads to loss of vegetation during summer	Landscape Management Plan includes procedures for irrigation during establishment and ongoing maintenance. Resilience of plants chosen for the design is considered	Likely	Moderate	NS
19	Low precipitation	Decreased average rainfall leads to drier soil conditions and soil shrinkage, causing damage to underground service infrastructure	Underground service infrastructure all within the hardstanding areas and therefore have a resilience against drier soils.	Very unlikely	Major	NS
20	Low precipitation	Extended periods of dry days may lead to a risk of spontaneous grassland fires, causing building damage	The site only includes managed amenity grassland which is very unlikely to combust. There is a fire strategy for the site in place, including a network of hydrants for use in the event of a fire.	Very unlikely	Major	NS

Risk ID	Climate Hazard	Potential climate change risk to scheme	Existing or embedded mitigation measure	Hazard impact likelihood	Hazard impact consequence	Evaluation of significance
21	Extreme winds	High winds lead to increased stress and damage to buildings, especially material fixtures, claddings and fasteners	Current standards include sufficient allowance for changes in wind patterns	Very unlikely	Major	NS
22	Extreme winds	High winds lead to damage to vegetation and trees	Site is exposed and strong winds currently occur, layout of buildings considers mitigation of wind impacts through creation of microclimates.	Very unlikely	Slight	NS
23	Extreme winds	High winds lead to increased stress and damage to above ground utility infrastructure	Current standards include sufficient allowance for changes in wind patterns.	Likely	Slight	NS
24	Extreme winds	High winds leads to movement of dust from construction, which can harm the health of construction workers and the public.	Current standards include sufficient allowance for changes in wind patterns.	Likely	Moderate	NS
25	Lightning	Increased lighting strikes lead to more damage, especially roofs, guttering and windows.	A lightning protection system has been provided to furnace buildings	Unlikely	Slight	NS
26	Humidity	Increased humidity through warmer air causes mould, condensation and decreased	Current standards include sufficient allowance for changes in humidity	Unlikely	Slight	NS

Risk ID	Climate Hazard	Potential climate change risk to scheme	Existing or embedded mitigation measure	Hazard impact likelihood	Hazard impact consequence	Evaluation of significance
		thermal performance of buildings.				

6.7 Mitigation and enhancement

The proposed development will result in additional direct GHG emissions for the proposed development during construction and operation, from the sources noted in Table 6.1.

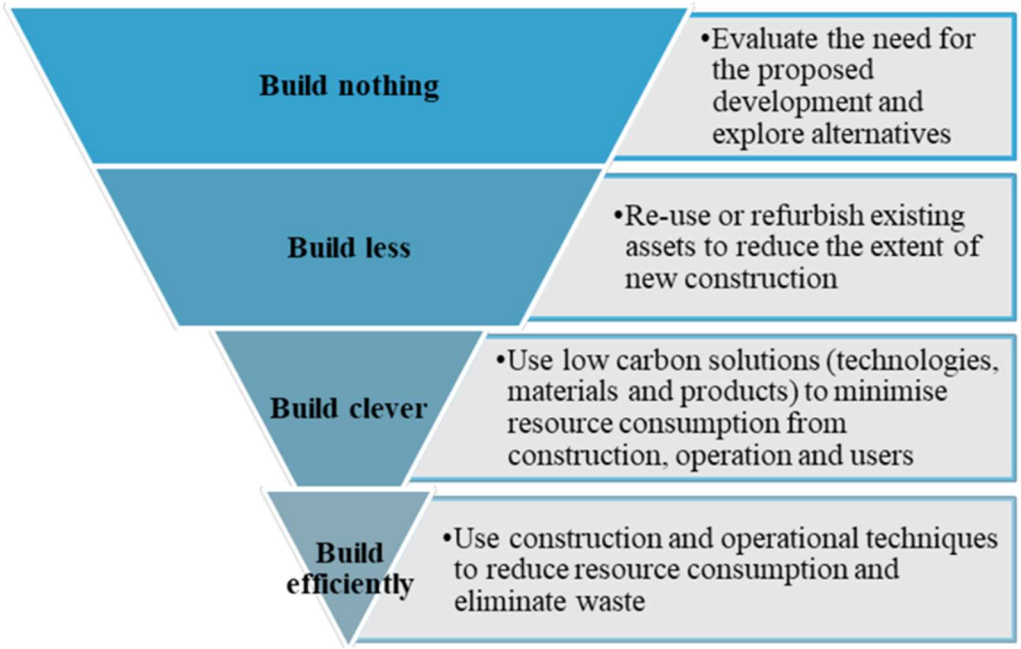
The design, mitigation and enhancement measures implemented to minimise GHG emissions during the operation of the proposed development are recorded in Section 0. The GHG emissions assessment results in Section 6.6 identify the greatest sources of GHG emissions and suggested mitigation to reduce these during the construction and operational phases are summarised in this section.

Typical mitigation measures include:

- Measures to reduce GHG emissions - low carbon and/or reduced resource consumption solutions (including technologies, materials, and products) to minimise resource consumption during the construction, operation, and at end of life; and
- Measures to remediate GHG emissions - measures to further reduce carbon through on or off-site offsetting or sequestration.

PAS 2080 outlines the GHG emissions reduction hierarchy shown in Figure 6.4. This has been adopted in identifying opportunities to reduce emissions over the life of the project. As there are no existing assets on site, it is likely that the mitigation opportunities identified will fall under the 'build clever' and 'build efficiently' tiers of the hierarchy.

Figure 6.4: Carbon emissions reduction hierarchy6



6.7.1 Mitigation of effects from construction

Impact of the development on climate (GHG emissions)

The following measures are recommendations to mitigate the impact of GHG emissions from the construction of the proposed development:

- Implement the principles of 'designing out waste' to reduce the embodied emissions associated with the manufacture of materials that are subsequently wasted;
- Select alternative materials with lower emissions intensities e.g. recycled materials, cement substitutes; and
- Select local material suppliers if feasible within the design specification to reduce the transport distances and associated emissions from freight.

6.7.2 Mitigation of effects from operation

Impact of the development on climate change (GHG emissions)

The following measures are recommendations for design interventions to mitigate the impact of GHG emissions during the operation of the proposed development:

- Design for operation, consider service-based material and selection of durable materials with low requirements for maintenance and replacement over the operational life of the development, with consideration of appropriate selection of materials. For example, it has been identified that the furnaces will need to be replaced within the operational lifetime of the proposed development. Consideration should be given to best available technologies for the time, particularly in consideration of the Welsh and UK Governments' 2050 net zero carbon targets. A future decarbonisation plan must be developed by CiNER Glass Ltd to facilitate the development;
- Develop an energy management plan that ensures the factory is operating efficiently; and
- Develop strategies to encourage the use of low carbon transport modes, including active and public transport, to reduce emissions from transport. This should include an EV charging strategy for cars parking at the proposed development and sufficient bicycle parking[62].

Vulnerability of the scheme to climate change

No risks identified in the CCR assessment have been identified as significant following embedded mitigation and therefore no further recommendations for mitigation are needed.

[62] This can support strategies already put in place by Blaenau Gwent Council that are supported by the UK Government's Office for Low Emission Vehicles (OLEV), the Energy Saving Trust, Welsh Government and Natural Resources Wales. See https://www.blaenau-gwent.gov.uk/en/story/news/funding-boost-for-electric-vehicles/ [Accessed July 2021]

However, due to the uncertainties involved in adapting to future climate change, an adaptive pathway approach is recommended for monitoring and managing climate risks into the future. A clear plan, with climate related trigger points for review should be developed to support this, including an understanding of interdependencies and the requirements for developers of individual plots.

6.8 Residual effects

Following implementation of appropriate mitigation, it is still predicted that there will be GHG emissions from the construction and operation of the site, and therefore this remains a significant residual effect.

There are no residual impacts, following appropriate mitigation, following the CCR assessment.

Table 6.16 Residual Climate effects during construction

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Atmosphere	Greenhouse gases	Significant	Recommended mitigation for embodied carbon (designing out waste and select alternative materials and local suppliers)	Significant

Table 6.17 Residual Climate effects during operation

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Atmosphere	Greenhouse gases	Significant	Embedded design mitigation (passive design, furnace heat recovery, on-site renewable generation and rainwater harvesting) and recommended mitigation (future decarbonisation plan, energy management plan and low-carbon transport plan)	Significant
The proposed development	Climate change resilience	Significant	Embedded design mitigation	Not significant

7 Ecology

7.1 Introduction

This chapter of the ES assesses the likely significant effects of the proposed development on the ecological resources within the site and surrounding vicinity. The assessment has been carried out in accordance with guidance set out in the Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal (Chartered Institute of Ecology and Environmental Management's (CIEEM), 2019) ('the CIEEM Guidelines')[63].

A full description of the proposed development is given in Chapter 3: Proposed development but in summary: CiNER Glass Limited is proposing to develop a Glass Bottle Manufacturing facility (hereafter referred to as the 'proposed development'). The project 'red line' boundary considered in this assessment is shown in Figure 2.1. and is hereafter referred to as the 'site'.

This Chapter documents survey work undertaken in relation to habitats and species in addition to reporting the value of receptors and assessing the effects arising from the site construction (and associated enabling works such as vegetation clearance), and the operation of the proposed development. This Chapter also documents measures to mitigate and compensate these effects. Enhancement measures, which go beyond mitigating effects, are also identified. The residual effects following the inclusion of these measures are then assessed. Decommissioning has been scoped out of the Project's EIA, and therefore is not considered in this Chapter of the ES.

This Chapter has been informed by the baseline ecology survey data, reports and associated drawings included in ES Volume II, Appendices D1-13. Ecology surveys were completed between April 2020 and November 2020.

[63] CIEEM (2019) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, Version 1.1. Chartered Institute of Ecology and Environmental Management.

7.2 Legislation, policy context and guidance

7.2.1 Legislation

The legal context for ecological survey is provided by a framework of international and domestic legislation which aims to protect specific sites, habitats and species. A full list of relevant legislation is provided in Appendix D1.

Sites

Statutory protected sites include:

- The National Site Network comprising Special Areas of Conservation (SAC) and Special Protection Areas (SPA) protected under the Conservation of Habitats and Species Regulations 2017 (as amended) (also known as the Habitat Regulations). Amendments include those recently made by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019.
- Ramsar sites designated by the International Convention on Wetlands of International Importance (the Ramsar Convention);
- National Sites (Sites of Special Scientific Interest (SSSI) and National Nature Reserves (NNR)) protected under the Wildlife and Countryside Act 1981 (as amended); and
- Local Sites (Local Nature Reserves (LNRs)), protected under the National Parks and Access to the Countryside Act 1949 (as amended). These sites are protected by the relevant legislation regardless of whether planning permission is required. Where planning consent is required, they will also be protected by Planning Policy. Country Parks, Local Wildlife Sites (LWS) including Sites of Importance for Nature Conservation (SINC), and Ancient Woodlands are protected by Planning Policy, which will apply to schemes which require planning consent.

Species

Statutory protected species include:

- European Protected Species (EPS) protected under the Habitat Regulations (as amended); and
- Nationally Protected Species, protected under the Wildlife and Countryside Act 1981 (as amended) (WCA); Protection of Badgers Act 1992; Countryside and Rights of Way Act 2000 (CRoW); The Eels (England and Wales) Regulations 2009; and Salmon and Freshwater Fisheries Act 1975.

These legislations protect different species to varying degrees, and in most cases their habitats also, regardless of whether planning permission is required. In addition, these species are also afforded protection through Planning Policy, which requires that they are a ‘material consideration’ of any planning application. Species and habitats of conservation concern include:

- Section 7 species and habitats listed in the Environment (Wales) Act 2016 (the Environment Act) (applies to Wales only). These species and habitats are also known as 'Species and Habitats of Principal Importance for the Conservation of Biodiversity in Wales and England'; and
- Locally Protected Species which may be identified within County Local Biodiversity Action Plans (LBAP), the Royal Society for the Protection of Birds (RSPB) 'Birds of Conservation Concern' or Red Data books for example.

Habitats

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

Invasive Non-Native Species (INNS) of Plants

It is an offence to 'plant or otherwise cause to grow in the wild any plant which is included in Part 2 of Schedule 9' under the Wildlife and Countryside Act 1981 (as amended). These species are classified as 'controlled waste' and as such must be disposed of safely at a licensed landfill site under the Environmental Protection Act (1990).

The Invasive Alien Species (Enforcement and Permitting) Order 2019 allows for the enforcement of the EU Invasive Alien Species Regulation 1143/2014 on the prevention and management of invasive alien plant and animal species in England and Wales, including the relevant licenses, permits and rules for keeping invasive alien species. Species on this list are no longer listed on Schedule 9 of the Wildlife & Countryside Act 1981 (as amended).

The Environment (Wales) Act 2016 and the Natural Environmental Rural Communities Act 2006

Public authority listed in the Environment (Wales) Act 2016, including Local Planning Authorities "must seek to maintain and enhance biodiversity in the exercise of functions in relation to Wales, and in doing so promote the resilience of ecosystems, so far as consistent with the proper exercise of those functions". Ecosystem resilience is defined as the capacity for ecosystems to adapt, and comprises the key characteristics:

- Diversity between and within ecosystems;
- The connections between and within ecosystems;
- The scale of ecosystems; and
- The condition of ecosystems (including their structure and functioning).

In complying with the Biodiversity and Resilience of Ecosystems Duty, it is necessary to have regard to:

- The list published under Section 7;

- The State of Natural Resources Report (SoNARR) published under Section 8[64]; and
- Any area statement published under Section 11 for an area that includes all or part of an area in relation to which the authority exercises functions.

Section 7 lists species and habitats which are 'of principal importance for the purpose of maintaining and enhancing biodiversity in relation to Wales' (as decided by Welsh Government in consultation with Natural Resources Wales (NRW)).

The Well-being of Future Generations Act

It places a duty on public bodies to carry out sustainable development. In this Act "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. The action a public body takes in carrying out sustainable development must include:

(a) setting and publishing objectives ("well-being objectives") that are designed to maximise its contribution to achieving each of the well-being goals, and

(b) taking all reasonable steps (in exercising its functions) to meet those objectives. The seven well-being goals include: a resilient Wales, a prosperous Wales, a healthier Wales, a more equal Wales, more cohesive communities, a Wales of vibrant culture and thriving Welsh language and a globally responsible Wales.

Of most relevance is 'A resilient Wales', which seeks to maintain and enhance a biodiverse natural environment with healthy functioning ecosystems that support social, economic and ecological resilience and the capacity to adapt to change (for example climate change).

7.2.2 National Policy Context

Planning Policy Wales (PPW) (Edition 11)

PPW11[65] sets the national policies in relation to development control through the Town and Country Planning Act 1990. This is supported by a series of Technical Advice Notes (TAN), of particular relevance is Technical Advice Note 5 (WG, 2009) which sets out the consideration of nature conservation in the determination of planning applications.

PPW11 sets out that "planning authorities must seek to maintain and enhance biodiversity in the exercise of their functions. This means that development should not cause any significant loss of habitats or populations of species, locally or nationally and must provide a net benefit for biodiversity" (para 6.4.5). This

[64] Natural Resources Wales / The State of Natural Resources report 2016
[65] https://gov.wales/sites/default/files/publications/2021-02/planning-policy-wales-edition-11_0.pdf

policy and subsequent policies in Chapter 6 of PPW11 respond to the Section 6 Duty of the Environment (Wales) Act 2016.

A recent letter from WG to Local Planning Authorities (LPAs)[66] clarified that in light of the PPW11, and the Environment (Wales) Act 2016, where biodiversity enhancement is not proposed as part of an application, significant weight will be given to its absence, and unless other significant material considerations indicate otherwise it will be necessary to refuse permission.

Future Wales: The National Plan 2040

Future Wales provides the National Development Framework for Wales, setting out the direction for development in Wales until 2040. It addresses national priorities through the planning system, including sustaining and developing a vibrant economy, achieving decarbonisation and climate resilience, developing strong ecosystems and improving the health and well-being of communities in Wales. It is a spatial plan and therefore sets out a direction of where development and infrastructure should be located for the good of the communities in Wales.

The principles of the Well-being of Future Generations Act are embedded within the plan, to facilitate sustainable development. Importantly, it sets out how biodiversity needs to be safeguarded, and how actions should secure the maintenance and enhancement (net gain) of biodiversity, ecosystem resilience and green infrastructure, and part of development proposals.

United Kingdom Biodiversity Action Plan (UK BAP)

In 1992 the UK signed the Convention on Biological Diversity at the Rio Convention pledging the UK to develop national strategies for the conservation and sustainable use of biological diversity. The UK Government subsequently produced Biodiversity: The UK Action Plan in 1994, which described the biological resources of the UK as a whole and in turn led to the production of Biodiversity Action Plans for individual habitats and species.

Biodiversity policy within the UK has been revised through the publication of the UK Post-2010 Biodiversity Framework (JNCC, 2012). A total of 65 Priority Habitats and 1150 Priority Species have been identified as the most in need of protection. Such species and habitats present in Wales have been listed as species and habitats of principal importance for conservation in response to the requirements of the Environment (Wales) Act 2016. They are hereafter referred to as Section 7 (S7) species.

Wales Action Plan for Pollinators (2013)

The Action Plan for Pollinators in Wales recognises that: ‘Pollinators are an essential component of our environment. Honey bees and wild pollinators including bumblebees, solitary bees, parasitic wasps, hoverflies, butterflies and moths and some beetles are important pollinators in Wales, for crops such as fruit

[66] https://gov.wales/sites/default/files/publications/2019-11/securing-biodiversity-enhancements.pdf

and oil seed rape, clovers and other nitrogen fixing plants that are important to improving the productivity of pasture systems for livestock grazing, and wild flowers.'

The Welsh Government has worked with industry and stakeholders to look in more detail at the evidence and issues around pollinators and their conservation in Wales. Following consultation, an 'Action Plan for Pollinators in Wales' was launched setting the strategic vision, outcomes and areas for action to halt and reverse pollinator decline in Wales. This plan aims to reduce and reverse the decline in wild and managed pollinator populations, which includes bees, some wasps, butterflies, moths and hoverflies, some beetles and flies. A pollinator task force comprising of key stakeholders is now active and a draft implementation plan is in place[67].

7.2.3 Local Policy Context

The BGCBC LDP includes a number of policies relating to nature conservation, in particular:

SP10 Protection and Enhancement of the Natural Environment

Blaenau Gwent's unique, natural environment and designated landscape will be protected, and where, appropriate, enhanced. This will be achieved through:

10. Protecting, enhancing and managing Cwm Merddog woodland/Coed Ty'n y Gelli and Brynmawr Sections and Mynydd Llangynidr SSSI;
11. Ensuring that development does not have a significant effect on neighbouring Usk Bat Site, Cwm Clydach Woodlands, Aberbargoed Grasslands, Sugar Loaf Woodland or the River Usk SAC;
12. Ensuring that the locally identified SINCs and Local Biodiversity Action Plan (LBAP) species are protected and enhanced;
13. Protecting those attributes and features which make a significant contribution to the character, quality and amenity of the landscape;
14. Maintaining and enhancing the Green Infrastructure including creating a green network of local wildlife sites and wildlife corridors, links and stepping stones;
15. Ensuring development seeks to produce net gain in nature conservation by designing in wildlife, and ensuring any avoidable impacts are appropriately mitigated for; and
16. Ensuring development proposals do not have an unacceptable adverse impact upon the water environment and contribute to improving water quality where practicable.

[67] https://gov.wales/sites/default/files/publications/2019-04/action-plan-for-pollinators.pdf

DM14 Biodiversity Protection and Enhancement

Development Proposals within 10 km of the Usk Bat Sites SAC that would have an impact on connectivity corridors or cause direct or indirect disturbance to features must be subject to an Appropriate Assessment (HRA).

Development proposals will only be permitted within, or in close proximity to sites designated as SINCS, and LNRs or that affect ecological corridors and Priority Habitats and Species, where either:

1. It maintains or enhances the ecological function or geological importance of the designation and species, or
2. The need for the development outweighs the nature conservation importance of the site/species, and it can be demonstrated that the development cannot be reasonably located elsewhere and compensatory provision will be made equivalent to that lost as a result of the development.

DM15 Protection and Enhancement of the Green Infrastructure

Development proposals will be permitted provided:

1. There is no loss in connectivity within the Strategic Green Infrastructure network which comprises: a) river corridors and or b) special landscape areas.
2. Where appropriate, they facilitate connections to Strategic and Local Green Infrastructure; and
3. Where appropriate, they create natural open space and features to enhance linkages between green infrastructure.

DM16 Tree, Woodland and Hedgerow Protection

Development proposals will be permitted provided there would not be unacceptable harm to trees, woodland and hedgerows that have natural heritage value or contribute to the character of a particular locality.

Blaenau Gwent Local Biodiversity Action Plan

The Blaenau Gwent Local Biodiversity Partnership LBAP[68] details habitats and species of importance for nature conservation within the county. Of relevance to this project are the river habitat and the species groups otter (Lutra lutra); bats; birds; reptiles and amphibians; pollinating insects and invasive non-native species.

The Local Nature Partnership which has merged Blaenau Gwent Local Biodiversity Partnership with Torfaen Local Biodiversity Partnership is currently developing a Local Nature Action Plan (LNAP) and State of Nature Report, which will supersede the LBAP and form the basis of decision making, project development and local action. In the absence of a published LNAP reference has been made to LBAP habitats and species in this report.

68 Blaenau Gwent County Borough Council (2015). Blaenau Gwent Local Biodiversity Action Plan.

7.2.4 Guidance and standards

A range of guidance documents are available for biodiversity, but the principal assessment sources include:

1. Guidelines for Ecological Impact Assessment in the UK and Ireland, Versions 1.1 (CIEEM, 2019)[63].

Guidance for specific species, groups and other ecological features is discussed in individual relevant sections or is provided in the ecological baseline reports (ES Volume II, Appendices D1-13).

7.3 Study area

Study areas for each survey are detailed in Table 7-2 below. The Study area encompasses the land within the red line boundary of the Project site (shown in Figure 2.1). In addition, for amphibian surveys all waterbodies within 500 m of the project boundary were surveyed, and for riparian mammal (otter and water vole) surveys, 100 m up and downstream of connecting waterbodies were surveyed.

7.4 Consultation

An EIA Scoping Report was prepared and submitted to BGCBC on 20th May 2021. The EIA Scoping Report sets out the proposed scope for the assessment of visual impact and can be found on BGCBC's planning portal.

A Scoping Opinion was received from BGCBC on the 24th June 2021. This can be viewed on BGCBC's planning portal, Application reference C/2021/0128 and has been summarised with responses to explain where the Scoping Opinion comments have been incorporated in the assessment. Table 7.1 below provides responses to relevant comments raised in this correspondence.

Table 7.1: Local authority comment and applicant response.

Scoping opinion comment	Applicant response
We advise the site is subject to assessment to determine the likelihood of protected species being present in the area and likely to be affected by the proposals. Targeted species surveys should be undertaken for all species scoped in which should be undertaken by a suitably qualified ecologist and where necessary, licensed ecologist and comply with best practice guidelines. In the event that the surveys deviate from published guidance, or there are good reasons for deviation, full justification for this should be included within the EIA.	As detailed in the baseline methodology (Section 7.5.1) a range of protected species were undertaken within the site and adjacent habitats, as recommended by the Preliminary Ecological Appraisal which outlined the potential for protected species to occur within the site. These surveys have been undertaken by suitably qualified ecologists and follow best practice guidance.

Scoping opinion comment	Applicant response
Regarding great crested newts, we would advise that this species is not scoped out of the assessment on the basis of the results of eDNA surveys alone. We advise that each waterbody is subject to assessment using HSI methodology and traditional surveys regardless of an eDNA survey result.	The Chapter has been updated to scope great crested newts into the assessment, as a precautionary approach. As such potential impacts to GCN, should they occur within the site, have been considered.
Should protected species be found during the surveys, information must be provided identifying the species-specific impacts in the short, medium and long term together with any mitigation and compensation measures proposed to offset the impacts identified.	Potential impacts to amphibians including great crested newts, reptiles, fungi, invertebrates, breeding birds, roosting and foraging/commuting bats, badger, otter and other notable mammals have been considered both in the short and long term as a result of the proposed development. Mitigation and compensation measures have been detailed where required.
Where proposals implicate protected species which are also notified features of designated sites, we advise that the EIA considers he impacts of these species from both perspectives.	Impacts on lesser horseshoe bats, as well as other bat species, which are qualifying features of the Usk Bat SAC and Mynydd Llangatwyg SSSI, and other SSSIs within 10 km, have been considered under protected sites and also under bats.
We advise that the EIA sets out how the long term security of any mitigation or compensation will be assured including management and monitoring information and long term financial and management responsibility. Where the potential for significant impacts on protected species is identified, we advocate that a conservation plan is prepared for the relevant species and included as an Annex to the EA.	The ES chapter sets out proposed management of retained and newly created sites as part of the proposed development, which will be provided by the applicant. In addition, monitoring of habitats and species is proposed. A contribution to management of off-site habitats by the applicant is also proposed, at a number of local nature reserves and for which management plans exist. The management which will be provided as a result of the proposed development will be additional, since BGCBC do not currently have any management in place or plans to do so at these sites. This proposed offsetting has been discussed with relevant officers in BGCBC.
Where a European protected species is identified and the development proposal will contravene the legal protection they are afforded, a licence should be sought from NRW. The EIA must include consideration of the requirements for a licence and set out how the works will satisfy the three requirements as set out in the Conservation of Habitats and Species Regulations 2017 (as amended)	It is currently anticipated that no European protected species licences will be required, however a badger licence will need to be obtained to close outlier setts present in the site prior to any activities associated with the proposed development commencing.
We advise that in accordance with the Environment (Wales) Act 2016 and PPW11, the application demonstrates how it can deliver biodiversity enhancements and thus contribute to promoting ecological resilience. This is reaffirmed in the welsh Government letter of 23/10/19 to all chief planning officers.	Biodiversity enhancements are proposed on and offsite. The majority of enhancements and net gain will be provided through off-site habitat management, delivering management prescriptions as set out in existing LNR management plans.

7.5 Methodology

The assessment presented within this report is undertaken in accordance with the guidance for ecological assessment provided by the Chartered Institute of Ecology and Environmental Management (CIEEM)[63].

The assessment considers the potential impacts on statutory and non-statutory nature conservation sites, habitats and species of conservation importance. The methodology for establishing baseline conditions is set out in the following sections along with the methods for evaluating receptors and assessing impacts.

7.5.1 Methodology for establishing baseline conditions

Table 7.2: Survey methodology including timing and survey effort. Further details on methods and results can be found in the baseline reports in Appendices D1-13.

Ecological Feature	Date	Summary of method	Survey boundary
Desk study (including review of up to date local biodiversity records centre, existing relevant reports and online sources)	April 2020	A desk study was undertaken to identify any existing ecological information for the Site (i.e. red line boundary) and surrounding area. A search was undertaken to identify statutory designated sites within 5 km of the Site boundary. Online searches were carried out using the Multi Agency Geographic Information for the Countryside (MAGIC)[69], Natural Resources Wales website[70] and the Joint Nature Conservation Committee (JNCC) website[71]. In addition to this, protected and notable[72] species, Schedule 9 invasive non-native species and non-statutory site data within 5 km of the Site were obtained from the Biodiversity Information Service for South East Wales Biodiversity Records Centre (SEWBReC)[73] on 6th April 2020.	The study area encompasses the terrestrial land within the red line boundary of the Project site (shown in Figure 2.1).

[69] http://magic.defra.gov.uk/ Accessed online 12/11/2019.
[70] https://naturalresources.wales/conservation-biodiversity-and-wildlife/find-protected-areas-of-land-and-seas/designated-sites-search/?lang=en Accessed online 21/11/2019.
[71] http://jncc.defra.gov.uk Accessed online 12/11/2019.
[72] Notable' species and habitats considered in this report include species and habitats of principal importance for the purpose of maintaining and enhancing biodiversity in relation to Wales, under section 7 of the Environment (Wales) Act 2016, in addition to any species considered to be of significance for nature conservation such species listed in red data books, the Royal Society for the Protection of Birds (RSPB) 'Birds of Conservation Concern' lists and or Local Biodiversity Action Plans (LBAPs).
[73] http://www.sewbrec.org.uk/home.page (accessed 03/04/19).

Ecological Feature	Date	Summary of method	Survey boundary
		Further details are provided in the preliminary ecological appraisal report[74] in Appendix D2.	
Extended Phase 1 Habitat survey	1st April 2020	An Extended Phase 1 Habitat survey[75] and protected species walkover was completed of the Study Area in suitable conditions by two Suitably Qualified Ecologists. Further details are provided in the preliminary ecological appraisal report in Appendix D2. Phase 1 habitat survey is a standard technique for rapidly obtaining baseline ecological information over a large area of land. It is primarily a mapping technique and uses a standard set of habitat definitions for classifying areas of land on the basis of the vegetation present. Incidental records of flora and fauna were also made during the survey including any invasive species listed under Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) and Invasive Alien Species Order 2019, in the form of Target Notes, and the habitats identified were evaluated for their potential to support protected species and other species of conservation concern, including those listed above.	The study area encompasses the terrestrial land within the red line boundary of the Project site (shown in Figure 2.1).
Phase 2 Vegetation Survey: National Vegetation Classification (NVC)	July 2020	An NVC survey was undertaken by a suitably qualified ecologist. The objective was to describe the plant communities in habitats judged to be of highest value for nature conservation using NVC methods[76]. The vegetation types initially selected for study were identified from a Phase 1 Habitat Survey report in Appendix D2. Other habitats were also present but considered less likely to be of nature conservation significance, and although initially not included in the scope for the NVC survey, some were later included.	The study area encompasses the land within the red line boundary of the Project site (shown in Figure 2.1).

[74] Arup (2020) Preliminary Ecological Appraisal: CiNER.
[75] Joint Nature Conservation Council (2010) Handbook for Phase 1 Habitat Survey – A Technique for Environmental Audit (ISBN 0 86139 636 7).
[76] Joint Nature Conservation Committee (JNCC), 2006: National Vegetation Classification: A User's handbook.

Ecological Feature	Date	Summary of method	Survey boundary
		The survey was undertaken over several days in 7, 10 and 17 July 2020. A total of 66 quadrats were recorded. The quadrat areas were generally selected as being representative samples of the stand in which they occurred. The survey aimed to collect a minimum of five quadrats from each of the main plant communities, aiming to provide a reasonable representation of the vegetation type. Some unusual or poorly represented communities were sometimes described by just one or two quadrats. The quadrat data was analysed using the appropriate software and published reference sources, to determine NVC communities and sub communities present. Further details are provided in the NVC report in Appendix D3.	
Fungi	October and November 2020	A survey was undertaken to identify notable fungi species, by a SQE. Two walk-over survey visits were undertaken during September and October 2020, and which coincided with the main fungi fruiting season. Each visit involved a walk-through survey of the fungi survey plots, through vegetation considered to be of highest potential value for grassland fungi. Further details are provided in the Fungi report in Appendix D4.	The study area encompasses the terrestrial land within the red line boundary of the Project site (shown in Figure 2.1).
Invertebrates	May, June and September 2020	Invertebrate surveys were undertaken by a suitably qualified ecologist. An initial site visit identified habitats likely to be of greatest importance for invertebrates. Sampling sessions were undertaken between spring and early autumn and timed to coincide with the peak periods of invertebrate activity: 28th of May, 26th of June and 4th of September. The main emphasis for more detailed invertebrate surveys was on those habitats likely to have the greatest invertebrate interest Other less promising habitat types were also surveyed in less detail, with the aim being to ensure complete coverage of the whole range of main invertebrate habitats represented across the site.	The study area encompasses the terrestrial land within the red line boundary of the Project site (shown in Figure 2.1).

Ecological Feature	Date	Summary of method	Survey boundary
		In addition to general spot-searching techniques, some more specialised sampling methods were used to ensure all potentially important habitat features were sampled effectively including using sweep nets, pond nets and light traps. Where subsequent microscopic examination was required in order to ensure an accurate identification, specimens were collected into tubes with either ethyl acetate or iso-propyl alcohol. Further details are provided in the Invertebrate report in Appendix D5.	
Amphibians surveys	June 2020	Seven waterbodies within the Study Area were subject to a Habitat Suitability Assessment (HSI)[77] by a suitably qualified ecologist. Waterbodies scoring above 0.5 (equating to below average and above) were then sampled for the presence of great crested newt environmental DNA (eDNA) in accordance with the approved methodology endorsed by the Statutory Environmental Bodies[78]. Four waterbodies were subject to eDNA surveys, undertaken by a suitably qualified ecologist. Presence/absence surveys and population assessment surveys were also undertaken, by suitably qualified ecologists, on two waterbodies, which had a positive and inconclusive eDNA result. Further details are provided in the Amphibian report in Appendix D6.	The project site boundary, and planning application boundary, is shown in Figure 2.1. All suitable waterbodies[79] within 500m of project site (red line boundary shown in Figure 2.1) were surveyed during the amphibian surveys. This comprised seven waterbodies in total.

[77] Amphibian and Retile Groups of the UK (2010) Great crested Newt Habitat Suitability Index. Froglife.
[78] Biggs *et al*., (2014) Using eDNA to develop a national citizen science-based monitoring programme for the great crested newt (*Triturus cristatus*), biological conservation.

Ecological Feature	Date	Summary of method	Survey boundary
Reptile survey	June, July and September 2020	A reptile survey was carried with the aim of determining the presence or likely absence of reptiles within the Study Area. Habitats, which were considered most suitable for reptiles, were identified during the Extended Phase 1 Habitat survey. One hundred refugia (roofing felt) were deployed in late spring 2020. Artificial refugia comprised roofing felt mats measuring 0.5 m x 0.5 m, were placed in suitable habitat in groups of 10 and spaced circa 10m apart. Seven checks were undertaken in suitable weather, by suitably qualified ecologists, with the last check on the 10th September 2020. During each survey artificial refugia was carefully checked for signs of reptiles. In addition, any natural refugia within the area, were checked for signs of reptiles. This is in line with best practice survey guidance[80]. Further details are provided in the Reptile survey report in Appendix D7.	The study area encompasses the terrestrial land within the red line boundary of the Project site (shown in Figure 2.1).
Breeding bird survey	Transect surveys completed between April and June 2020.	Breeding bird surveys were undertaken within the Study Area, by suitably qualified ecologists, in accordance with current best practice including the CBC[81] Techniques and Bird Monitoring methods[82]. This comprised walking transects (the same as those used for bat surveys) to sample all accessible habitat and recording all signs of breeding using the BTO standard activity recording codes. Surveys were undertaken on four occasions between May (13th and 26th) and June (1st and 22nd) 2020, between dawn and 10 am.	The study area encompasses the terrestrial land within the red line boundary of the Project site (shown in Figure 2.1).

[80] Froglife (1999) Reptile survey: an introduction to planning, conducting and interpreting surveys for snake and lizard conservation. Froglife Advice Sheet 10. Froglife, Halesworth.
[81] Bibby, B.B., (2000). Bird Census Techniques. London: Academic Press.
[82] Gilbert, G.G., Gibbons, D.W. and Evans, J.,(1998). Bird Monitoring Methods: A manual of techniques. Bedfordshire, RSPB.

Ecological Feature	Date	Summary of method	Survey boundary
		Field surveys broadly followed the 'territory mapping' or Common Bird Census (CBC) methodology[83],[84], albeit with a reduced number of visits (four). CBC territory mapping is the most accurate practical way to determine the numbers and distribution of breeding birds where a high level of detail is required Further details are provided in the Breeding bird survey report in Appendix D8.	
Otter survey	June and August 2020.	The otter survey involved surveying all suitable waterbodies present within the Study Area that had been identified during the Phase 1 habitat survey or Ordnance Survey data. Two otter surveys were completed of each of these waterbodies between June and August 2020 (inclusive) (2nd June, 19th June and 18th August). The otter survey was conducted in line with relevant survey guidance[85], by a suitably qualified ecologist. This involved accessing the watercourse and walking in-channel (where possible), to search for evidence of otter presence such as resting places, spraints, food remains, prints, slides and holts. Further details are provided in the otter report in Appendix D9.	All suitable waterbodies within the project site (see Figure 2.1) and connecting waterbodies 100m upstream and downstream (where accessible) were surveyed.
Bat roost survey (buildings/structures and trees)	Preliminary roost assessment survey undertaken in June and July 2019. Emergence and re-entry surveys	All trees, buildings and structures within the Study Area were assessed for their suitability to support roosting bats, by a suitably qualified ecologist, as well as checking for signs of bats (such as dead specimens, droppings, urine splashes, fur oil -staining and/or squeaking noises by bat squeaking noises) in accordance with published guidance[86]. Buildings were subject to a preliminary assessment on the 15th June 2020.	The study area encompasses the terrestrial land within the red line boundary of the Project site (shown in Figure 2.1), as well as

[83] Bibby, C.J., Hill, D.A., Burgess, N.D. and Mustoe, S. (2000) *Bird Census Techniques. 2nd Edition*. Academic Press: London
[84] Marchant, J. H. (1983) *BTO Common Birds Census Instructions*. BTO, Tring.
[85] Chanin, P. (2003). Monitoring the Otter *Lutra*. Conserving Natura 2000 Rivers Monitoring Series No. 10. English Nature. Peterborough.
[86] Bat Conservation Trust (2016). Bat Surveys for Professional Ecologists (3rd Edition); Good Practice Guidelines.

Ecological Feature	Date	Summary of method	Survey boundary
	undertaken between July and September 2020. Ground level inspection of trees in August 2020, and aerial inspections in September 2020.	All trees were subject to a Preliminary Ground Level Assessment on the 22nd June 2020. A follow up survey by a licensed bat worker of a low suitability tree found within the site was undertaken using a ladder and endoscope on 6th September 2021. Potential roost features in either trees, buildings or structures were categorised as being of high, moderate or low suitability for use by bats in accordance with the Bats: Good Practice Survey Guidelines24. Buildings and structures with potential roosting features were subject to further assessment (no trees were assessed as having higher than low suitability within the area of the works, and were therefore not subject to further surveys). One building adjacent to the site was subject to nocturnal surveys (dusk emergence survey) on the 30th July 2020. Further details are provided in the bat roost survey report in Appendix D10.	suitable buildings/structures adjacent to the site.
Bat activity (static and transects)	Monthly surveys between May and October 2020.	Bat transect surveys were undertaken monthly, by suitably qualified ecologists, from June to October 2020 (inclusive) in accordance with best practice survey guidance[86]. One transect route, which covered the Study Area, was walked each month, and all bat activity recorded using bat detectors (Bat loggers). Static bat activity monitoring was also undertaken between June to October 2020, in accordance with best practice survey guidance24. Four ultrasonic bat detectors are deployed in suitable habitat within the site and left in-situ for five consecutive nights to record calls by foraging/commuting bats within the site. Data recorded by the detectors (as Wildlife Acoustic Compression files i.e. .wac files), were downloaded and processed using Kaleidoscope Pro Software to produce audio files (.wav) and zero crossing files. The processing also included the automatic identification of bat species based on the classifiers developed by Wildlife Acoustics (Bats of Europe 3.0.0).	The study area encompasses the terrestrial land within the red line boundary of the Project site (shown in Figure 2.1).

Ecological Feature	Date	Summary of method	Survey boundary
		these files were then reviewed by a bat specialist to ensure the correct identification of species. A Bat Activity Index (BAI) was then calculated for each bat species at each location during each session. Further details are provided in the bat roost survey report in Appendix D11.	
Badger survey	June and August 2020	A badger survey was conducted within the Study Area, by suitably qualified ecologists, on the 2nd and 19th June, and 18th August, to identify evidence of badger activity in accordance with the standard methodology[87] and the principles of other published guidance[88]. Dedicated searches were made for signs of badger activity such as sett holes, footprints, latrines, hairs and paths which constitute characteristic evidence of badger presence. Camera traps were installed at two locations within the Study Area to provide additional data on potential setts. Sett 2 and sett 3 were monitored with camera traps on at least four occasions each, between July and September 2020. The images obtained were checked for badger. Further details are provided in the badger survey report in Appendix D9	The study area encompasses the terrestrial land within the red line boundary of the Project site (shown in Figure 2.1).

[87] Harris, S. Cresswell, P and Jefferies, D. (1989) Surveying Badgers. The Mammal Society Publication No. 9. Mammal Society.
[88] Neal, W. and Cheeseman, C. (1996) badgers. Published by Poyser. 1st Edition.

7.5.2 Zone of Impact for Ecological Features

All plant and animal species, habitats and integrated plant and animal communities that occur within the 'zone of impact' of the proposed development are defined as potential 'ecological receptors'. The zone of impact for ecological features varies, depending on the nature and behaviour of the receptors, and the type of impact that may affect them. As a rule, in this report, the assessment of individual receptors is considered for the whole of the site plus the distances listed in Table 7.3.

Table 7.3: Maximum Zone of Impact from Scheme Boundary for Ecological Features

Ecological Feature	Maximum Zone of Impact from the Site Boundary
Statutory designated European sites (including faunal species included as part of the designation), e.g. SAC.	5 km
Statutory designated European sites for which bats are a qualifying feature	10 km
Statutory Nationally designated sites (including faunal species included as part of the designation), including SSSIs, National Nature Reserves (NNRs) and Local Nature Reserves (LNRs)	2 km
Non-statutory designated sites including SINCs and ancient woodland	2 km
Records of protected and or notable species	Up to 2 km (species dependant)
Protected and notable species / habitats	Within/adjacent to the site
Non-native Invasive species	Within/adjacent to the site

The maximum zone of impact for international sites was established at 5 km due to potential hydrological impacts with the exception of effects on mobile bat populations where a 10 km zone was used.

The zone of impact for nationally designated sites was considered to be 2 km due to potential hydrological impacts with the exception of effects on mobile bat populations where a 10 km zone was used.

For locally designated non-statutory sites, 2 km was chosen as a maximum zone of impact given the non-statutory nature of their designation and the fact that these sites are generally designated for their habitat value rather than species, which could be impacted upon over a larger area; e.g. bats.

For fauna, it is largely the behaviour of species, including movement in the landscape combined with the nature of the development, which determines the 2 km maximum zone of impact with the exception of bats where 5 km was used to reflect the importance of foraging habitats within this distance of roosts.

As discussed in Chapter 5: Air quality, impacts from air quality to Internationally designated sites are reviewed within 10 km of the site in accordance with relevant

best practice guidance[89], and impacts to nationally and locally designated sites within 2 km of the site.

7.5.3 Determining Value

The CIEEM guidelines recommend that the value of ecological receptors or features is determined based on a geographic frame of reference. For this assessment, the following geographic frame of reference is used to determine the importance of ecological features[90]:

Table 7.4: Criteria used for determining ecological value of a feature.

Importance of ecological feature	Criteria
International and European	National Site network including: SPAs; potential SPAs (pSPAs); SAC; candidate or potential SACs (cSACs or pSACs); and Wetlands of International Importance (Ramsar sites). Biogenetic Reserves, World Heritage Sites and Biosphere Reserves. Areas, which meet the published selection criteria for those sites listed above but which are not themselves designated as such. Resident, or regularly occurring, populations of species, which may be considered important at an International or European level.
National	Designated sites including: SSSIs; Marine Protected Areas (MPAs) including Marine Conservation Zones (MCZs); and National Nature Reserves (NNRs). Areas, which meet the published selection criteria for those sites listed above but which are not themselves designated as such. Areas of habitats of principal importance for conserving biodiversity (i.e. listed in response to the requirements of the Environment (Wales) Act 2016). Resident, or regularly occurring, populations of species, which may be considered important at National level.
County	Designated sites including: Sites of Nature Conservation Importance (SNCIs); County Wildlife Sites (CWSs); and Local Nature Reserves (LNRs) designated in the county or unitary authority area context. Areas which meet the published selection criteria for those sites listed above but which are not themselves designated as such. Areas of habitats identified in the Blaenau Gwent Local Biodiversity Action Plan (LBAP), which are a priority for conservation within the County. Resident, or regularly occurring, populations of species, which may be considered important at a County level.
Local	Designated sites including: LNRs designated in the local context. Trees that are protected by Tree Preservation Orders (TPOs). Areas of habitat; or populations/communities of species considered to appreciably enrich the habitat resource within the local context (such as

[89] Air emissions risk assessment for your environmental permit - GOV.UK (www.gov.uk)

[90] Descriptions have been adapted from Interim Advice Note 130/10 - Ecology and Nature Conservation: Criteria for Impact Assessment (Highways Agency, 2010) which follows a similar geographic frame of reference as the CIEEM guidelines but includes further definition on criteria.

Importance of ecological feature	Criteria
	veteran trees), including features of value for migration, dispersal or genetic exchange.

7.5.4 Valuing Habitat and Species

In accordance with the CIEEM guidelines[63], in assigning a level of value to each habitat or species considered in the assessment, it is necessary to consider its distribution and status, including a consideration of trends based on available historic records. Rarity (including inclusion of lists of species of conservation importance, such as Red Data Lists, Birds of Conservation Concern, Biodiversity Action Plans and Lists of Habitats and Species of Principal Importance for the Conservation of Biodiversity: Section 7 Habitats and Species) is an important consideration because of its relationship with threat and vulnerability although since some species are inherently rare, it is necessary to consider rarity in the context of status. A habitat or species that is rare or declining should be assigned a greater level of importance than one that is rare but known to have a stable distribution or population.

Those ecological features which have been identified as being of sufficient value to be material to decision-making (e.g. those considered to be of 'Local' importance or above), and which it is considered could experience significant effects as a result of the proposed development (i.e. effects that could adversely affect the integrity of the habitat or the favourable conservation status of a species' local population), have been classified as 'Important Ecological Features' (IEF) (as outlined in CIEEM Guidelines), and thus are considered in the detailed assessment. Other ecological features (i.e. those which are of less than 'Local' importance are scoped out, and not subject to any further assessment within this document).

In accordance with the CIEEM Guidelines, where there is the potential for a breach of legislation in relation to protected species (regardless of their value), those species are also considered as IEF.

Following identification and valuation of the IEF, it is then necessary to investigate potential impacts on those features in order to understand how they might be affected by the proposed development.

7.5.5 Predicting and Characterising Ecological Impacts

In accordance with CIEEM guidelines, when describing impacts reference is made to the following:

- Positive or negative – an impact that either increases or reduces quality of the environment or factor being assessed;
- Magnitude – the size of an impact in quantitative terms where possible;
- Extent – the area over which an impact occurs;

- Duration –the time for which an impact is expected to last;
- Reversibility - a permanent impact is one that is irreversible within a reasonable timescale or for which there is no reasonable chance of action being taken to reverse it. A temporary impact is one from which a spontaneous recovery is possible; and
- Timing and frequency – whether impacts occur during critical life stages or seasons and how often impacts occur.

Both direct and indirect impacts are considered: direct ecological impacts are changes that are directly attributable to a defined action, e.g. the physical loss of habitat occupied by a species during the construction process. Indirect ecological impacts are attributable to an action, but which affect ecological resources through impacts on an intermediary ecosystem, process or receptor, e.g. a pollution event reducing the food source for a species such as otter or water vole.

The integrity of a site is defined within TAN 591 as: "…the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and / or the levels of populations of the species for which it was classified."

Mitigation and Enhancement

It is important as part of any environmental impact assessment, wherever possible, to clearly differentiate between mitigation and enhancement. These terms are used in this assessment as follows:

- Mitigation is used to refer to measures to avoid, reduce or remedy a specific negative impact in situ; and
- Enhancement is used to refer to measures that would result in positive ecological impacts, but which do not relate to specific significant negative impacts or where measures are required to ensure legal compliance.

[91] Welsh Government (2009) Technical Advice Note 5: Nature Conservation and Planning. Cardiff

7.5.6 Significance Criteria

In accordance with the CIEEM guidelines, a significant impact, in ecological terms, is defined as 'an impact (whether negative or positive) on the integrity[92] of a defined site or ecosystem and/or the conservation status[93] of habitats or species within a given geographical area, including cumulative and in-combination impacts'. It is important to note however that in accordance with the CIEEM guidelines, the actual determination of whether an impact is ecologically significant is made irrespective of the value of the receptor in question. In this respect the CIEEM methodology differs from some other approaches to EIA.

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

The assessment relies on professional judgement and guidance as provided within CIEEM Guidelines.

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

7.5.7 Limitations and Assumptions

Limitations

The findings presented in this assessment represent those at the time of survey and reporting, and data collected from available sources. Ecological surveys are limited by factors, which affect the presence of plants and animals, such as the time of year, migration patterns and behaviour.

The ecological surveys presented in this ES were conducted at the optimal survey periods and using methodologies that are accepted by NRW and other statutory bodies. The results of the ecological survey allow evaluation of nature conservation value, assessment of significance of potential impacts that may arise from the proposed development and consideration of appropriate mitigation measures. Every effort has been made to ensure that the findings in the ES study present, as accurate as possible interpretation, of the status of flora and fauna of the site.

[92] Integrity is the coherence of ecological structure and function, across a site's whole area that enables it to sustain a habitat, complex of habitats and/or the levels of populations of species.
[93] Conservation status for habitats is determined by the sum of the influences acting on the habitat and its typical species that may affect its long-term distribution, structure and functions as well as the long-term survival of its typical species within a given geographical area. Conservation status for species is determined by the sum of influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within a given geographical area.

Limitations for specific species and surveys are detailed for each baseline report (Appendices 8B-K). None of the limitations are considered to be significant or to have compromised the validity of the surveys or assessment.

Assumptions

A number of assumptions have been made when undertaking the impact assessment. Professional judgement has been used at all times, including during the interpretation of desk study and survey results, assessment of potential effects, the significance of effects and the likely effects of mitigation measures.

The assumptions that have been made are as follows:

- The desk study and survey data collected is sufficiently robust for informing the evaluation and impact assessment of ecological receptors; and
- The evaluation and impact assessment of each ecological receptor is based on the likely ecological conditions at the time of construction and operation.

7.6 Baseline environment

7.6.1 Designated Sites

Internationally and Nationally Designated Sites

A number of statutory designated sites were identified within the search area. They comprised two SACs within 5 km, and two SSSIs, within 2 km. In addition, there are five SSSIs designated for bats within 10 km. They are detailed in Table 7.5, Table 7.6 and Table 7.9 below, in addition to Figure 7.1.

Table 7.5: European Statutory designated sites within 5 km of the site.

Site Name	Designation	Features	Approximate Distance and Orientation from Site
Usk Bat Sites	SAC	Lesser horseshoe bat (Rhinolophus hipposideros) are the primary qualifying feature for the SAC. The Usk Valley area in south-east Wales contains one of the largest maternity roosts for lesser horseshoe bat as well as a number of important hibernacula in caves in the area. The area contains up to 5% of the UK population, though counts in hibernation sites suggest this may be an underestimate. Annex 1 habitats which are a qualifying but not primary reason for selection of the site comprise: blanket bogs, tilio-Acerion forests of slopes, screes and ravines, calcareous rocky slopes with chasmophytic vegetation, caves not open to the public, degraded raised bogs still capable of natural regeneration and European dry heaths.	Lies circa 900 m north-east of the site.
Cwm Clydach Woodlands	SAC	Asperulo-Fagetum beech forests are the primary qualifying feature for the SAC. Atlantic acidophilous beech forests with Ilex and sometimes Taxus in the shrublayer (Quercion robori-petraeae or Ilici-Fagenion) are a qualifying but not primary reason for selection of the site.	Lies circa 4.3 km east of the site.

Table 7.6: Nationally Statutory designated sites within 2 km of the site

Site Name	Designation	Features	Approximate Distance and Orientation from Site
Mynydd Llangatwg SSSI	SSSI	Designated for its geology and biodiversity. The latter comprising base-rich grassland, heather dominated blanket mire and dry heath. Notable vascular plants, bryophytes and lichens are present, in addition to lesser horseshoe bats which roost in cave systems	Lies circa 900 m north-east of the site.
Mynydd Llangynidr SSSI	SSSI	Designated for its geomorphology.	Lies circa 1.5 km north-west of the site.

Table 7.7: Nationally designated sites, for bats, within 10 km of the site.

Site Name	Designation	Features	Approximate Distance and Orientation from Site
Cwm Clydach	SSSI	Cwm Clydach is of special interest for its stands of beech Fagus sylvatica woodland, intergrading with more open habitats, which together support a number of rare and scarce vascular plants including whitebeams Sorbus spp. and soft-leaved sedge Carex montana and important fungal assemblages containing rare species such as Squamanita paradoxa. The site is also of special interest in supporting two localities of national geological importance. Lesser horseshoe bats Rhinolophus hipposideros have been observed foraging within the woodland and several caves are known to be used as roosts.	Lies approximately 4.3 km east of the site.
River Usk (Upper Usk)	SSSI	The River Usk comprises a large, linear ecosystem which acts as an important wildlife corridor, an essential migration route and key breeding area for many nationally and internationally important species. The Usk is of special interest as a fine example of a river running over sandstones and for its associated plant and animal communities. Its character spans a wide range of types from an upland base-poor stream to a large lowland river with extensive tidal reaches. Its overall diversity is a product of its geology, soil types, adjacent land-use and hydrology.	Lies approximately 7.5 km north and east of the site.

Site Name	Designation	Features	Approximate Distance and Orientation from Site
		The river and bankside trees support large populations of flying insects which provide an important food source for bats, including Daubenton's bat Myotis daubentonii and the rare lesser horseshoe bat Rhinolophus hipposideros.	
River Usk (Tributaries)	SSSI	The Usk system, comprising the River Usk and including its upper tributaries, represents a large, linear ecosystem that acts as an important wildlife corridor, an essential migration route and key breeding area for many nationally and internationally important species. The Usk is of special interest as a fine example of a river running over sandstones and for its associated plant and animal communities. Its character spans a wide range of types from an upland base-poor stream to a large lowland river with extensive tidal reaches. Its overall diversity is a product of its geology, soil types, adjacent land-use and hydrology. The river and bankside trees support large populations of flying insects, which provide an important food source for bats, including Daubenton's bat Myotis daubentonii. The Usk valley between Brecon and Abergavenny supports important populations of lesser horseshoe bat Rhinolophus hipposideros and several of the tributaries, including the Grwyne, Rhiangoll and Nant Menasgin are known to provide important feeding areas and sheltered flight lines for this species.	Lies approximately 7.6 km north of the site.
Siambre Ddu	SSSI	Siambre Ddu is situated 5 km south west of Abergavenny, at the head of Cwm Llan Wenarth. The site is at the top of a steep north west facing slope 400 metres above sea level. The site is of special earth science interest as a subsidence doline and is also an important hibernation roost site for lesser horseshoe bat Rhinolophus hipposideros.	Lies approximately 8.7 km east of the site.
Buckland Coach and Ice - House	SSSI	The site comprises a long-disused stable block and coach house, an old icehouse and an adjacent area of woodland and scrub. The stable block and coach house provide an important breeding site for lesser horseshoe bats Rhinolophus hipposideros, and the icehouse is used by the colony as a hibernaculum in winter and as a night roost in summer.	Lies approximately 8.8 km north of the site.

There are two areas of ancient woodland within 2 km (as shown in Figure 7.2). The closest ancient woodland is 1.4 km; separated from the site by the A467.

Locally Designated Sites

Non-statutory designated sites within 2 km of the site were returned in the desk study records from SEWBReC. Twenty-three were identified, which are adopted SINCs and LNRs. They are listed in Table 7-8 below, and LNRs are shown in Figure 7.2.

Table 7.8: Locally designated sites within 2 km of the site

Site Name	Designation	Features	Approximate Distance and Orientation from site
Rassau pond	SINC	Open water.	100 m south
Ebbw River North Section	SINC	Open standing water and river.	101 m east
Garnlydan	SINC	Mosaic habitats with acid grassland, standing open water, bog habitats and flushes, fens, reed beds and other swamps, heathlands and grass heath communities	640 m east
Ebbw (Fawr) Watercourse	SINC	Fish and likely presence of otter and dipper (Cinclus cinclus) breeding site.	670 m south
Beaufort Hill Ponds and Woodland Ebbw Fach	SINC	Mosaic habitats.	834 m south-east
Land at Park View, Beaufort	SINC	Marshy grassland and neutral grassland.	868 m south
Beaufort Hills Pond and Woodland	LNR	Mosaic habitats	900 m south-east
Land to the rear of Glyndwr Road, Rassau	SINC	Neutral grasslands.	979 m south-west
Nant y Croft, Rassau	SINC	Neutral grasslands.	1302 m south-west

Site Name	Designation	Features	Approximate Distance and Orientation from site
Highway Verge Section 1 Bryn Serth	SINC	Mosaic habitats.	1341 m south-west
Rhyd y Blew	SINC	Standing open water, with support features bring breeding and overwintering birds.	1160 m south-west
Bryn Serth	SINC	Mosaic habitats: acid grasslands, marshy grasslands, heathlands and grass-heath communities standing open water, swamp in addition to notable mammal species	1420 m south-west
Hirgan Fields Grassland	SINC	Mosaic habitats: acid grassland, neutral grassland, heathlands and grass-heath communities.	1495 m south east
Pond Group 1	SINC	Standing open water.	1596 m south-east
Clydach Watercourse	SINC	River habitat, with supporting features of fish, probable otter and dipper breeding site.	1615 m north-east
Waun y Pound	SINC	Mosaic habitats, neutral grassland and acid grassland.	1744 m south-west
Land off Parkhill Crescent	SINC	Acid grasslands, heathlands and grass-heath communities, mineral spoil tips and other post-industrial land	1764 m south-east
Sirhowy Hill Pond and Woodland	LNR	Mosaic habitats	1.8 km south-west
Sirhowy Hill Woodland and Cardiff Pond	SINC	Acid grasslands, heathlands and grass heath communities, marshy grassland, neutral grassland and mosaic habitats.	1810 m south
Bryn Farm, Brynmawr	SINC	Mosaic habitats.	1832 m east
Parc Nant-y-Waun	SINC	Mosaic habitats	1896 m south-east
Parc Nant-Y-Waun,	LNR	Mosaic habitats	1.9 km south-east.
Pond Group 2	SINC	Standing open water and mosaic habitats.	1916 m east

7.6.2 Habitats

Field surveys

Extended Phase 1 Habitat Survey

Sixteen habitat types were identified on site. These are described below and shown on Figure 7.3. Full details including target notes and photographs are detailed in the Preliminary Ecological Appraisal report (Appendix D2).

Plantation Coniferous Woodland (A1.2.2)

A conifer plantation was present in the south of the site, planted on sloping ground which adjoined the A465. Species comprised pine (Pinus sp.), spruce (Picea sp.) and larch (Larix sp), the latter being planted on the lower, southerly section of the plantation. The understorey was sparse and supported very limited ground flora.

Mixed Plantation Woodland (A1.3.2)

Within the plantation there was a small area of broadleaved trees in the southern part of the site (Photograph 7, Appendix D2). The canopy comprised largely oak species (Quercus sp.), with scattered willow (Salix sp.) and alder (Alnus glutinosa). In addition, similar broadleaf trees were also present in other connecting areas of the plantation. Willow and alder also occurred along the edges of the conifer plantation. Hazel (Corylus avellana) and hawthorn (Crataegus monogyna) were also evident in the canopy. The ground flora comprised dense bramble (Rubus fruticosus agg.), with scattered ferns such as male fern (Dryopteris filix-mas).

Dense/Continuous Scrub (A2.1)

Dense willow, alder and bramble scrub were present around the periphery of grassland areas, and lining ditches/standing water.

Scattered Scrub (A2.2)

Scattered willow and gorse (Ulex spp) scrub was present throughout areas of grassland. Other scrub species present included bramble, broom (Cystitus scoparius), birch (Betulus spp), and alder seedlings.

Mixed Scattered Trees (A3.3)

Larch, pine and spruce trees occurred in lines along the stream, as well as adjacent to the building to the south of the Site (Photograph 3). Occasional broadleaved species were also present including alder, birch and willow.

Acid Grassland – Semi-Improved (B1.2)

The western part of the site supported short acid grassland (Photograph 2) which in places occurred in a mosaic with short perennial vegetation, particularly

adjacent to the track. The grassland comprised red fescue (Festuca rubra), sheep's fescue (F. ovina), cat's ear (Hypochaeris radicata), hawkbit (Leontodon sp.), bent grass (Agrostis sp.), tormentil (Potentilla erecta), common knapweed (Centaurea nigra), mat grass (Nardus stricta), crested dog's-tail (Cynosurus cristatus), tufted hair-grass (Deschampsia cespitosa), field wood-rush (Luzula campestris), coltsfoot (Tussilago farfara) and common bird's-foot-trefoil (Lotus pedunculatus). In one location there was a larger area of Purple moor grass (TN 16) although generally this grass species was scattered throughout the grassland, along with soft rushes (Juncus effusus) and hard rush (J. inflexus), thistles (Cirsium spp.), and sedges, particularly glaucous sedge (Carex flacca) which was abundant in places. Occasional ling heather (Calluna vularis) and bilberry (Vaccinium myrtillus) were also present around the periphery of grassland areas, in addition to tormentil (Potentilla erecta).

Marshy Grassland (B5)

A large proportion of the open areas of the site were dominated by purple moor grass (Photograph 9, Appendix 8B), occurring with other species such as common sorrel (Rumex acetosa), soft rush, fox glove (Digitalis purpurea) and tufted hair-grass. Ling heather and bilberry were present in places and bracken (Pteridium aquilinum) was also present at the edges of areas of marshy grassland. The majority of the marshy grassland appeared to be species poor, being largely dominated by purple moor grass and with limited presence/diversity of broadleaved herbs. In enclosed areas in the eastern part of the site, marshy grassland was heavily grazed with bare peat exposed in places (TN 14, photograph 10, Appendix D2).

In one part of the site, within marshy grassland, sphagnum moss was frequent, and occurred with cross-leaved heath (Erica tetralix) (TN 15, Appendix D2), as well as other herbs such as cuckoo flower (Cardamine pratensis), tormentil and bistort (Persicaria spp.).

Acid/Neutral Flush (E2.1)

A flush was present running through an area of grazed marshy grassland in the eastern part of the site.

Standing Water (G1)

In a fairly open area of marshy grassland, a wide ditch was present (circa 3 m) (TN 9, photograph 11, Appendix D2). The aquatic vegetation was more diverse and comprised a large proportion of pondweeds (Potamogeton spp.) and other species such as lesser spearwort (Ranunculus flammula) and sweet-grass (Glyceria spp). The water level was low at the time of the survey, and only small areas of open water were present. A few trees and scrub were present alongside sections of the ditch including willow and bramble.

Within the conifer plantation, two ditches occurred parallel, in lower lying areas between areas of the plantation. At the time of the survey, sections of these ditches had small areas of shallow water, with abundant sweet-grass and some spearwort (TN 5, Appendix D2).

A man-made ditch occurred along the southern boundary of the site, at the bottom of the A465 embankment (Photograph 12, Appendix D2). This comprised a stony bank/channel and at the time of survey, supported water throughout the ditch. Soft rush was abundant along the edge of the channel, although no other aquatic plants within the channel were noted.

An attenuation lagoon (Photograph 14, Appendix D2) occurred to the south east of the site, circa 120 m from the boundary. This appeared to be a recently man-made lagoon, as a holding for surface run-off from the adjacent, newly constructed section of the A465. The lagoon was circa 80 m long and 30 m wide, with sloping earth banks, and gravel/shingle edges. It supported deep water, and dense bulrush (Typha sp.) was evident at the western end. It was not possible to closely inspect the lagoon due to secure fencing.

Running Water (G2)

A stream flows through the site, into a culvert under the A465 (Photograph 6, Appendix D2), and, according to OS mapping, connected to the Afon Ebbw circa 1.2 km downstream. The stream was lined with a half of a corrugated metal pipe (circa 50 cm wide), with 45-degree vegetated slopes either side. At the location of the track, which led to the reservoir, the stream was also culverted through a pipe with concrete lined banks either side. At the time of the survey, there was a low volume of water within the channel, which flowed slowly.

A smaller stream flowed through the site (TN 10, photograph 4, Appendix D2), further west of the main stream, also running under the track (through two small metal pipes). It occurred adjacent to an earth bank and was surrounded by dense willow and bracken scrub. Vegetation comprised willowherb (Epilobium spp.), sweet-grass, soft rush and horsetail (Equisetum spp.). At the time of the survey sections of the stream supported a small volume of water, and in places was orange in colour (possibly polluted by iron oxide).

Ephemeral/Short Perennial Vegetation (J1.3)

The western part of the site supported grassland, which also occurred in a mosaic with short perennial vegetation (Photograph 1, Appendix D2) particularly in areas lying adjacent to the track. These areas comprised low lying vegetation such as ribwort plantain (Plantago lanceolata), common cat's-ear (Hypochaeris radicata), mouse-ear hawkweed (Pilosella officinarum), sedges, daisy (Bellis perennis) and mosses. Glaucous sedge was also present.

Fence (J2.4)

Stock fences separated fields, to the east of the conifer plantation, and also separated the northern boundary of the site, with conifer plantation/moorland to the north.

Earth Bank (J2.8)

An earth bank separated the lower grassland plateau from marshy grassland to the site.

Buildings (J3.6)

No buildings were present within the site boundary. A building complex was present to the south, which appeared to be largely derelict, and another building, was present to the north of the site, which appeared to be in use.

Bare Ground (J4)

A narrow bare earth track runs along the eastern side of the conifer plantation joining the main track which leads to the reservoir.

Gravel/Hard Standing (J5)

A track dissected the centre of the site comprising compacted gravel/stone and connected the Rassau Industrial Estate to the west with Carno Reservoir to the east.

NVC surveys

Desk study

One hundred and fifty-seven records of notable vascular plants were returned by SEWBReC within the search area. None of these were within the site boundary.

Twenty-six records of notable bryophytes species were returned by SEWBReC, none of which were within the search area. These included the bog-moss flapwort (Odontoschisma sphagni) and bryophytes: Campylium stellatum, Kindbergia praelonga, Orthortichum cupulatum, Sarmentypnum exannulatum, Calliergonella lindbergii, Sphagum compactum, Sphagnum tenellum, Sphagnum flexuosum, Cephalozia connivens, Ephemerum serratum, Kurzia pauciflora, Preissia quadrata, Riccardia multifida, Fossombronia wondraczekii, Ptilidium ciliare, Pohlia camptotrachela, Calypogeia sphagnicola, Hypnum cupressiforme var. lacunosum, Grimmia trichophylla, Straminergon stramineum, Racomitrium ericoides, Racomitrium fasciculare and Sphagnum cuspidatum.

Two records of notable lichen species were returned by SEWBReC, although none of these were within the search area. These included: the Cladonia cervicornis subsp. verticillata and Peltigera canina.

Field Study

The NVC survey identified a number of vegetation communities within the broad habitats as described above in the Extended Phase 1 Habitat survey. Those within or adjacent to the site boundary are detailed in Table 7-9 below and in addition to being detailed within the NVC report in Appendix D3.

Table 7.9: NVC survey results.

Vegetation type	Summary of vegetation community descriptions	Detailed habitat description	Notable species
Neutral grassland	MG1 Arrhenatherum elatius grassland	The driest areas of ungrazed grassland are typically dominated by tall grasses, particularly False Oat-grass (Arrhenatherum elatius) and Yorkshire Fog (Holcus lanatus). The species diversity tends to be low, although the sward is often supplemented by species from other communities where it occurs as part of a habitat mosaic. The largest patches generally fall comfortably within the NVC MG1 community, but the patchy transitions to damp grassland, open vegetation and scrub communities on the industrial plateau are less easily categorised, especially where they have been disturbed recently.	
Industrial plateau mosaic grassland/species rich grassland	MG10 Holcus lanatus – Juncus effusus rush pasture/MG1 Arrhenatherum elatius grassland; and in the drier parts and MG9 Holcus lanatus – Deschampsia cespitosa grassland; and and M23 Juncus effusus – Galium palustre rush pasture in dampest parts, and possibly grading into a fragmentary M6 mire community	The level development plateau in the west of the study area supports a patchy mix of grassland, wetland, scrub and open vegetation communities that cannot be placed within a single NVC community. The scale of variation can be very small; for example, there are some wetland strips that are only the width of a wheel rut. The plateau seems to be poorly drained, and there are many transitions between wet and dry grassland. The range of plants present include species typical of base rich soils and a few from acid soils, suggesting that the plateau has mixed substrata. Another important factor affecting this area is the recent scrub clearance by flail cutting, which has opened up formerly shaded ground, favouring ruderal plants, and created local soil disturbance by rutting. In addition, the plateau is grazed by sheep. In terms of the NVC, the flora is closest to MG10 Holcus lanatus – Juncus effusus rush pasture, but with transitions to MG1 Arrhenatherum elatius grassland in the drier parts and MG9 Holcus lanatus – Deschampsia cespitosa grassland and M23 Juncus effusus – Galium palustre rush pasture in dampest parts, and possibly grading into a fragmentary M6 mire community in the dampest peaty puddles dominated by Cotton-grass, Sharp-flowered Rush	Alchemilla glabra (Smooth Lady's-mantle). Several plants on industrial plateau (near Q28). Carex vesicaria (Bladder Sedge). Patch on damp western margin of industrial plateau, apparently growing as a casual rather than in its usual wetland habitat. Ophrys apifera (Bee Orchid). Two plants seen in short turf

Vegetation type	Summary of vegetation community descriptions	Detailed habitat description	Notable species
		and sedges. Quadrats 28 and 29 were recorded from former scrub patches, apparently dominated by gorse and grey willow (Salix cinerea) until earlier this year. These may formerly have been categorised as U20 and W1 respectively but are now mostly open ground in transition to grassland or reverting back to scrub.	within north-east part of industrial plateau (near Q20).
Sparse grassland / short perennial vegetation	OV22 Poa annua – Taraxacum officinale open vegetation community	The edge of the road between the road and the industrial plateau grassland has a transitional fringe of ruderal vegetation mainly comprising sparse grasses, Dandelion (Taraxacum officinale) and low-growing mosses. There is little or no soil. Only one quadrat (Q27) was recorded as an example of this community. It fits reasonably well with the NVC Poa annua – Taraxacum officinale community. Away from the road, the vegetation gradually blends into the adjacent MG1 and industrial plateau grassland.	Empetrum nigrum (Crowberry). Small patches present in heathy areas on stony ground with central mosaic habitat (including at Q25 and Q60).
Purple moor-grass and heather dominated ungrazed marshy grassland	M25 Molinia caerulea – Potentilla erecta mire	The drier parts of the ungrazed marshy grassland mosaic are dominated by purple moor-grass, often with patchy heather. The vegetation includes a high proportion of bryophytes and sedges, particularly star sedge (Carex echinata). The soil is mostly shallow and peaty, but the presence of local, open stony patches with bare mineral soil appears to indicate that the area was disturbed several years ago and is still undergoing successional processes. The frequent rose-bay willowherb (Chamerion angustifolium) also suggests a history of disturbance. In terms of the NVC the vegetation can be classified as M25 Molinia caerulea – Potentilla erecta mire. Most quadrats are closest to the M25a sub-community. The vegetation is rather variable, most examples are between two extremes from relatively open, diverse heathy patches on shallow soil to species poor areas with deeper peat. There are also local transitions to grey willow scrub.	
Grazed marshy grassland mosaic	M25 Molinia caerulea – Potentilla erecta mire	The eastern fields are grazed by cattle, and support a less diverse mix of marshy grassland and rush pasture than the ungrazed central area. Purple moor-grass and soft rush are prominent features of the	

Vegetation type	Summary of vegetation community descriptions	Detailed habitat description	Notable species
		vegetation. Much of the land appears to have been subject to disturbance, as indicated by the presence of patchy bare ground and high frequency of foxgloves and rose-bay willowherb. The presence of scrubby grey willow trees and stumps throughout the area, and large tussocks of purple moor-grass, may indicate that the fields were ungrazed for some time prior to the recent cattle grazing. The quadrat data for this area has been split into two frequency tables, with Table 8 (Appendix D3) showing the more typical marshy grassland vegetation (mainly from the north-western field), and Table 9 (Appendix D3) including the vegetation showing most signs of recent disturbance (particularly from the south-eastern field). The two communities are both subject to heavy trampling by cattle and neither conforms exactly to the published NVC communities. The western side of the field appears least disturbed, with deeper, peaty soil. Some parts have large tussocks of purple moor-grass and a very low species diversity, suggesting that they had previously been ungrazed for several years. This is probably best described as a disturbed example of M25 Molinia caerulea – Potentilla erecta mire. Quadrat 50 is from a particularly wet area, and this is probably closer to a flush community but not readily conforming to a published NVC community.	
Marshy grassland	M23 Juncus effusus rush pasture M25 Molinia caerulea – Potentilla erecta mire	The more disturbed parts of the eastern fields support a mix of vegetation types, often varying on a small scale and with patchy bare ground and remnants of scrub. These are difficult to assign to NVC communities but probably lie closest to a mix of M25 Purple Moor-grass - Potentilla erecta mire and MG10 Holcus lanatus – Juncus effusus rush pasture, forming mosaics with ruderal plants and fragmentary grey willow and bramble scrub communities	
Heathland	H12 Heath	There are no large areas of heath within the site, but heath patches are an important element of several of the vegetation mosaics,	Empetrum nigrum (Crowberry). Small

Vegetation type	Summary of vegetation community descriptions	Detailed habitat description	Notable species
		typically merging with the M25 marshy grassland community. Two quadrats were recorded as examples of the larger patches. Heather is the most consistent feature of these patches but is not very extensive. In terms of the NVC the vegetation is probably a fragmentary form of H12 Calluna vulgaris – Vaccinium myrtillus heath, even though there is very little bilberry.	patches present in heathy areas on stony ground with central mosaic habitat (including at Q25 and Q60).
Damp track vegetation at TN38	M23 Juncus effusus – Juncus acutiflorus – Galium palustre rush pasture.	A disused vehicle track is present beside the planation and ditch at TN4. It is partly overgrown by the adjacent trees, but the open sections support a diverse, flushy grassland flora that was sampled as Quadrat 38. The vegetation is characterised by a mix of rushes, sedges, bryophytes and low-growing herbs over a damp stony substratum. In terms of the NVC this is closest to M23 Juncus effusus – Juncus acutiflorus – Galium palustre rush pasture. Within the site it is only represented as this narrow strip, and grades into plantations, scrub and M25 vegetation away from the track edges.	
Ditches	M23	The wettest parts of the area were slow-flowing ditches. These supported a swampy mix of wetland plants, with water horsetail (Equisetum fluviatile), sharp-flowered rush (Juncus acutiflorus) and marsh bedstraw (Galium palustre) being most abundant. The vegetation does not easily conform to S10 Equisetum fluviatile swamp or any other NVC swamp community but is probably best described as very wet M23 Juncus effusus – Juncus acutiflorus – Galium palustre vegetation. This may be due to the probable history of disturbance of this area. Small quantities of bottle sedge and bulrush are present, but not in sufficient quantity to describe the patches as distinct NVC communities.	
Rose-bay Willowherb Community	OV27	Rose-bay willowherb occurs at low density in much of the vegetation within the study area, but there are a few places where it forms tall, dense, low-diversity stands. The largest of these are to the north of the eastern fields, which was sampled as Quadrat 66.	

Vegetation type	Summary of vegetation community descriptions	Detailed habitat description	Notable species
		This vegetation is readily assigned to the published NVC community OV27 Chamerion angustifolium vegetation.	
Bramble scrub	W24 Rubus fruticosus – Holcus lanatus underscrub	Brambles patchily distributed in the ungrazed central parts of the site and around the plantation margins. They are typically associated with rose-bay willowherb and rushes, forming transitions with the OV27 and M23 communities. The community appears to be a form of the NVC W24 Rubus fruticosus – Holcus lanatus underscrub community. However, it is atypical because of the transitions to damp grassland vegetation and the absence of Yorkshire fog from any of the quadrats.	
Grey Willow scrub	W1 Salix cinerea – Galium palustre woodland	Grey willow scrub forms large and small patches within the habitat mosaic of the ungrazed central area. It is also present in a few rides or clearings within the large central plantation. It is generally present as an early successional stage of the unmanaged marshy grassland, rather than as a distinct woodland community, but it is developing woodland ground flora including a number of ferns. Eared willow (Salix aurita) and creeping willow (Salix repens) are present in some of the younger stands, but not in the taller, denser scrub. Within the NVC the willow scrub is best described as a young example of W1 Salix cinerea – Galium palustre woodland, still showing signs of transition from M23 marshy grassland.	
Woodlands / TN1 North-western plantation		The north-western edge of the industrial plateau is bordered by a mixed plantation. It mostly lies on a south-facing bank beside the Rassau electricity substation and there is a shaded wet ditch running along its foot. The main plantation trees include Italian alder (Alnus cordata), grey alder, rowan (Sorbus aucuparia), Swedish whitebeam (Sorbus intermedia), hazel and field maple, with occasional conifers including lodgepole (Pinus contorta) and Corsican pine (P. nigra) and sitka spruce (Picea sitchensis). Grey willow, alder and gorse are dominant along the foot of the slope but may not be part of the original plantation. The woodland ground	Viburnum lantana (Wayfaring Tree). Included in plantation at TN1. Likely to be planted.

Vegetation type	Summary of vegetation community descriptions	Detailed habitat description	Notable species
		flora is mostly limited to a species-poor mix of sparse grasses and brambles. However, the ditch supports a number of wetland plants including bulrush, branched bur-reed and common spike-rush.	
TN2 South-western plantation		The southern edge of the industrial plateau is bordered by a mixed plantation which is broadly similar in character to TN1. It lies outside the project area so was only examined through the perimeter fence. The main plantation trees include grey alder, common alder, Sitka spruce, goat willow (S. caprea), red-osier dogwood (Cornus sericea) and lodgepole pine. The ground flora is very sparse and mainly limited to mosses and grasses.	
TN3 Central plantation		This is the largest woodland within the project area. It comprises a patchy mix of canopy trees with the most frequent ones including sitka spruce, lodgepole pine, grey alder and Japanese larch (Larix kaempferi). The former plantation rides forming east-west gaps through the plantation have largely been colonised by grey willow and common alder, although they still retain a sparse, low-diversity marshy grassland flora. There is virtually no ground flora beneath the dense Sitka Spruce and lodgepole pine canopies, other than mosses and sparse grasses near the margins. However, the grey alder and Japanese larch areas have an understorey of bramble and a developing ground flora dominated by Ivy and ferns. The ground topography within the plantation is very variable, with many ridges and banks, and several damp hollows with shallow standing water. There has been windthrow of several trees, especially amongst the lodgepole pines in the centre of the plantation.	
TN4 Ditch plantation		A linear plantation on the steep banks bordering a metal-lined ditch. The main canopy tree is sitka spruce, but there are also hawthorn (Crataegus monogyna) and rowan trees, and local areas where grey willow scrub is dominant. The ground flora is generally	

Vegetation type	Summary of vegetation community descriptions	Detailed habitat description	Notable species
		sparse, but the lighter margins support a mix of heath and M25 marshy grassland, and occasional gorse.	

7.6.3 Species

Fungi

Desk study

No records of fungi were returned by SEWBReC.

Field study

Two hundred and two fungi taxa were identified (detailed in Appendix D4). The majority of fungi recorded are considered to be common and widespread (although many are likely to be under recorded). These common species were largely associated with the open mosaic of grassland on the industrial plateau, plantation and scrub habitats, and occurred in low densities. A number of rare and notable species have been recorded within the Site, associated with banks of the conifer plantation and broadleaved/mixed woodland (within the plantation). This includes Gomphidius glutinosus, which was recorded on a mossy bank beneath Sitka spruce at the eastern edge of the plantation. This species is only abundant in Scotland and considered uncommon elsewhere in Britain. Within the broadleaved woodland, Hypoxylon stygium and Coryne cf tasmanica was recorded growing on deciduous boughs and Rimbachia bryophila (the first record for south Wales), was recorded on a mossy bank. A species of Hypocrea was found on a rush stem north of the plantation, which is considered likely to be H.placentula, a new record in Wales. In addition, it was considered likely that Hypocreopsis rhododendri (Hazel Gloves) was present on grey willow trees within woodland, although it was not possible to confirm this due to being gnawed by grey squirrel.

Invertebrates

Desk study

Numerous records of notable invertebrates were returned by SEWBReC within the search area. These included: beaded chestnut (Agrochola lychnidis), mottled rustic (Caradrina morpheus), garden dart (Euxoa nigricans), brindled beauty (Lycia hirtaria), powered quaker (Orthosia gracilis), Anomalous, garden tiger (Arctia caja), broom moth (Ceramica pisi), flounced chestnut (Agrochola helvola), brown-spotted pinion (Agrochola litura), knot grass (Acronicta rumicis), green brindled crescent (Allophyes oxyacanthae), ghost moth (Hepialus humuli), small square spot (Diarsia rubi), rustic (Hoplodrina blanda), sallow (Cirrhia icteritia), dot moth (Melanchra persicariae), centre barred sallow (Atethmia centrago), neglected rustic (Xestia castanea), feathered gothic (Tholera decimalis), white ermine (Spilosoma lubricipeda), dingy skipper (Erynnis tages), double dart (Graphiphora augur), grayling (Hipparchia semele), Silurian (Eriopygodes imbecilla), small pearl bordered fritillary (Boloria selene), grey dagger (Acronicta psi), small heath (Coenonympha pamphilus), dusky brocade (Mniotype adusta), autumnal rustic (Eugnorisma glareosa), cinnabar (Tyria jacobaeae) and small phoenix (Ecliptopera silaceata).

Field Study

The invertebrate survey undertaken in 2020 (detailed in Appendix D5) identified 154 species within the project area. The majority of these species are common and widespread species, although a number of species which are listed as being scarce or a priority for nature conservation were recorded. These species included a rove beetle (Philonthus parvicornis), dingy skipper butterfly (Thymelicus Sylvestris) (Nationally scarce[94]), small heath butterfly (Coenonympha pamphilus) (Section 7, research only) and cinnabar moth (Tyria jacobaeae) (Section 7, research only). All of these species were associated with grassland habitats. Dingy skipper was recorded within stands of ruderal grassland, within the western part of the site, where bird's foot trefoil was frequent. The rove beetle, P. parvicornis was recorded within area of silage in marshy grassland. Cinnabar moth and small heath butterfly were recorded within short grassland, where dingy skipper was also present.

Fish

Desk Study

No records of fish were returned by SEWBReC.

Field Study

Targeted fish surveys were not completed as part of this assessment however an appraisal of habitat suitability for fish was undertaken as part of the Preliminary Ecological Appraisal (Appendix D2). Waterbodies within the site supported very little water at the time of the survey, although it is likely that during periods of high rainfall water levels are higher. Due to the ephemeral nature of these waterbodies, it is unlikely they support fish or at least significant fish populations. The attenuation lagoon south east of the site, may support fish however.

The watercourses, similarly, supported little water at the time of the survey although it is likely there would be a larger volume of water/faster flow during periods of high rainfall which could support fish. It is however considered very unlikely that the watercourses within the site would be used by fish due to the poor/lack connectivity to other watercourses. As such fish are not considered further in this assessment.

Amphibians

Desk study

SEWBReC did not return any records of great crested newt from within the search area, or other notable amphibians.

Field Study

The Preliminary Ecological Appraisal report (Appendix D2) showed that a number of waterbodies were present within the site, which could support great

[94] Forthcoming species Status review (Boyce, in prep)

crested newts and other amphibians (palmate newt, common frog etc). The woodland and scrub on site were assessed as being suitable terrestrial habitat for these amphibian species.

All waterbodies subject to HSI assessment were found to have 'below average' suitability for great crested newts and were subject to further survey work to confirm presence/absence of great crested newts (see the amphibian report, Appendix D6). eDNA surveys were undertaken on waterbodies with water at the time of the survey (1-4); returning a positive result for Waterbody 4, and an inconclusive result for Waterbody 1. A population assessment was undertaken on Waterbody 4. Waterbody 1 was dry, and therefore not subject to further survey effort, and Waterbody 7, previously not subject to an eDNA survey, held water later in the season, and was therefore also subject to presence/absence surveys.

Table 7.10: Survey Results: eDNA

Waterbody	**eDNA Result**
WB1	Inconclusive
WB2	Negative
WB3	Negative
WB4	Negative

Table 7.11 :Survey Results – presence/absence and population assessments

Waterbody	**Visit 1**	**Visit 2**	**Visit 3**	**Visit 4**	**Visit 5**	**Visit 6**
WB4	No great crested newts recorded	No great crested newts recorded. Palmate newt recorded.	No great crested newts recorded. Palmate newt recorded.	No great crested newts recorded. Palmate newt recorded.	No great crested newts recorded. Palmate newt recorded.	No great crested newts recorded. Palmate newt recorded.
WB1	Dry	Dry	Dry	Dry	Dry	Dry
WB7	Dry	Dry	Dry	Dry	Dry	No great crested newts recorded. Palmate newt recorded.

No evidence of great crested newts was found during further presence/absence and population surveys. Despite the positive eDNA results, the survey effort was considered sufficient to conclude that great crested newts are very likely to be absent from the site. Due to the very low risk that great crested newts are likely to be present on site, this species will not be scoped out of this Chapter, and a precautionary approach will be followed to ensure that the occurrence of any great crested newts is appropriately mitigated for. For the purposes of this Chapter the presence of a small population of great crested newts is assumed.

The site supports populations of palmate newt, and common amphibian species, including common frog and common toad, are also likely to be present.

Reptiles

Desk study

SEWBReC returned five records of common lizard (Zootoca vivipara) within the search area: with the closest record at 1640 m north-west of the Site. One record of a gravid female common lizard was also returned.

Field Study

During the Extended Phase 1 Habitat (detailed within the Preliminary Ecological Appraisal in Appendix D2) suitable reptile habitat was recorded within the Site, and two common lizards were recorded beneath bitumen felt (TN 12, photograph 15, Appendix D2), presumably left on site following previous surveys. An artificial amphibian/reptile refugium was also recorded at one location (TN 13, photograph 13, Appendix D2).

Reptile surveys undertaken in June, August and September 2020 (detailed within the reptile survey report in Appendix D7). Peak counts of nine common lizard were recorded during presence/absence surveys indicating that at least a good population is present within the site.

An adder has been recorded at the nearby Carno reservoir (circa 200m east) during upgrade works (pers comms, Dwr Cymru October 2020).

Birds (Breeding)

Desk study

Bird records provided by SEWBReC, outside of the site boundary but within the search area included merlin (Falco columbarius), red kite (Milvus milvus), common crossbill (Loxia curvirostra) barn owl (Tyto alba), brambling (Fringilla montifringilla), fieldfare (Turdus pilaris), redwing (Turdus iliacus), peregrine (Falco peregrinus), hen harrier (Circus cyaneus), goshawk, tree pipit (Anthus trivialis), nightjar (Caprimulgus europaeus), osprey (Pandion haliaetus), wryneck (Jynx torquilla), hobby (Falco subbuteo) and little ringed plover (Charadrius dubius).Some of these species such as osprey, hen harrier, fieldfare, wryneck and redwing are migrants and are not considered likely to use habitats within the site for breeding. Little ringed plover are considered unlikely to use the site as habitats are unsuitable.

Field Study

Woodland, trees and scrub within the site were identified during the Extended Phase 1 Habitat Survey (detailed within the Preliminary Ecological Appraisal in Appendix D2) as being suitable for nesting birds, in addition to the open grassland and marshy grassland offering some potential including for ground nesting species.

Breeding bird surveys (detailed in Appendix D8) recorded the territories of eight target species (i.e. protected or notable species), with a further two target species breeding in close proximity of the Site: Marsh tit (Poecile palustris), willow warbler (Phylloscopus trochilus), whitethroat (Sylvia communis), goldcrest (Regulus regulus), song thrush (Turdus philomelos), mistle thrush (Turdus viscivorus), tree pipit (Anthus trivialis), bullfinch (Pyrrhula pyrrhula), greenfinch (Chloris chloris) and lesser redpoll (Acanthis cabaret). Details are provided in Table 7-12 below, of target species found within the site, along with number of breeding pairs and associated habitats.

The most abundant breeding target Species was willow warbler (11 territories, five with the site) followed by tree pipit (seven territories, five within the site) and whitethroat (five territories, two within the Site).

The sole Schedule 1 (of the Wildlife and Country 1981 (as amended)) species observed during the survey period was crossbill, although no evidence of breeding was noted.

Table 7.12: Summary of bird species recorded within the study area and associated habitats

Species	Conservation Status	Number of Breeding Pairs	Associated habitats
Marsh tit	Section 7, Red list	1	Woodland
Willow warbler	Section 7, Red list	5	Willow scrub
Whitethroat	Section 7, Red list	2	Open grassland and scrub habitats
Goldcrest	Section 7, Amber list	2	Conifer woodland
Song thrush	Section 7, Amber list	1	Woodland edges and scrub
Mistle thrush	Section 7, Amber list	1	Woodland edges and scrub
Tree pipit	Section 7, Amber list	5	Open grassland with scattered scrub
Bullfinch	Section 7, Red list	1	Conifer woodland to the north of the site

Otter

Desk study

SEWBReC returned two records of otter comprising dead animals found along a road 1.6 km west of the Site.

Field Study

The Extended Phase 1 Habitat survey (detailed within the Preliminary Ecological Appraisal report in Appendix D2) identified a number of waterbodies within/nearby the Site. The majority of these were considered to be sub-optimal for otter due to their ephemeral nature, and or supporting very little water. It was noted that the nearby Carno reservoir and adjoining Ebbw river/woodland corridor to the east/south-east (circa 200 m), was likely to provide more optimal habitat. This river corridor and reservoir is also designated as a SINC, for which otter are a qualifying feature.

No evidence of otter was recorded during targeted otter surveys (detailed in Appendix D9). Five of the seven waterbodies on Site (1, 2, 3, 4 and 6) were assessed as having low suitability for otter whilst Waterbodies 5 and 7 as having negligible suitability for otter. These were considered to be sub-optimal for otter since five of the seven waterbodies appear to be ephemeral, one waterbody (5) appeared to be man-made and the other waterbody (3) was contained within fencing.

Water Vole

Desk study

SEWBReC did not return any records of water vole from within the search area.

Field Study

The majority of waterbodies within the site were assessed as being unsuitable for this species (detailed in the Preliminary Ecological Appraisal report in Appendix D2), due to either comprising a stony bank or having a metal lining and therefore not offering burrowing opportunities. One of the streams, and one of the ditches which were within grassland, north of the conifer plantation, could be suitable for water vole due to the presence of earth banks, although these areas are considered to be sub-optimal due to being ephemeral waterbodies and not connected to any other areas of water. Furthermore, both waterbodies supported little emergent aquatic vegetation, which would provide a food source for water vole. These waterbodies were surveyed for signs of water vole during targeted surveys for otter (Appendix D9) and no water vole signs were recorded. As such, water vole is not considered further in this assessment.

Bats (Roosting and Commuting/Foraging)

Desk study

Bats records within the area provided by SEWBReC within the search area included roost and foraging records between 300 m and 2 km for the following species: Daubenton's bat (Myotis daubentonii), noctule bat (Nyctalus noctula), brown long-eared bat (Plecotus auratus), Myotis bat, Natterer's bat (Myotis nattereri) and lesser horseshoe bat (Rhinolophus hipposideros).

Field Study

Bat Roosts (Tree, Buildings and Structures)

Preliminary ground inspections of trees and roost assessments of buildings, within the site and adjacent habitats (as detailed in Appendix D10), recorded one tree within the site as having low suitability for roosting bats. This was subject to a further inspection in September 2021 using an endoscope and was again assessed as having low suitability with no signs of bat usage found.

Another tree was found to support bat boxes (including a maternity box) but this was located outside of the site boundary, and at the same location another tree with low suitability for roosting bats was also recorded.

Two buildings (Building A and B) to the south of the site (and outside of the site boundary), known as the Tech-board buildings, were assessed as being of low suitability for roosting bats due to the presence of varying sized holes in the building's exteriors, and which could provide access to bats to suitable roosting places within the interior. It was considered that the interior being largely open was unlikely to support more than small numbers of roosting bats, during the preliminary roost assessment.

An initial emergence survey was undertaken by Arup (detailed in the bat survey report in Appendix D10) of Building B and the northern aspect of Building A during August, and two brown long-eared bats were seen emerging from the small outbuilding (Building B). In addition, there were passes by common pipistrelle and lesser horseshoe.

During the Arup emergence survey, it was discovered that a bat emergence survey was also being undertaken by Bay Ecology Ltd, to inform proposals to develop the Tech-board site. Bay Ecology Ltd, have undertaken a number of nocturnal surveys comprising largely dusk emergence and one dawn re-entry, in addition to automatic monitoring using static detectors (undertaken in July and August). As detailed in a separate report[95] (detailed in Appendix D11), the Building A has been found to support small numbers of common pipistrelle, small numbers of individual lesser horseshoe bats, individual brown long-eared bats, and potentially myotis bats (likely to be Daubenton's bats). Bat roosts were present in segregated

[95] Bay Ecology (2020) Bat Building Inspection and Activity Report: Former Fibretech building, Rassau Industrial Estate, Ebbw Vale.

areas of the main building interior such as small offices. These species of bats were also recorded foraging within the main building.

The bat roosts identified within the structures were considered to be daytime roosts which are comprised of non-breeding females and males. Bats appeared to be using various roosting sites within the structures interchangeably, and behaviour which is considered to be linked to changes in weather conditions, particularly in areas where there was water ingress.

In addition, Bay Ecology Ltd recorded a third structure to the south west of the Tech-board site, which did not support any evidence of roosting bats at the time of the surveys but was assessed as having low suitability, and potential for bats roosting in other buildings to roost at this location, due to the recorded frequent change of use of roost sites.

Bat Foraging and Commuting

The Extended Phase 1 habitat survey identified suitable habitat for foraging/commuting bats including woodlands, hedgerows, species rich grassland, scrub and waterbodies.

A desk study and comprehensive suite of transect surveys and static detector monitoring has been completed at the site as detailed within the baseline report (Appendix D11). During all surveys, common pipistrelle were by far the most abundantly logged species, with records from each transect and static monitoring location. The same species/groups of species were recorded during both the transect and static surveys and comprised: common pipistrelle, soprano pipistrelle, pipistrelle species, Myotis species, Nyctalus species, serotine, Plecotus species, lesser horseshoe bat and unidentified bat species.

Common pipistrelle accounted for 88% of all bats recorded during the transect surveys and 85% of all bats recorded during the static monitoring surveys. Activity levels of all of the other species were significantly lower than this, with the lowest levels recorded being of serotine (>1% of calls recorded in transects & statics), lesser horseshoe bat (1% of calls recorded in transects & 0.5% of calls recorded by statics) and unidentified bats (2% of calls recorded in transects & >1% of calls recorded by statics).

During static monitoring, bat activity levels increased through spring to peak in July and August before tailing off in the autumn. Bat activity was circa three times higher in monitoring locations that were situated adjacent to plantation woodlands, compared with the monitoring locations that were situated in open grassland habitats. All of the recorded species were logged in all monitoring locations, with the exception of serotine, which was only recorded once at Location 2 (Appendix D11).

The transect surveys recorded peak levels of activity in May and August, with much activity concentrated around the plantation woodlands on and adjacent to the site. The highest diversity of bat species was recorded in July (five species), whilst the lowest diversity (two species) was recorded in June.

During the emergence and re- entry surveys undertaken by Arup, and also Bay Ecology Ltd, foraging activity by a number of bat species, was also recorded within the buildings (Appendix D11). The vast interior of the northern factory and large northern tower was used as a sheltered foraging area for the bat species identified roosting within the structure (i.e. common pipistrelle, lesser horseshoe, brown long-eared and myotid bats – likely Daubentons), along with individual bats from local populations entering the structure. The structure was also considered to be used as a sheltered area for social interactions between bats.

Badger

Desk study

Two records of foraging badger were returned from SEWBReC, from within the Site.

Field Study

The site contains large areas of plantation, grasslands and scrub that offer suitable habitat for badger sett building, commuting and foraging.

No signs of badger were recorded during the Extended Phase 1 Habitat survey (as detailed within the Preliminary Ecological Appraisal report, Appendix D2). A number of mammal holes were recorded but were assessed as being too small for badger and more likely fox (Vulpes vulpes) or rabbit (Oryctolagus cuniculus). One hole had a pile of recently dug earth outside, more typical of badger however (Photograph 8, Appendix D2).

During targeted surveys for badger (as detailed in Appendix D9, four setts including the one recorded during the Extended Phase 1 habitat survey, were recorded within the site. Two setts were recorded as disused, and two as active with badger hairs at one entrance. No badgers were recorded however, during further camera monitoring between July and September 2021. These setts were considered to be outlier setts.

Hazel Dormouse

Desk study

SEWBReC did not return any records of hazel dormouse from within the search area.

Field Study

The conifer plantation is sub-optimal habitat for dormice, and since it is not connected to larger areas of broadleaved woodland, or significant areas of dense scrub, the presence of dormouse is considered unlikely. As such, this species is not considered further in this assessment

Other Notable Mammal Species

Desk study

Other notable mammal records provided by SEWBReC within the search area included west European hedgehog (Erinaceus europaeus) at 1.4 km from the site boundary.

Field Study

Signs of rabbit were found throughout the Site during the Extended Phase 1 Habitat surveys (as detailed within the Preliminary Ecological Appraisal report, Appendix D2), particularly in grassland areas, and a number of mammal holes were recorded within the conifer plantation, which were considered likely to be used by fox or rabbit (as well as badger). A fox scat was also recorded at one location (TN 1, Appendix D2).

The Site's habitats could be suitable for a number of Section 7 species, including European polecat (Mustela putorius), hedgehog and potentially brown hare (Lepus europaeus).

Fox's (adult and cub) were found to be using one of the likely badger outlier setts, as detailed under 'badger'.

Invasive Non-native Species

Desk Study

SEWBReC returned a number of records from the search area although none were from the Site.

Species recorded within the wider search area included: Rhododendron (Rhododendron ponticum), wall cotoneaster (Cotoneaster horizontalis), Japanese knotweed (Fallopia japonica), giant hogweed and Himalayan balsam.

Field Study

During the Extended Phase 1 habitat survey (as detailed within the Preliminary Ecological Appraisal report, Appendix D2) Rhododendron was recorded at one location within the Site, adjacent to the stream (TN 11, Appendix D2). This species is listed on Schedule 9 of the WCA.

Subsequent NVC surveys also recorded a number of other INNS including

- Rhododendron: Locally frequent in conifer plantations at TN3 and TN4 (Appendix D2).
- Hollyberry Cotoneaster (Cotoneaster bullatus), Schedule 9 species: Two plants seen in scrub mosaic in central area (Appendix D2).
- Himalayan Cotoneaster (Cotoneaster simonsii), Schedule 9 species: Several small plants present in scrub mosaic in central area and on industrial plateau (Appendix D2).

7.7 Evaluation of Receptors

This section evaluates the nature conservation importance of the habitats and species present in the vicinity of the scheme in terms of their importance in an international, national, regional, county and local context.

Table 7.13: Nature Conservation Evaluation of Ecological Receptors

Ecological Feature	Evaluation	Conservation in the context of the Development
European Protected Sites		
Usk Bat Sites SAC	International	Usk Bat Sites SAC is considered to be of International value due to its designated status.
Cwm Clydach Woodlands SAC		Cwm Clydach SAC is considered to be of International value due to its designated status.
Nationally Protected sites		
Mynydd Llangatwg SSSI	National	Mynydd Llangatwg SSSI is considered to be of national value due to its designated status.
Mynydd Llangynidr SSSI		Designated for its geomorphology. Mynydd Llangynidr SSSI is considered to be of national value due to its designated status.
National Protected sites, designated for bats		
Cwm Clydach, River Usk (Upper Usk), River Usk (Tributaries), Siambre Ddu, Buckland Coach and Ice House SSSIs	National	Designated for roosting / hibernating and foraging bats. These SSSI are considered to be of national value due to their designated status.
Three LNRs: Beaufort Hills Pond and Woodland, Sirhowy Hill Pond and Woodland, and Parc Nant-Y-Waun LNRs	County	Designated for their mosaic of habitats, and amenity value. These LNRs are considered to be of County value due to recognition in the relevant Local Planning Authority LDP
Twenty SINCs: Rassau pond, Ebbw River North Section, Garnlydan Ebbw, (Fawr) Watercourse Beaufort Hill Ponds and Woodland Ebbw Fach Land at Park View,	County	Designated for their mosaic of habitats, and protected species. These SINCs are considered to be of County value due to recognition in the relevant Local Planning Authority LDP

Ecological Feature	Evaluation	Conservation in the context of the Development
Beaufort, Land to the rear of Glyndwr Road, Rassau Nant y Croft, Rassau Highway Verge Section 1 Bryn Serth, Rhyd y Blew, Bryn Serth, Hirgan Fields Grassland, Pond Group 1 Clydach Watercourse, Waun y Pound, Land off Parkhill Crescent, Sirhowy Hill woodland and Cardiff Pond Bryn Farm, Brynmawr, Parc Nant-y-Waun, Pond Group 2 SINCs		
Ancient woodland sites	County	There are two areas of recorded ancient woodland[96] within 2 km of the site, with the closest being 1.4 km from the site. These areas are considered to be of County value due to recognition in the relevant Local Planning Authority LDP.
Habitats		
Species rich mosaic grassland inlcuidng short perennial vegetation, ungrazed marshy grassland and heathland mosaic.	County	The mosaic of species rich acid and ungrazed marshy grassland habitats which occur on the industrial plateau within the north western part of the site, qualify as SINC habitats, in accordance with published guidelines[97]. Additionally, a number of rare plants occur within these habitats which are contributory SINC species including: smooth lady's mantle, bladder sedge, bee orchid and crowberry. The mosaic of acid and marshy grassland could also be considered a UK BAP and Section 7 habitat: 'open mosaic habitat on previously developed land'. Habitats such as heathland, neutral grassland and ditches, form part of the habitat mosaic on the industrial plateau and as such part of the SINC habitats; although they do not qualify as SINC habitats when considered separately. The species rich marshy grassland within the industrial plateau, when considered separately to other habitats within the site, is also considered to qualify as a Priority habitat within the 'UK Post-2010

[96] in accordance with the Ancient Woodland Inventory: https://naturalresources.wales/evidence-and-data/research-and-reports/ancient-woodland-inventory/?lang=en

[97] South Wales Wildlife Sites Partnership (2004) *Guidelines for the Selection of Wildlife Sites in South Wales.* Gwent Wildlife Trust.

Ecological Feature	Evaluation	Conservation in the context of the Development
		Biodiversity Framework' Biodiversity Action Plan (UKBAP), in addition to being a Section 7 habitat.
Species-poor disturbed marshy grassland, scrub, neutral grassland, running water, standing water and mixed and conifer plantation.	Local	These habitats are not considered to have significant value for nature conservation, although may provide habitat for protected species; including reptiles, nesting birds and fungi. As such they are considered to be of Local value only. Species poor marshy grassland in the eastern part of the site, although not species rich and would not qualify as a SINC habitat, supports deep peat at least in some areas, and this is a valuable habitat in terms of the ecosystem services it provides.
Buildings and hardstanding	Less than local	These habitats have limited value for nature conservation. The building has value for the bat roosts that it supports, which is evaluated separately under 'bats' below.
Species		
Fungi – broadleaved woodland and conifer plantation	County	The site supports a large number of fungi species, and a number of which are rare and notable including: Gomphidius glutinosus, Hypoxylon stygium and Coryne cf tasmanica, Rimbachia bryophila. In addition Hypocrea species, likely to be H.placentula and Hypocreopsis rhododendri (Hazel Gloves) were thought likely to be present. These species were largely associated with the mixed plantation woodland. Gomphidius glutinosus is assessed as having county significance for nature conservation. It has a widespread distribution but in Britain it is only abundant in Scotland and considered uncommon elsewhere. Hypoxylon stygium and Rimbachia bryophila are small fungi but they are likely to be genuinely rare, rather than just under-recorded; the record of Rimbachia bryophila potentially being the first in wales. Coryne cf tasmanica was also found on a deciduous trunk in this area. This is usually considered to be an Australian species and may be a first record for Wales. The presence of these species would qualify the area of mixed woodland as having likely significance for fungi in a county context, because it meets the Wildlife Sites Guidelines of supporting species recorded from 10 or fewer 10 km grid squares in Wales, and species recorded from 3 or fewer sites within a Watsonian Vice County[98].

[98] A geographical division of the British isles used for the purposes of biological recording and other scientific data-gathering

Ecological Feature	Evaluation	Conservation in the context of the Development
		A species of Hypocrea was found on a rush stem north of the plantation. This appears to be H.placentula, which if confirmed would be new to Wales, and possibly to Britain. However, there is nothing significant about the patch of rush the fungus was growing in that would warrant its protection. Additionally, it was not possible to confirm the presence of Hypocreopsis rhododendri, and such this species cannot currently be considered as contributing to the sites value for nature conservation
Fungi – grassland and scrub habitats	Less than Local	Species recorded within these habitats are common and widespread, and also occur in low densities. They contribute to the species diversity of these habitats, however.
Invertebrates	Local	The Site supports a limited range of invertebrates although a number of notable invertebrate species have been recorded: a rove beetle (P. parvicornis), dingy skipper butterfly, small heath butterfly and cinnabar moth. Small heath and cinnabar moth are listed in published Section 7 lists as 'Research only' species, since they have declined in parts of the United Kingdom, they are still relatively common and have not decreased significantly in Wales. A number of small heath butterfly adults were recorded during the May visit to Rassau on the area of ruderal grassland at the western end of the site. This species is widely distributed in central and southern England, and Scottish and Irish populations are mainly coastal. In Wales, the largest populations are in the south with large colonies along the coast although they also occur inland on post-industrial brownfield sites. Populations have declined particularly on brownfield sites, and as such they are listed as Section 7 species. A single male Rove beetle (P. parvicornis) was collected in a decomposing grass heap on the heavily grazed marshy grassland at the eastern end of the site. It is usually found in cow or horse dung in a range of open situations, though it has also been recorded less frequently in other patch habitats such as compost heaps and carrion. Recent British records of are confined to scattered sites in England, north as far as Yorkshire and a handful of Welsh localities, though there is an old record from Cumbria. It is considered likely to be upgraded to Nationally Scarce in the forthcoming Species Status Review[99].

[99] Boyce. In prep.

Ecological Feature	Evaluation	Conservation in the context of the Development
		The Site is assessed as being of Local value for invertebrates, due to the species poor invertebrate assemblage and limited presence of notable/rare species.
Amphibians	Local	Great crested newts are considered likely to be absent from the site although due to a positive eDNA result in one waterbody, this species has been scoped into the assessment. Palmate newt have been recorded within the site, and were considered likely to be breeding; although its noted that this species is common and widespread. Additionally, suitable habitats were limited to small areas of ephemeral waterbodies. Suitable habitats also exist within the site for common amphibians including common frog, which are common and widespread in Wales; although listed as a Section 7 species due to a decline in their numbers in Wales. Amphibians also benefit from their own action plan with BGCBC's LBAP. The Site is assessed as being of Local value for amphibian populations.
Reptiles	County	The mosaic of habitats within the site are suitable for common reptile species. Peak counts of nine common lizard were recorded during presence/absence surveys indicating that at least a good population is present within the site. Additionally, adder may use habitats within the site. A good population of common lizard qualifies the site as a SINC. As such, the Site is considered to be of County value for reptiles. Common lizard are Section 7 species. All native reptiles are protected under Schedule 5 of the Wildlife and Countryside Act 1981 with respect to killing, injury and sale only.
Breeding Birds	Local	Surveys recorded an assemblage of breeding birds typically associated with the habitat surveyed, including eight territories of notable species (BoCCW 3 Red and amber lists): Marsh tit, willow warbler, whitethroat, goldcrest, song thrush, mistle thrush, tree pipit, bullfinch, greenfinch and lesser redpoll. No evidence of breeding by any Schedule 1 species was observed. The site is assessed as being of Local value for breeding birds, due to the limited breeding bird assemblage and limited presence of notable/rare species, which are also acknowledged to be relatively common and widespread. All wild birds in the UK are protected under Section 1 of the Wildlife and Countryside Act 1981 (as amended) which makes it an offence to intentionally kill, injure or take any wild bird or take, damage or destroy the nest (whilst being built or in use) or its eggs.

Ecological Feature	Evaluation	Conservation in the context of the Development
Badger	Less than Local	Four badger setts have been recorded within the site including two disused setts, and two active setts. These setts are considered to be outlier setts. The site is considered to be of Less than Local value for badgers. Although not rare, badgers are protected under the Protection of Badgers Act 1992 for welfare reasons and therefore are a potential ecological constraint within the site.
Otter	Less than Local	No signs of otter have been recorded within the site during targeted surveys. Habitats within the site are considered to be sub-optimal but due to nearby records of otter it is not possible to rule out occasional presence of otter within the site. Otter are a Section 7 species. Otters are fully protected by UK law under the Wildlife and Countryside Act 1981 (as amended) through inclusion in Schedule 5. Otter is also included in Schedule 2 of the Conservation of Habitats and Species Regulations 2017 Regulations (as amended). Otter also benefit from their own action plan with BGCBC's LBAP The site is assessed as being of Less than Local value for otter.
Bats - roosting	Local	No buildings are present within the site. One tree was assessed as having low suitability for roosting bats within the site. A tree in nearby habitats supported a bat box, and another had low suitability for roosting bats. The adjacent Tech-board building supports small roosts of common pipistrelle, lesser horseshoe, brown long-eared and Myotid bats (likely Daubenton bats). The majority of these bat species are common and widespread within Wales. Lesser horseshoe bats, although rare in the UK and an Annex II species, are quite widespread in this part of Wales. Additionally, only low numbers of non breeding males/females were found to be roosting. Lesser horseshoe bats within the site, and adjacent habitats are associated with the Usk Bat Site SAC, which is of International value. Lesser horseshoe within the site, are not considered to form a significant component of the SAC however. All bat species are protected through inclusion on Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and Schedule 2 of the Conservation of Habitats and Species Regulations 2017 (as amended). Eight of the UK's bat species are Section 7 species. Four species including lesser horseshoe are also listed as Annex II species in the Habitats Directive (also known as Council

Ecological Feature	Evaluation	Conservation in the context of the Development
		Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora); which requires the designation of important areas which support these species as SACs. Bats also benefit from their own action plan with BGCBC's LBAP. The site is considered to be of Local value for roosting bats, due to widespread bat species roosting within nearby habitats.
Bats – foraging/commuting	Local	The site is used by foraging and commuting bats, with the most common species being common pipistrelle bat, in addition to smaller numbers of soprano pipistrelle, noctule, brown long-eared, Leisler and myotid bats. In addition, passes by lesser horseshoe bats were recorded. The majority of species are commonly occurring species and widespread within Wales and the UK. Lesser horseshoe are rarer species in the UK although are relatively common within south Wales. All bat species are protected through inclusion on Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and Schedule 2 of the Conservation of Habitats and Species Regulations 2017 (as amended). Eight of the UK's bat species are listed as Section 7 species. Four species including lesser horseshoe are also listed as Annex II species in the Habitats Directive (also known as Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora); which requires the designation of important areas which support these species as SACs. Bats also benefit from their own action plan with BGCBC's LBAP. The site is considered to be of Local value to foraging/commuting bats; since the species present are common and widespread.
Other notable mammals	Local	The site's habitats are considered likely to support a number of Section 7 species including European polecat, hedgehog and potentially brown hare. Fox's (adult and cub) were found to be using one of the likely badger outlier setts, and signs of rabbits were also recorded. European polecat, hedgehog and brown hare are UKBAP/Section 7 species. Brown hare has also been recorded within the Site, which is also UKBAP/S7 and Powys LBAP species.

Ecological Feature	Evaluation	Conservation in the context of the Development
		The above species, which are of conservations significance, occur within the Site, however are likely to be present in small numbers due to the limited habitat available. It is therefore considered that the site is of Local value for notable mammal species.
Invasive species	Negligible	Hollyberry cotoneaster, Himalayan cotoneaster and rhododendron are present within the site. These species are all listed as Schedule 9 species under the Wildlife and Countryside Act 1981 (as amended). Therefore, although not a valued receptor, the presence of invasive species is an ecological constraint within the Site and needs to be considered.

7.8 Assumed Construction Practices, standard species mitigation and habitat management

This section describes some established and uncontroversial standard best practice construction techniques and methods which will be employed to avoid or reduce the risk of potential impacts, in particular habitat damage, disturbance and species mortality. These will be described in detail in the final CEMP and are listed in the outline CEMP (Appendix A3). The adoption and implementation of these measures and best practice construction techniques will be secured through appropriate planning conditions.

This section describes those licences which will and may be required to be obtained in advance of construction taking place. The licences are likely to include those necessary to mitigate impacts on badger, and potentially other species such as bats should roosts be found during pre-construction surveys. Licences will be issued by NRW and will include details of the measures, techniques and strategies to be adopted. This section is based on a series of assumptions for the measures, techniques and strategies which will conditioned as part of the licences, and these will be integrated into the working practices and methods for the construction.

This section describes mitigation strategies associated with site clearance, for reptiles and notable fungi habitats, which will need to be relocated to suitable habitats/sites prior to construction, and these habitats managed sympathetically to create the necessary conditions for these species.

In addition to that which is described below, the outline CEMP will also detail the requirement and timing required for pre-construction surveys for protected species (including badgers, bats, and otters), and Ecological Clerk of Works (ECoW) to oversee specific elements of site clearance in accordance with method statements, oversee management of ecological issues as they arise, and to educate site personnel in ecological issues where needed.

Habitats and Vegetation

Retained trees adjacent to the site which may be at risk of root damage, will be protected in line with the British Standard BS5837:2012, in addition to the Arboricultural report (DRAGON-ARUP-ENVE-XX-RP-YE-000013).

To protect retained habitats from pollution including dust, pollution events or sediment run-off, all site activities in proximity to watercourses and waterbodies will be controlled and in accordance with relevant legislation and undertaken in compliance with the relevant Guidance for Pollution Prevention (e.g. GPP5100) and industry best practice (CIRIA101 and CIRIA C741[102]). Additional measures

[100] Natural Resources Wales (NRW), the Northern Ireland Environment Agency (NIEA), Scottish Environment Protection Agency (SEPA) (2018). Guidance for Pollution Prevention – Works or maintenance in or near water: GPP5 v1.2 Feb 2018. http://www.netregs.org.uk/media/1418/gpp-5-works-and-maintenance-in-or-near-water.pdf
[101] CIRIA (2018) CIRIA http://www.ciria.org
[102] CIRIA C741 'Environmental Good Practice on Site'; Fourth Edition (2015).

such as silt fencing, silt busters or bales will be used where necessary to prevent silt or contaminants from being released into connecting watercourses.

Potential pollution to groundwater will be managed during construction in accordance with relevant CIRIA good practice guidance (C750[103])

Where there are likely impacts to Groundwater Dependant Terrestrial Habitats Ecosystems (GWDTE) as a result of dewatering, the following mitigation would be implemented (as detailed within Chapter 14: Water environment):

- Construction sequencing and zoning to reduce the pumping rates and the surface area that has to be dewatered;
- Using 'closed-circuit' dewatering systems that involve recharging the abstracted water to ground within or close to the site, rather than pumping off-site;
- Groundwater level monitoring on the boundary during basement construction; and
- Surveillance of the potentially impacted features including water level monitoring in the abstraction well.

Dust and vehicle emissions will be managed through the production and implementation of management plans, which will eliminate impacts on air quality. Measures will comprise management of earthworks / exposed soils, appropriate storage of materials, regular inspections, wheel washing systems, covering vehicles carrying materials during transport and use of sprinkler or water bowsers to dampen excavations and or haul routes.

Noise and vibrations will be managed through the production and implementation of a management plan. This will include the sensitive siting of noisy equipment away from sensitive receptors and all plant and machinery having silencers fitted. Construction activity will typically be confined to 08.00-18.00 hours, Monday to Friday and 08.00-13.00 hours on Saturdays, and where working is required outside of these hours for safety or engineering practicability reasons, the works to be carried out during these extended hours will be discussed and agreed with the local Environmental Health Officer in advance of the works commencing.

Fungi

Rare and notable fungi species are present within the mixed plantation, which will be lost as a result of site clearance activities. It is possible to translocate fungi, where they depend on dead wood (or dead trees). As such dead willow with Hypocrea fungi will be moved to nearby woodland with a suitable microclimate (under direction of a suitably qualified ecologist) i.e. Parc Bryn bach and or Sirhowy woodlands. Care will need to be taken to ensure that it is not damaged in the process of moving from site.

Additionally, a proportion of the trunks and larger branches will stacked within the same off site woodland to provide habitat for fungi as they break down;

103 CIRIA C750 (2016) Groundwater control: design and practice (second edition) CIRIA http://www.ciria.org

including with some trunks being left in open locations and others in shade to enable a range of fungi communities to develop.

INNS

Rhododendron and cotoneaster species, Schedule 9 INNS have been recorded within the site, and which could be disturbed during construction activities.

General good practice with regard to INNS will be employed during construction including the cleaning of all equipment and footwear with a suitable disinfectant before entering the site. In addition, all equipment and footwear will be thoroughly cleaned and disinfected when leaving site.

Specific mitigation will also be implemented during construction, particularly clearance activities, to ensure that rhododendron and invasive cotoneaster species are not spread from the site. These mitigation measures will be detailed with the outline CEMP and will include avoidance measures and or appropriate treatment. Under the Environmental Protection Act 1990, Schedule 9 INNS are considered controlled waste and therefore have to be disposed of safely at a licensed landfill if they need to be removed during construction. Further details of this are provided in the within the outline CEMP (Appendix A3).

All Species

Toolbox Talks will be provided by a suitably experienced ecologist to all site personnel to inform them of ecological features at the Site including INNS, protected and notable species prior to the commencement of construction works. An associated registry of attendance will be signed and kept as a record and a copy of the toolbox talk left at the Site office.

Good practice working methods will be adhered to which prevent any adverse impacts to otters, badgers or other mammals at the Site. Materials or plant will not be left overnight in an area that may prohibit access for accessible to commuting otters and or badgers and excavations will not be left uncovered overnight. If any excavations are required to be left open overnight, a ramp will be provided created to allow any animals to escape.

Temporary construction lighting required will be directional lighting and designed to ensure no light spill over 0.5 Lux[104] on to any identified retained or created habitats for commuting and foraging areas or bats. The principles of the lighting design are detailed within the outline CEMP (Appendix A3), and details such as locations, types, Lux and positions, will be required for the final CEMP, secured through the planning application.

If any protected species or signs of protected species such as a badger sett, otter resting/breeding place or INNS (other than rhododendron) are encountered during the works, all work in the vicinity is to stop immediately and a suitably qualified ecologist contacted as soon as possible for advice.

[104] Industry standard based on various sources, including Bat Conservation Trust and Institute of Lighting Professionals (2018) Bats and artificial lighting in the UK. Guidance Note 08/18.

Amphibians

No great created newts where found during the surveys, although a positive eDNA was recorded from one waterbody within the site. It is considered very unlikely that this species is present within the site however a precautionary approach will be followed with regard to the potential presence of a small population of great crested newts occurring within the site.

A comprehensive trapping and relocation programme will be undertaken within suitable habitats on the site which will be fenced using herptile fencing, in addition to destructive searching of areas which are not possible to fence such as dense scrub. Refugia will be placed within terrestrial habitats along with pitfall traps, which will be checked daily and any great crested newts relocated to the adjacent retained marshy grassland which will be subject to habitat enhancements. Waterbodies, holding water at the time, will also be subject to bottle trapping with any great crested newts also being relocated to the adjacent marshy grassland and new pond (see site design below). Draining of waterbodies will also be undertaken sensitively to ensure no great crested newt is harmed. Trapping and relocation, in addition to destructive searching and waterbody draining will be overseen by an appropriately licensed ecologist, and the exercise will be completed when a sufficient number of great crested newt free checks have been confirmed. This will be undertaken under a development licence obtained from NRW further to planning consent being obtained.

A repeated presence/absence survey will be undertaken in spring 2022, and if necessary, population survey, to confirm the presence of great crested newts and indicative population size.. If GCN are found to be absent from the site, a cancellation of the development licence will be sought, though it should be noted that mitigation actions relevant to other amphibians and reptiles will be implemented as required.

Adjacent habitats, namely marshy grassland, will be enhanced for great crested newts currently using the site but which will need to be relocated prior to construction activities commencing. Enhancements will comprise the creation of herptile refugia/hibernacula (at least ten) (also provided for reptiles) which will provide hibernation and sheltering opportunities for great crested newts. In this area of marshy grassland, a pond will also be created prior to site clearance, which can be used by any relocated great crested newts. This pond forms part of the site landscaping, but will be provided ahead of other landscaping proposals due to the requirement to provide aquatic habitat for relocated great crested newts. The pond will be designed for great crested newts with gently sloping edges and being 1m deep at the centre. It will be planted with native waterplants suitable for great crested newts.

Pollution which effects the water and/or associated terrestrial habitats could negatively impact amphibian species. The risk of such pollution events are reduced by the implementation of the pollution prevention measures as described in outline CEMP.

Full details of great crested newt mitigation to be provided during construction are detailed within a separate Great Crested Newt Conservation Strategy, which will be submitted along with the planning application.

Reptiles

Common lizard have been recorded within grassland and scrub habitats in the site, and it is considered likely that adder could also be present.

The majority of these habitats will be lost during clearance and construction of the site; although suitable habitats east of the watercourse will be largely retained and protected. As such, there is the potential for injury and harm to these reptiles that may be present in affected habitats and mitigation is required.

Due to the likely good population size of common lizard, a comprehensive trapping and relocation mitigation strategy will be required. Details will be provided in the outline CEMP (Appendix A3).

Adjacent habitats, namely marshy grassland, will be enhanced for reptiles, currently using the site but which will need to be relocated prior to construction activities commencing. Enhancements will comprise the creation of reptile refugia/hibernacula (at least ten) which will be provide hibernation, shelter and basking opportunities for reptiles.

Reptile trapping and relocation will need to be undertaken in accordance with best practice guidance[105], and under supervision of a suitably qualified ecologist. This will comprise the installation of suitable one-way herptile fencing around the construction area under supervision. This will also be made of hard long-lasting material rather than plastic sheeting. The exclusion fence will be maintained throughout the development works. This fencing will be inspected regularly by the ECoW to ensure that it retains its integrity. On completion of the development works the exclusion fence will be removed under the watching brief of a suitably qualified ecologist.

Initial vegetation clearance may be required to facilitate fencing installation, as guided by the suitably qualified ecologist. Further vegetation clearance will be undertaken alongside trapping (as detailed below), to encourage reptiles into with vegetation being reduced in stages until it has been cut to the ground. This will be done sensitively, under guidance of the suitably qualified ecologist and undertaken using handheld brush cutters or strimmers. This will ensure that any reptiles present within the fenced area will gradually moved from vegetation towards any Artificial Cover Objects (ACOs), which have been laid out.

ACO, comprising bitumen roofing felt, will be deployed within the fenced area (with at least ten refuges per hectare). These ACO will be allowed to ‘bed in’ for at least 10 days prior to the first relocation visit, and subsequently checked daily or twice daily by the suitably qualified ecologist, and any reptiles found removed using gloved hands and relocated as soon as possible to the identified receptor area. Any reptiles captured will be placed in a secure container with vegetation. Details including location of capture, sex and life stage will be recorded.

Where habitat piles are present for example log piles, a suitably qualified ecologist will be present to supervise the gradual dismantling of these and removal of any reptiles using gloved hands to the adjacent receptor site.

[105] http://archive.jncc.gov.uk/pdf/pub03_herpworkman_Ch9.pdf

Reptiles will be captured and released within appropriate prevailing weather conditions between March and October. Capture and relocation will not be undertaken during winter months between late October - February. Herptile checking will continue in each fencing compartment until a minimum of ten consecutive visits have occurred, during suitable weather conditions, with no reptiles having been encountered.

A destructive search will be undertaken, at the end of the trapping/relocation programme, therefore facilitating the relocation of any reptiles which have evaded capture (and in any areas where it has not been possible to fence). This will take place at a time when reptiles are expected to be active (March - October) and during suitable weather conditions. 'Destructive searching' will comprise removing the surface 250mm of topsoil under supervision, in a sequential manner across the site, in order to allow for any reptiles to be capture and relocated to the receptor site. Care will be taken not to either track over areas which have not yet been cleared, or to store the stripped topsoil on such areas.

Once the fenced area has been destructively searched in this manner, it will be considered to have been cleared of reptiles, and normal earthworks and construction activities will then proceed in a conventional manner with no further constraint. As detailed above the reptile fencing will need to be maintained for the duration of the works.

Following completion of the destructive search and prior to the commencement of development works within the Site, the ground should be kept free of vegetation.

Birds

Where possible, vegetation down to stump level will be undertaken outside of the nesting season, to reduce the risk of encountering breeding birds. This will need to ensure that habitats suitable for sheltering/hibernating reptiles will not be disturbed.

Vegetation clearance undertaken during the bird breeding season (March to September) will require sensitive working methods to ensure no active nests are damaged or destroyed in accordance with the Wildlife and Countryside Act 1981 (as amended).

If vegetation clearance is required during the breeding bird season, an ECoW will be appointed to carry out a nesting bird check on any vegetation to be cleared, or vegetation directly adjacent to major works, no more than 24 hours prior to works commencing. If an active nest is identified, a suitable buffer shall be implemented around the nest with no works occurring within this buffer until the young are fully fledged, see the outline CEMP (Appendix A3) for further details.

A range of bird boxes (no less than 30) will be provided on mature trees, within the site. The number and location will be selected by the ECoW and will be informed by the number of appropriate trees available. This will provide nesting habitat for breeding birds during construction.

Otter

No otter resting or breeding places have been recorded within the site, or adjacent habitats. It is considered possible that otter may use the site, although it is likely to be infrequent and that this would be limited to foraging and commuting.

Night-time works could disturb foraging or commuting otters within circa 50 m of the Proposed development. Temporary construction lighting required will be directional lighting and designed to ensure no light spill over 0.5 Lux on to any potential commuting and foraging areas within the site and adjacent habitats. This is outline within the outline CEMP (Appendix A3), and final details will be provided in the final CEMP.

Any open excavations during construction should be covered at night or a means for escape such as ramps provided to reduce the risk of trapping or injuring otters.

Badger

Four setts have been recorded within plantation woodland on the site, which will be lost during clearance of the site to facilitate construction activities. These setts were assessed as being outlier setts, and only two has evidence of use although only one sett supported signs of use by badger. Further monitoring found no evidence of badger using either setts although evidence of use by foxes was recorded. It was considered likely that these setts would be used infrequently by badger.

Prior to any clearance and or construction activities commencing, the site and suitable habitat within 50 m of the construction area should be surveyed to ensure no additional setts have appeared since the original badger surveys were undertaken.

Any setts within or adjacent to the construction area, which have the potential to be used by badger, will subsequently need to be closed, under licence from NRW. Sett closure can only be undertaken between the 1st July and 30th November.

Prior to exclusion of the setts, any undergrowth will be cleared using hand power tools to facilitate the installation of wire mesh.

One way badger gates construction in accordance to the specification set out in the Design Manual for Roads and Bridges Volume 10, Section 4 Part 2 (HA 59/92 Mitigating Against Effects on Badgers) will be placed at all entrances where badgers will be excluded. The gates will be surrounded by welded wire mesh fencing laid on the ground for a radius of 5 m around each entrance. For the first week following installation the gates will be held open using wire.

Once the gates have been in place for a week the gates will be set in a one-way position so that animals are only able to come out of the entrances but are not able to re-enter. Soft sand will be placed at the entrances to record footprints of any animals that may be using the setts being closed.

Gates will be monitored for at least 21 days, before setts can be closed.

Once badgers have been excluded from the sett, it will be possible to destroy the sett. Alternatively, it should be ensured that the sett is sufficiently secure to

prevent badgers re-establishing. Monitoring will be undertaken to confirm that badgers have not re-inhabited any of the setts, for the duration of construction works.

Any open excavations during construction will be covered at night or a means for escape such as ramps provided to reduce the risk of trapping or injuring badgers, as detailed within the outline CEMP (Appendix A3).

Bats

No bat roosts were identified within the site, although the Techboard building to the south was found to support a number of bat roosts including the rarer lesser horseshoe bat. Additionally, one tree within the site (SO1588512712) was assessed as having low bat suitability. None of these trees or buildings will be disturbed by the proposed development. A number of bat species including lesser horseshoe bat were also recorded using habitats within the site for foraging and commuting, particularly along woodland edges. No loss of roosts is anticipated however the proposed development however it is acknowledged that bats could start to roost within suitable trees between the date of this assessment and the start of construction activities. The proposed development will result in the loss and severance of commuting and foraging habitats, as well as disturbance of commuting and foraging bats using the site.

Pre-construction surveys will be conducted to establish whether the low suitability tree within the site, has the same suitability or whether it has become more suitable for roosting bats, in addition to surveying other trees to assess whether they have become suitable for bat roosting. Any trees assessed as being moderate or high suitability will be subject to further climbing and or emergence/re-entry surveys to confirm whether roosting bats are present. Where the tree is confirmed to be a bat roost, it will be removed under an EPS development licence obtained from NRW, and a replacement roost provided.

Trees assessed as being low suitability for roosting bats after the pre-construction survey will be soft felled, in accordance with methodology outlined in the outline CEMP (Appendix A3).

Disturbance licences are not anticipated to be required for potential disturbances to the roost within the Techboard building; the building is part of proposals which are subject to a separate planning application and benefits from a separate EPS licence which includes the re-establishment of the roost in habitat to the south west of the site.

Key commuting and foraging routes for bats, including edges of plantation woodland, will be retained during and post construction, and subject to enhancements post construction through additional tree planting.

Temporary construction lighting required within bat activity periods will be directional lighting and designed to ensure no light spill over 0.5 Lux on to any identified commuting and foraging areas. The principles of this will be outlined in the outline CEMP and further details will be provided within the final CEMP.

Other Section 7 Species

Habitat clearance and habitat manipulation techniques will be designed to be sensitive to other Section 7 species and to deter species away from construction areas. Suitable alternative habitat will be identified away from the construction footprint and activities and provided for any Section 7 species found during construction. Section 7 species will be moved to these areas by a ECoW. Habitat clearance and manipulation techniques, as well as the role of the ECoW will be detailed within the outline CEMP (Appendix A3).

7.9 Embedded Design and Habitat Creation

Where possible, the proposed development has been designed to avoid or reduce the potential impacts to ecological features of the site. These ecologically driven designs are embedded into the proposed development and have therefore been taken account of during the assessment. The embedded designs to avoid or reduce such operational impacts to the ecological resource of the site are described in the subsequent sections.

A landscape masterplan (Drawing reference: DRAGON-ARUP-XXXX-XX-DR-L-1001501) has been developed which provides a vision for the site; setting out how the development will be delivered to provide its main function as a glass manufacturing facility whilst minimising impacts on landscape and biodiversity, in addition to providing opportunities to enhance the landscape for people and nature.

The design comprises the creation of species rich grassland areas to the north and south of the glass manufacturing facility. Grassland will be established on re-profiled land, of varying topographies to create different microclimates for different fauna, including sheltered sunny banks which will be of particular value to invertebrates and reptiles.

The majority of conifer and mixed woodland will be lost from the site however scattered trees will be retained along the watercourse and in the southern periphery of the site, along the boundary. Native tree planting will be supplement retained trees within the southern part of the site, and either side of the stream, which will continue to run north to south, to the east of the buildings. There will also be additional native tree planting in the northern part of the site. An area of woodland will also be created at one location. Native, drought tolerant species will be used which will be more resilient against future impacts of climate change. Tree planting and areas of woodland will soften the appearance of buildings within the landscape and provide species rich woodland habitat which will be of value to fungi, invertebrates, foraging bats, badger, nesting birds and potentially otter. It is likely that the newly created woodland habitat, particularly as it matures, will provide more opportunities for roosting bats, in addition to nesting opportunities for breeding birds, which are currently limited due to the majority of woodland comprising conifer species. A larger extent of broadleaved woodland including wet woodland is also likely to support a greater diversity of invertebrate species which will support foraging bats in the area.

The created corridor of tree/woodland planting will also provide connectivity for bats travelling between known roosts to south-west of the site, and into the wider landscape including lesser horseshoe which may also be travelling to the Usk Bat SAC and Mynydd Llangatwyg SSSI.

The existing engineered stream which runs through the site will be planted with native tree planting as described above, and native scrub habitat. This habitat will have value to foraging bats, nesting birds, and potentially otter that may travel into the site from neighbouring areas such as the nearby Carno reservoir.

A number of waterbodies of varying sizes will be located within areas of grassland, and scattered trees. These new waterbodies will comprise a mix of temporary and permanent waterbodies, designed with GCN in mind as well as being suitable for a range of flora and fauna. There will be three Sustainable Drainage Systems (SuDS) waterbodies, which will be approximately 0.22 ha in extent, and are likely to be ephemeral and only support water for some of the year due to their drainage functions. Another waterbody will also be created, which will be approximately 0.008 ha / 80m^2 and will not have any drainage functions. This waterbody will therefore support water permanently. All waterbodies will be at least 1m deep at the centre, with gently sloping edges. They will be planted with native waterplants but will not be stocked with fish.

The existing species-poor marshy grassland which is located east of the main stream running through the site, will be largely unaffected with the exception of a small area which will be dissected by the road running around the site, and amenity areas with formal landscaping (which occur between buildings and the road). This area of grassland has been identified as supporting peat and is currently in a degraded condition. As such, areas of retained marshy grassland habitat will be subject to management to enhance its condition, through the re-wetting of marshy grassland (as set out in the supporting Design and Access Statement -DRAGON-ARUP-XX-RP_A_000001_DAS), including the blocking of drains and reinstating management of sphagnum mosses. These measures will aim to encourage a more species rich assemblage of flora and fauna. This area will also be the focus of enhancements for reptiles as discussed above under ‘reptiles’ which will be translocated from suitable habitats to the west of the stream.

A network of paths will be created through the landscaped habitats within the site, to provide a recreational resource for employees and visitors to the site; with these being carefully designed to minimise their footprint on new and retained habitats for example through the use of boardwalks set above habitats.

In addition to providing compensatory habitats for the range of flora and fauna, found on the site and connecting habitats, landscape features will provide other functions including improved drainage through the use of SuDS, improving the water quality in connectivity downstream, and also regulating the level of flow from water runoff. In addition, the landscaping will provide a recreational resource for employees and visitors to site, through the provision of improved access around semi-natural habitats which are adjacent to the buildings and infrastructure.

The lighting strategy for the operation site will consider the ecology of the site, with reference to artificial lighting guidance for bats. The lighting strategy will

minimise lighting in sensitive habitats, such as retained along the retained watercourse, and marshy grassland to the east in addition to newly created habitats to the south, north and east of the buildings. Where possible it will ensure that any light spill is limited to a maximum of 0.5 Lux on sensitive habitats. Where possible, low-level lighting will be used to keep illumination focussed and limiting spill onto adjacent habitats. This may comprise lighting such as bollard lighting etc, and methods such as control systems, position and orientation of lighting[106].

Traffic management will also be provided on the operational site, to ensure that traffic by site staff and visitors, is limited to low speeds, and therefore reducing the risk of collision with animals that may be present within the site.

Drainage for potential pollutants from manufacturing and foul flows from staff facilities will be treated as contaminants and disposed of via the foul drainage on site (as detailed within Chapter 14: Water environment).

7.10 Assessment of Impacts and Significance

The following sections characterise and evaluate the significance of potential impacts of the scheme on ecological receptors during the construction and operational phases.

In accordance with the CIEEM guidelines, impacts have only been assessed in relation to those features of local or greater ecological value and/or are subject to legal protection, which are also potentially vulnerable to impacts from the proposed development.

On this basis, the following receptors have been taken forward for detailed assessment:

- Statutory European Designated Sites within 5 km – Two SACs: Usk Bat sites and Cwm Clydach SAC;
- Statutory Nationally Designated Sites within 2 km – Mynydd Llangatwg SSSI and Mynydd Llangynidr SSSI;
- Statutory Nationally Designated Sites within 10 km which are designated for bats - Cwm Clydach, River Usk – Upper Usk, River Usk – Tributaries, Siambre Ddu and Buckland Coach and Ice House SSSIs;
- Statutory Locally designated sites – Beaufort Hills LNR, Sirhowy Hill Pond and Woodland LNR, Parc Nant y Waun LNR;
- Non-statutory Designated Sites - twenty SINCs: Rassau pond, Ebbw River North Section, Garnlydan, Ebbw (Fawr) watercourse, Beaufort Hill Ponds and Woodland, Land at Park View, land to the rear of Glyndwr Road, Nant y Croft, Highway Verge Section 1, Rhyd y blew, Bryn Serth, Hirgan Fields Grassland, Pond Group 1, Clydach watercourse, Waun y Pound, land off

[106] Bat Conservation Trust and Institution of Lighting Professionals (2018) Guidance Note 8 Bats and Artificial Lighting

Parkhill Crescent, Sirhowy Hill Woodland and Cardiff Pond, Bryn farm, Parc Nant y Waun, Pond Group 2;

- Non-statutory designated sites – ancient woodland within 2 km; there are two areas of ancient woodland;
- Mosaic of habitats – County valued habitats including species rich marshy grassland and acid grassland. Locally valued habitats including neutral grassland, conifer and mixed plantation woodland, waterbodies, watercourse, scattered trees and scrub, dense scrub, and short ephemeral vegetation; and,
- Protected and Notable species including:
    - Fungi;
    - Invertebrates;
    - Amphibians;
    - Reptiles;
    - Breeding birds;
    - Badger (Less than local but included due to protection under UK legislation for welfare reasons);
    - Otter;
    - Roosting and commuting/foraging bats;
    - Notable mammals; and,
    - Invasive species (due to relevant legislation only and not for nature conservation reasons).

As detailed in the existing baseline survey information, dormouse, water vole, and fish were considered unlikely to be present within the site and therefore are not included further in the Chapter for assessment. In addition, habitats of less than local value i.e. buildings and other man-made infrastructure are also not included in remaining sections of the chapter.

Potential Construction Effects

Potential ecological impacts of the works during the construction phase which includes site preparation may be direct or indirect and may be categorised as follows:

- Habitat loss through vegetation clearance to provide access tracks and storage of aggregates and silt;
- Habitat disturbance and or degradation including pollution and sedimentation; and increases in water run-off from the site as a result of more impermeable surfaces;
- Disturbance to species during construction (noise, vibration and lighting);
- Habitat fragmentation and or physical restrictions to species movements; and,
- Species mortalities and injuries – e.g. through collisions with construction vehicles and direct contact through excavation works, falling and trapping in open excavations during construction.

Potential Operational Effects

Potential ecological impacts of the works during the operational phase may be direct or indirect and may be categorised as follows:

- Habitat degradation through the air pollution and water pollution;
- Habitat disturbance through increased use of the site and immediate surrounds;
- Species disturbance through increased light and noise pollution; and,
- Species mortalities and injuries through collision with vehicle traffic.

Internationally and Nationally Designated Sites: National Site Network and SSSIs

There are two Internationally designated sites potentially affected: including Usk Bat Site SAC at 900 m east of the site, and Cwm Clydach SAC at 4.8 km. There are two nationally designated sites: including Mynydd Llangatwg at 900 m (within the Usk Bat Site SAC) and Llangynidr SSSI at 1.5 km. There are also five SSSIs designated for bats within 10 km: Cwm Clydach, River Usk (lower), River Usk (Tributaries) and Siambre Ddu, with the closest (Cwm Clydach) being 4.8 km to the site.

Any impacts to the Usk Bat and Cwm Clydach SAC, and Mynydd Llangatwg and Mynydd Llangynidr SSSI would be significant at an international and national level respectively. In addition, any effects to the SSSIs: Cwm Clydach, River Usk – Upper Usk, River Usk – Tributaries, Siambre Ddu and Buckland Coach and Ice House, would be significant at a national level. There are also two areas of ancient woodland, with the closest compartment at 1.4 km, and any effects to these areas would be significant at a county level.

The project has the potential to affect these Internationally and nationally designated sites during construction via the following pathways and mechanisms:

- Habitat degradation through the air pollution and water pollution;
- Disturbance to qualifying species;
- Harm or mortality of qualifying species; and,
- Habitat loss and or fragmentation of foraging/commuting habitat for qualifying species.

A Habitats Regulation Assessment (HRA) (as detailed in Appendix D12) has also been prepared in based on the proposed works, which discussed potential effects in relation to the Usk Bat Site SAC qualifying features: lesser horseshoe bats and associated habitats, and Cwm Clydach SAC and qualifying habitats.

Due to the distance of designated sites from the site, potential effects on the nearby SACs, SSSIs and ancient woodland habitats are limited to 1) effects on water quality or quantity/flow: pollutants (fuel, chemical spills, dust and vehicle emissions) from construction or high sediment load in surface water runoff from construction areas in addition to potential changes in flows; and 2) air quality

effects during construction: increases in levels of nitrogen oxides (NOx), sulphur dioxide (SO2) and ammonia (NH3), which can be absorbed directly[107] or indirectly i.e. through deposition, which affects the soil pH or causes nutrient enrichment of the soil.

None of the Internationally or nationally protected sites are hydrologically connected to the Project area, and therefore there is no pathway for effects from changes in water quality during construction. In addition, the majority of international/national sites are over 4.8 km, with the exception of Usk Bat SAC and Mynydd Llangatwyg SSSI which is approximately 900 m from the site. As detailed within Chapter 5: Air quality, effects from dust or vehicle emissions during construction are not anticipated to be significant. Effects from dust are not anticipated to effect ecological receptors greater than 50 m from the site and vehicle emissions will be short term during construction. Best practice is outline in Section 7.8 with regard to managing dust emissions and traffic speeds within the site during construction.

Effects on lesser horseshoe bats, as a qualifying species of the Usk Bat SAC and Mynydd Llangatwyg SSSI, in addition to other SSSIs within 10 km (Cwm Clydach, River Usk – Upper Usk, River Usk – Tributaries, Siambre Ddu and Buckland Coach and Ice House) are discussed below with regard to construction effects. Effects on other species of bats (Daubenton and brown long-eared) which are also qualifying features of Mynydd Llangatwyg as well as other SSSIs, and which occur within the site, are also discussed.

With the implementation of the construction mitigation and embedded landscape planting there would be no significant effects on qualifying habitats associated with Internationally and nationally valued designated sites.

Lesser Horseshoe and Other Qualifying Bat Species

Lesser horseshoe bats are a feature of the Usk Bat Site SAC, which is located circa 900 m north east of the site. Low numbers of individual lesser horseshoe bats (circa two individuals) have been recorded day roosting within the adjacent Tech-board building to the south of the site (circa 85 m), and also foraging infrequently within the site. Roosting evidence of lesser horseshoe bats was found in the form of droppings on the floor of office rooms in the west and east of the main building (Building A), single bats were observed roosting in a room on the first floor in the west of the building, and a single bat was observed within a room in the northern part of the building (on two survey visits).

Foraging activity by lesser horseshoe bats was focused along edges of woodland and scattered trees within the site, as well as within the adjacent Tech-board building and connecting habitats. No suitable roosting sites for lesser horseshoe bats were recorded within the site.

It is not possible to rule out that the individual lesser horseshoe bats found within and adjacent to the site, contribute to the Usk Bat Site SAC and Mynydd Llangatwyg SSSI (or other SSSIs within 10 km: Cwm Clydach, River Usk –

[107] The relevant assessment benchmark for pollutant concentrations ‘in the air’ is referred to as a critical level

Upper Usk, River Usk – Tributaries, Siambre Ddu and Buckland Coach and Ice House) since this species is known to travel up to 10 km between roosts[86]. The presence of small numbers of non-breeding female/male lesser horseshoe bats recorded roosting and foraging during summer months suggest that these bats are not a significant component of the SAC/SSSI populations.

Similarly, Daubenton and brown long-eared bats are not considered likely to form a significant component of Mynydd Llangatwg SSSI due to being present in small numbers. Unlike lesser horseshoe bats, these bat species are not considered likely to be associated with other SSSIs within 10 km of the site (Cwm Clydach, River Usk – Upper Usk, River Usk – Tributaries, Siambre Ddu and Buckland Coach and Ice House) since they are not known to regularly travel such distances between roosts[86].

There is the potential for disturbance to occur to roosting bats, which are lesser horseshoe, Daubenton and brown long-eared bats associated with the Usk Bat SAC and Mynydd Llangatwyg SSSI, in addition to lesser horseshoe which may be associated with other SSSIs within 10 km (Cwm Clydach, River Usk – Upper Usk, River Usk – Tributaries, Siambre Ddu and Buckland Coach and Ice House). However, at >85 m, any disturbance effects from noise, vibration etc as a result of the construction works are not considered to be significant. In addition, any potential effects from disturbance as a result of the proposed development will be buffered by existing planting along the boundary of the Tech-board site, which will be unaffected during construction. Furthermore, the Tech-board site is proposed for redevelopment with a compensatory roost being provided to the south west (>300 m).

Disturbance to foraging/commuting bats, is considered more likely since retained habitats (which will continue to provide a foraging/commuting corridor through the site during construction) will be in close proximity to potential disturbances during construction. However, it is acknowledged that suitable habitats for this foraging/commuting by these bat species also occurs extensively to the north and east of the Site, and which would be in good connectivity to the SAC. Considering the standard best practice measures being implemented during construction however, it is considered that any such disturbances will not have a significant impact on any foraging/commuting lesser horseshoe bats associated with Usk Bat Site SAC, Mynydd Llangatwyg SSSI and other SSSIs within 10 km. In addition, it is not likely that Daubenton and brown long-eared bats foraging/commuting within the site which may be associated with Mynydd Llangatwyg SSSI, would be affected considering the implementation of best practice measures during construction.

Habitat loss for foraging bats will occur as a result of the habitat mosaic including species rich and marshy grassland, scrub and woodland within the site, although it is acknowledged that these habitats occur extensively within the local area. Only low numbers of lesser horseshoe bats were recorded within these habitats, and other species including Daubenton and brown long-eared bats (although only common pipistrelle were recorded in greater numbers). Some habitats will be retained during construction namely scattered trees along the southern periphery of the site and along the stream, therefore providing some foraging habitat. Furthermore, post construction, species rich habitats will be created around the

site's periphery, and marshy grassland to the east of the site will be enhanced, increasing its value as a foraging resource for bats. As such temporary habitat loss effects on lesser horseshoe bats and other species, associated with the Usk Bat Site SAC and Mynydd Llangatwyg SSSI, as well as other SSSIs within 10 km, are not considered to be significant.

Some fragmentation of foraging/commuting habitats is likely to occur during construction due to the loss of tree/woodland habitat across the site, however as mentioned above scattered broadleaved trees will be retained within the southern periphery of the site and along the stream. Therefore, there will be some habitat connectivity for bats retained during construction. Landscaping design will comprise suitable broadleaved woodland to the north, east and south of the proposed development buffering the retained planting, in addition to the creation of species rich grassland and wetland habitats. Landscaping will therefore provide enhanced habitat connectivity for bats using the site post construction. As such habitat connectivity for foraging/commuting bats will be maintained during and post construction, which provides connectivity between existing planting to the south of the Rassau Industrial Estate and along the A465 - to the wider landscape in the east, including Usk Bat Site SAC and Mynydd Llangatwyg SSSI, as well as other SSSIs within 10 km of the site.

With the implementation of the construction mitigation and embedded landscape planting there would be no significant effects on qualifying bat species associated with Internationally and nationally valued designated sites.

Nationally Designated Sites: Ancient Woodlands

The proposed development has the potential to affect ancient woodland sites via the following pathway and mechanism: habitat degradation through changes in air quality. Any effects on locally designated sites would be significant at a County level.

As detailed under 'Internationally and nationally designated sites' above, effects from dust are not anticipated within 50 m of the site, and all ancient woodland sites are greater than 100 m. Changes in air quality as a result of increased vehicle emissions during construction are not anticipated to be significant and would not result in any adverse effects on ecological receptors. Furthermore, best practice measures, as set out in Section 7.8 with regard to dust and traffic management will be set out in a CEMP and implemented on site.

With the implementation of the construction mitigation there would no significant effects on county valued ancient woodland sites.

Locally Designated Sites

There are twenty-three locally designated sites within 2 km of the site, including SINCs and LNRs.

The proposed development has the potential to affect locally designated sites via the following pathway and mechanism: habitat degradation through changes in air

quality and water quality and quantity (i.e. flow). Any effects on locally designated sites would be significant at a Local level.

There is a potential pathway for effect to the River Ebbw SINC through the watercourse which runs through the site and connects to the River Ebbw downstream, through one of its tributaries. There is the potential for pollutants during construction, as well as sediment in surface water run-off. Water quantity, i.e. flow, could be affected, particularly groundwater, as a result of dewatering activities during construction. Habitats in hydrological connectivity such as the River Ebbw (designated SINC) (as described in the Chapter 15: Water) would be sensitive to these changes. As discussed in Chapter 15, and above in Section 7.8, the implementation of good practice pollution control measures during construction would ensure that there would pollution events or surface run off would be managed, and adverse effects to surface water and or groundwater would be avoided. Potential effects on groundwater flows/levels could occur during dewatering activities, which are considered likely to be required during the construction of basements. Any groundwater which is removed would however be discharged into the Ebbw River catchment, and therefore there would be no effects to this river catchment.

As described in Section 7.8 good practice will be outlined in the CEMP and will include measures to prevent pollution events or surface run-off with a high sediment load.

As detailed under 'Internationally and nationally designated sites' above, effects from dust are not anticipated within 50 m of the site, and all locally designated sites are greater than 100 m. Changes in air quality as a result of increased vehicle emissions during construction are not anticipated to be significant. Furthermore, best practice measures, as set out in Section 7.8 with regard to dust and traffic management will be set out in a CEMP and implemented on site.

With the implementation of the construction mitigation there would no significant effects on locally designated sites.

Habitats

A mosaic of habitats have been recorded within the site including conifer plantation woodland, mixed plantation woodland, scrub, scattered trees, acid grassland, marshy grassland, standing water, running water and ephemeral vegetation.

The mosaic of acid grassland, short perennial vegetation and marshy grassland which was recorded is species rich and qualifies as a SINC habitat. The remaining habitats within the site, were generally species poor with limited value for nature conservation, with the exception of mixed plantation woodland, which is considered to be of significant nature conservation value due to the notable fungi it supports. As such effects to the species rich grassland mosaic within the site would be significant at a County Level, and effects to other habitats within the site would be at a Local Level. Effects to fungi occurring within mixed plantation woodland would be significant at a County value although this is discussed under 'Fungi' below, rather than in this Section.

Some of the habitats, namely buildings and hardstanding within the site and adjacent areas, have been excluded from this assessment due to having less than local value for nature conservation.

The proposed construction and operation of the glass manufacturing facility have the potential to affect habitats via the following pathways and mechanisms: Habitat loss and habitat degradation.

The extent of habitat loss within the proposed development footprint is detailed in Table 7.14 below. The total habitat loss is estimated to be 15.82 ha of habitat areas, and 280 m of linear habitats. This includes 5.88 ha of County value habitats and 9.94 ha / 280 m of Local value habitats.

Species poor marshy grassland in the eastern fields (east of the watercourse running through the site,) which is to be lost (circa 2 ha), although species poor with limited ecological value, is considered likely to support deep peat (as indicated by NVC surveys). The extent of deep peat would need to be confirmed (further to ground investigation surveys) and impacts to these habitats would need to be assessed, due to the value of peat in a national context, and relevant planning policy.

The design has been amended to reduce the development footprint in this area of likely deep peat, as much as possible, and the area to the east of the development (circa 3.45 ha) will be retained and enhanced through long term protection and sympathetic management. This will be achieved through the blocking of drains and reinstating management of sphagnum mosses, with the aim to create a more diverse/species rich habitat.

The majority of habitats of Local value (including conifer plantation and scrub) will also be lost as a result of the development (circa 9.94 ha and 280 m, respectively), with the exception of the stream running through the site, and its marginal habitats (bankside habitats with scattered trees and shrubs) and also scattered trees which exist along the southern periphery of the site. In addition, as discussed above species poor marshy grassland will be retained to the east of the development.

As detailed in Section 7.9 the landscaping design proposals includes the enhancement of retained habitats which occur adjacent to the proposed development including species poor marshy grassland, stream corridor and tree lines (circa 4.97 ha), and the creation of species rich habitats around the periphery of the site (circa 5.39 ha). including woodland, grassland, wetland in addition to small areas of amenity planting. Any planting will utilise local, native species of local provenance which are also drought tolerant and avoiding species at risk of prevalent disease; e.g. ash die-back, Phytophthera, etc.

With the implementation of appropriate landscaping post construction, a large proportion of these local habitats lost from the site will be recreated on site (including woodland, waterbodies and species rich grassland). It is acknowledged that some of the existing habitats which are being lost, are also largely species poor including conifer plantation and ephemeral waterbodies; and therefore the replacement habitats will be of greater value for biodiversity since they comprise

species rich native woodland (with areas of wet woodland) and a mix of permanent and ephemeral waterbodies.

Additionally, enhancements to existing retained grassland habitat to create a more species rich habitat (marshy grassland), which will have significantly higher value that the existing grassland for biodiversity. It is therefore considered that the proposed mitigation during construction will mitigate/compensate for the loss of Local value habitats at least.

With the implementation of the construction mitigation there would be no significant effects on locally valued habitats as a result of habitat loss.

In terms of habitats of nature conservation value, circa 5.88 ha of species rich ungrazed marshy grassland and open mosaic grassland (including short perennial vegetation) will be lost as a result of the development. There will be post construction landscaping which will enhance and create habitats within the site, although, as discussed above, this is considered as mitigation for the loss of locally valued habitats. There is no additional land within the site which could accommodate the creation of species rich grassland as mitigation/compensation for the loss of the species rich marshy grassland and open mosaic grassland.

With the implementation of the construction mitigation there would be significant adverse effects on habitats of County value as a result of habitat loss.

Additional effects of habitats loss on habitats of County value, will need to be mitigated/compensated for. It is acknowledged that it will not be possible to mitigate for the loss of all habitats of higher value within the Site and therefore off-site compensation will also need to be secured. This will comprise the enhancement of species rich grassland habitats where they exist on other sites; for example, through long-term management. It is noted that there is also a requirement for biodiversity enhancements (refer to Legislation and policy, Appendix D1) which is likely to be delivered off-site also. As such enhancements are also discussed further in detail in Section 7.11.3.

The long-term management and monitoring of created and retained habitats on and off-site, will be crucial to ensure their value for biodiversity is protected and enhanced.

Table 7.14: Extent of Habitat lost, created and retained/enhanced

Phase 1 Habitat Type (and value)	Area / length within planning boundary	Area / length to be lost to proposed development	Habitat as defined in the Masterplan	Habitats to be retained	Area / length created	Net habitat gain (and percentage change)	Retained habitats to be enhanced through management
Conifer plantation (local)	3.42 ha	3.42 ha - less if some trees retained during construction	Scattered trees along the stream and site's southern periphery	0 ha	0 ha	-3.42 ha (100% decrease)	0 ha
Mixed plantation woodland (Local)	1.46 ha	1.46 ha – less if some trees retained during construction	New broadleaved woodland and wet woodland planting. These will supplement retained scattered trees along the stream and site's southern periphery	0 ha	1.66 ha (woodland) and 0.12 ha (wet woodland) = 1.78 ha	+0.32 ha (22 % increase)	0 ha
Dense/continuous scrub (local)	1.3 ha	1.3 ha	NA – no replacement proposed	0 ha	0 ha	-1.3 ha (100% decrease)	0 ha

Phase 1 Habitat Type (and value)	Area / length within planning boundary	Area / length to be lost to proposed development	Habitat as defined in the Masterplan	Habitats to be retained	Area / length created	Net habitat gain (and percentage change)	Retained habitats to be enhanced through management
Semi-improved acid grassland (county)	2.99 ha	2.99 ha	Species rich grassland	0 ha	3.22 ha	+0.23 ha (7.70% decrease)	0 ha
Marshy grassland - species rich (county)	2.73 ha	2.73 ha	Lost from site	0 ha	0 ha	-2.73 ha (100% decrease)	0 ha
Marshy grassland - species poor (local)	5.45 ha	2 ha (location of new road and ponds)	Species rich marshy grassland	3.45 ha	0 ha	- 2 ha (36.69% decrease)	3.45 ha (to species rich marshy grassland)
Ephemeral/short perennial vegetation (county)	0.16 ha	0.16 ha	Lost from site - no replacement proposed	0 ha	0 ha	-0.16 ha (100% decrease)	0 ha
Line of mixed scattered trees (local)	1.37 ha	0	NA – no replacement proposed	1.37 ha	0 ha	0 ha (none lost, retained in site)	1.37 ha
Scattered scrub (local)	1.17 ha[108]	1.17 ha	NA – no replacement proposed	0 ha	0 ha	-1.17 ha (100% decrease)	0 ha

[108] Habitat areas and lengths have generally been calculated using data from the Extended Phase 1 Habitat survey (Appendix D2 , and Figure 7.3), and Habitat gains have been calculated from the landscaping plans as shown in the site's Landscaping plan (see DRAGON-ARUP-XXX-XX-DR-A-001201)

Phase 1 Habitat Type (and value)	Area / length within planning boundary	Area / length to be lost to proposed development	Habitat as defined in the Masterplan	Habitats to be retained	Area / length created	Net habitat gain (and percentage change)	Retained habitats to be enhanced through management
Line of scattered scrub (local) and earth bank	236 m	236 m	NA – no replacement proposed		0 ha	-236 m (100% decrease)	0 ha
Main Stream (G2) (local)	0.15 ha		Stream / watercourse	0.15 ha	0 ha	0 ha (none lost, retained in site)	0 ha
Standing water – ditches and ephemeral waterbodies (local)	812 m (c. 0.16 ha)	812 m (c. 0.16 ha)	SuDS ponds	0 ha	0.30 ha	+0.14 ha (87.5% increase)	0 ha
Acid/neutral flush (local)	44 m	44 m	Acid/neutral flush	0 ha	0 m	-44 m ha (100% decrease)	0 ha
Building and hardstanding	0.43 ha	0.43 ha	Building and hardstanding	0 ha	11.33 ha	+10.9 ha (2584% increase)	0 ha
Amenity planting – none currently on site	0 ha	0 ha	Amenity planting and rain garden	0 ha	0.09 ha	+0.09 (100% increase)	0 ha
Sub total	20.79 / 280 m	15.82 ha lost (5.88 ha County habitats and 9.94 ha / 280 m Local habitats)		4.97 ha retained	11.33 ha buildings and 5.39 ha species rich landscaped habitats = 16.72 ha of new habitats within the site	+11.68 ha (+10.9 buildings/hardstanding) / -3.46 ha / -280 m.	4.82 ha retained and enhanced

Changes in ground and surface water quality could occur during construction as a result of pollution events or surface run-off with a high sediment load. Water quantity, i.e. flow, could also be affected, particularly groundwater, as a result of dewatering activities during construction. Habitats in hydrological connectivity such as the River Ebbw, and groundwater dependant terrestrial ecosystems including the marshy grassland in the eastern part of the site (as described in the Chapter 15: Water) would be sensitive to these changes. The implementation of good practice pollution control measures during construction, as detailed in Section 7.8, would ensure that there would pollution events or surface run off would be managed, and adverse effects to surface water and or groundwater would be avoided. Potential effects on groundwater flows/levels could occur during dewatering activities, which are considered likely to be required during the construction of basements. Any groundwater which is removed would however be discharged into the Ebbw River catchment, and therefore there would be no effects to this river catchment. There is the potential for temporary effects on the adjacent marshy grassland, as a GWDTE as a result of dewatering. This potential impact would be mitigated for through the implementation of best practice during construction as detailed in Section 7.8, and within Chapter 15: Water.

As described in Section 7.8, good practice will be outlined in the CEMP and will include measures to prevent pollution events or surface run-off with a high sediment load, and to manage dewatering activities. In addition, details of protection measures for retained habitats such as the use of Heras fencing around marshy grassland, the stream and retained trees will be provided.

Changes in air quality could also occur during construction, and which could result in the deterioration of adjacent terrestrial habitats. Such effects could occur from dust and vehicle emissions. As discussed in Section 7.8, good practice with regard to dust and vehicle emissions will be detailed within a CEMP and implemented on site including dust management measures and traffic management.

With the implementation of the construction mitigation there would be no significant effects as a result of habitat disturbance/degradation on locally valued habitats.

Fungi

Rare and notable fungi have been recorded within habitats on the site, namely broadleaved trees and mixed plantation woodland; and which qualifies this habitat as being of SINC value. The grassland and scrub habitats and majority of mixed plantation woodland were found to support a low diversity of widespread fungi species.

Potential effects to notable fungi, could occur in the form of habitat loss and disturbance. Any effects to habitats of SINC value, i.e. mixed plantation woodland, would be significant at a County Level, and effects to remaining habitats within the site would be at a Local Level.

To facilitate construction the majority of habitats within the site will be cleared which includes the majority of the mixed plantation woodland (circa 1.46 ha) and therefore associated notable fungi.

It is acknowledged that a number of trees will be retained within the southern periphery of the site and along the stream corridor. Where possible a preference will be made to retain broadleaved species, which support notable fungi or which have the potential to support such species.

As described in Section 7.8, specific measures will be implemented to protect some of the notable fungi within the site, which are associated with broadleaved trees/woodland. Dead willow which is associated with the Hypocrea fungi will be moved to nearby woodland (Parc Bryn Bach and Sirhowy woodland) with a suitable microclimate; and, a proportion of the trunks and larger branches will also be stacked within the same off site woodland including with some trunks being left in open locations and others in shade to enable a range of fungi communities to develop.

The clearance of the majority of woodland is still considered likely to result in the loss of some notable fungi species although the translocation of willow and other broadleaved tree branches, to suitable woodland off-site in addition to retention a number of broadleaved trees, will ensure the protection of some of the notable fungi species.

With the implementation of the construction mitigation it considered that there would be a potential significant adverse effect on fungi habitats of County value as a result of habitat loss.

Management of off-site woodlands and retained/created woodlands within the site will be required to ensure that they provide favourable conditions for retained and translocated fungi species; and encourage the establishment of diverse communities.

Suitable fungi habitats which are retained within the site could also be disturbed or degraded during construction for example as a result of pollution events or surface run-off with high sediment load, and physical disturbance from construction machinery. There is also the potential for fungi within retained habitats to be adversely affected by changes in air quality during construction through dust and vehicle emissions.

As described in Section 7.8, good practice will be outlined in the CEMP and will include measures to prevent pollution events or surface run-off with a high sediment load. Management measures to minimise dust and vehicle emissions will also be detailed within the CEMP, and protection measures for retained habitats such as the use of Heras fencing around retained broadleaved trees.

With the implementation of the construction mitigation there would be no significant effects on fungi habitats of County value as a result of habitat disturbance/degradation.

Invertebrates

The grassland habitats within the site have been found to support a number of notable invertebrate species, including dingy skipper and a P. parvicornis (rove beetle sp). Small heath butterfly and cinnabar moth were also recorded within grassland habitats, although these are not considered to be rare locally/regionally. Furthermore, these species are considered to form part of larger, local populations since the associated habitats occur within adjacent areas and the local landscape.

Potential effects to invertebrates could occur in the form of habitat loss and disturbance/degradation. Any effects would be significant at a Local Level.

Clearance of the majority of habitats within the project boundary will be required to facilitate construction. This comprises a mosaic of species rich grassland and marshy grassland with scattered and dense scrub habitats which are likely to support the notable species noted above. The approximate extent of habitat loss totals circa 7.88 ha, with 5.88 ha being most suitable for notable species. Circa 3.45 ha of marshy grassland to the east of the stream will be retained and subject to long term management which will enhance its suitability for invertebrate species (including P. parvicornis). Additionally, landscaping of the site will comprise the creation of new species rich habitats including grassland (3.22 ha), which will also be suitable for a number of invertebrates post construction, including notable species such as dingy skipper, small heath butterfly and cinnabar moth.

With the implementation of the construction mitigation there would be no significant effects on locally valued invertebrates as a result of habitat loss.

Management of retained and newly created habitats will be required to ensure the that they provide favourable conditions for invertebrates including notable species currently present within the site.

Retained habitats could also be disturbed or degraded during construction for example as a result of pollution events or surface run-off with high sediment load. There is also the potential for invertebrate habitats adjacent to the proposed development to be adversely affected by changes in air quality during construction through dust and vehicle emissions, and that retained habitats could by physically disturbed for example by machinery.

As described in Section 7.8, good practice will be outlined in the CEMP and will include measures to prevent pollution events or surface run-off with a high sediment load. Management measures to minimise dust and vehicle emissions will also be detailed within the CEMP, and protection measures for retained habitats such as the use of Heras fencing around retained marshy grassland.

With the implementation of the construction mitigation there would be no significant effects on locally valued invertebrates as a result of habitat disturbance/degradation.

Amphibians

No great crested newts have been recorded within the site through presence/absence surveys, although a positive eDNA result was returned for one of the waterbodies (which may be subject to a contaminated sample). This considered the presence of this species within the site is considered very unlikely. Nevertheless, a precautionary approach will be followed to ensure that should any great crested newts be present within the site they will be discovered and appropriately mitigated for; in addition to ensuring that there are no breaches of UK legislation. As such, a small population of great crested newts within the site has been assumed for the purposes of this assessment.

Palmate newt have been recorded within the site, and were considered likely to be breeding; although its noted that this species is common and widespread. Additionally, suitable habitats were limited to small areas of ephemeral waterbodies. Suitable habitats also exist within the site for common amphibians including common frog and common toad; which are common and widespread in Wales. Common toad and common frog are however listed as a Section 7 species due to a decline in their numbers in Wales.

Potential effects to amphibians could occur in the form of habitat loss and disturbance/degradation, harm and mortality. Any effects would be significant at a Local Level. Any such effects on great crested newts would also result in breaches of UK legislation.

The mosaic of species rich acid grassland and marshy grassland will be lost from the site, standing water (ephemeral ponds), mixed plantation woodland and areas of dense scrub. The approximate extent of habitat loss totals 12.24 ha; with 0.16 ha standing water/breeding habitat and 12.08 ha terrestrial habitats.

Landscaping of the site will comprise the creation of new species rich habitats (circa 5.39 ha) including grassland, waterbodies and tree planting, which will also be suitable for amphibian's post construction. 0.3 ha of open water will be created (an increase of 87.5%) which will include four waterbodies. These new waterbodies will comprise a mix of temporary and permanent waterbodies, designed with GCN and other amphibians in mind. The SuDS/drainage waterbodies, will be approximately 0.22 ha in extent, and are likely to be ephemeral and only support water for some of the year due to their drainage functions.

One waterbody, which will be approximately 0.008 ha / 80m^2, will not have any drainage functions and will therefore have water permanently. All waterbodies will be at least 1m deep at the centre, with gently sloping edges. They will be not be stocked with fish. These waterbodies will stand in areas of grassland and woodland. Three of the waterbodies will be planted with a range of native plant species, but the one pond provided for amphibians will not be planted and allowed to colonise naturally.

It is therefore anticipated that new waterbodies would provide more optimal habitat for common breeding amphibians than the existing habitats present within the site. The remaining 5.09 ha of terrestrial habitats are also likely to be more suitable for use by amphibians during their terrestrial life stages, for example

woodland will comprise a mix of dry and wet woodland, with native broadleaved species. This woodland habitat compared to the existing conifer and mixed woodland plantation would provide more opportunities for foraging and hibernation to amphibians.

Circa 3.45 ha of species-poor marshy grassland to the east of the stream will be retained, in addition to the stream and a number of scattered trees along the stream and the southern periphery of the site. The existing species poor marshy grassland in the eastern part of the site will be subject to management to enhance its condition and encourage the establishment of a range of flora and fauna including amphibians. In addition, as detailed above in embedded construction mitigation, a number of refugia/hibernacula will be created within this area which will also provide habitat for great crested newts and common amphibians within the site.

Furthermore, where continuity of habitat corridors is breached by the new road which runs around the eastern periphery of the buildings, connectivity of great crested newt habitats will be maintained by means of subsurface newt underpasses. The underpasses will be supplemented by permanent newt-fences to direct any commuting newts into the underpass entrances and/or to prevent them wandering onto the roads and other inimical hard surfaces.

As such newly created and enhanced retained habitats will be in a more favourable condition for great crested newts and amphibians and should support similar numbers to those currently present within the site. Additionally, they will provide connecting habitats around the site, for foraging, sheltering and hibernating amphibians.

Management of retained and newly created habitats will be required to ensure the that they provide favourable conditions for amphibians currently present within the site.

With the implementation of the construction mitigation there would be no significant effects on locally valued amphibians as a result of habitat loss or fragmentation.

Amphibians habitats, which are retained on the site during construction, could also be disturbed or degraded for example as a result of pollution events or surface run-off with high sediment load. There is also the potential for amphibian habitats adjacent to the proposed development to be adversely affected by changes in air quality during construction through dust and vehicle emissions, and that retained habitats could by physically disturbed for example by machinery.

As described in Section 7.8, good practice will be outlined in the CEMP and will include measures to prevent pollution events or surface run-off with a high sediment load. Management measures to minimise dust and vehicle emissions will also be detailed within the CEMP, and protection measures for retained habitats such as the use of Heras fencing around retained marshy grassland.

With the implementation of the construction mitigation there would be no significant effects on locally valued amphibians as a result of habitat disturbance/degradation.

There is the potential for harm and or mortality to amphibians as a result of vegetation clearance and construction activities, and also if any waterbodies need to be drawn down.

As described in Section 7.8, a trapping and relocation programme alongside destructive searching and sensitive draining of waterbodies will be implemented prior to site clearance, and which will be overseen by a licensed ecologist. Any great crested newts which are collected in refugia, pitfall traps or bottle traps will be relocated to the receptor habitat which will be the retained adjacent marshy grassland.

With the implementation of the construction mitigation there would be no significant residual on local valued amphibians as a result of harm and mortality.

Reptiles

Grassland and scrub habitats within the site have been found to support a breeding population of common lizard, and peak numbers recorded indicate that at least a 'good' population size is present. In addition, there are records of adder at the nearby Carno reservoir, indicating this species may also be present within the site due to the presence of suitable habitats.

Potential effects to reptiles could occur in the form of habitat loss and disturbance, harm and mortality. Any effects would be significant at a County Level, in addition there is the potential for harm and mortality to reptiles to result in breaches of UK legislation.

Clearance of the majority of habitats within the project boundary will be required to facilitate construction. This comprises a mosaic of species rich grassland and marshy grassland and dense scrub habitats, which support common lizard, and which have the potential to support adder. The approximate extent of habitat loss totals circa 9.18 ha.

Reptile habitats which will be retained within the Project boundary comprise the species-poor marshy grassland to the east of the watercourse (Circa 3.45) which runs through the site, in addition to scattered trees around the site's periphery (circa 1.37 ha). This area of marshy grassland (circa 3.45 ha) will be subject to long-term management to enhance its condition and its value to reptiles. Additionally, specific mitigation will be implemented in the area to enhance its suitability for reptiles, including the creation of a number of reptile refugia/hibernacula (as described in Section 7.8). This will increase the carrying capacity of this receptor site. Post construction landscaping of the site will comprise the creation of new species rich habitats (circa. 5.39 ha) including grassland, waterbodies and tree planting, which will also be suitable for reptile's, and is likely that reptiles would readily use these newly created habitats.

As such newly created and enhanced retained habitats will be in a more favourable condition for reptiles and should support similar numbers to those currently present within the site.

With the implementation of the construction mitigation there would be no significant effects on county valued reptiles as a result of habitat loss.

Management and monitoring will be required of retained and newly created habitats provide favourable conditions for reptile populations species.

Reptile habitats, which are retained on the site during construction, could also be disturbed or degraded for example as a result of pollution events or surface run-off with high sediment load. There is also the potential for reptile habitats adjacent to the proposed development to be adversely affected by changes in air quality during construction through dust and vehicle emissions, and that retained habitats could by physically disturbed for example by machinery.

As described in Section 7.8, good practice will be outlined in the CEMP and will include measures to prevent pollution events or surface run-off with a high sediment load. Management measures to minimise dust and vehicle emissions will also be detailed within the CEMP, and protection measures for retained habitats such as the use of Heras fencing around retained marshy grassland.

With the implementation of the construction mitigation there would be no significant effects on county valued reptiles as a result of habitat disturbance/degradation.

There is the potential for harm and or mortality to reptiles as a result of vegetation clearance and construction activities, which would result in a breaches of UK legislation.

As described in Section 7.8, a reptile trapping and relocation programme will be implemented prior to site clearance and construction, relocating any reptiles to retained and enhanced marshy grassland east of the main stream, which runs through the site (circa 3.45 ha). Destructive searching will then follow trapping and relocation. All trapping, relocation, destructive searching and vegetation clearance will be overseen by a suitably qualified ecologist. Reptile refugia and hibernacula will also be provided in the area of retained marshy grassland to enhance the habitats carrying capacity for reptiles.

Fencing will be retained around the perimeter of the construction site, and construction area maintained in a condition which is unfavourable to reptiles, to ensure that they are unlikely to occur on the site during construction.

With the implementation of the construction mitigation there would be no significant effects on county valued reptiles as a result of harm and mortality.

Breeding Birds

A range of bird species have been recorded within the site. Key species, i.e. Section 7 species, are set out in the Table 7.13 above, including the number of territories recorded, and associated habitats. Although these species are listed as notable species, they are also acknowledged to be common and widespread within the local area.

Potential effects including habitat loss and degradation, harm and mortality and disturbance are considered to be significant at a Local Level, in addition there is the potential for harm and mortality of nesting birds as well as the destruction of nests, to result in breaches of UK legislation.

The clearance of the majority of habitats within the site, including scrub, scattered trees and mixed woodland, will result in the loss of nesting habitat for the above species. Suitable habitats lost from the site totals circa 8.72 ha.

Circa 3.45 ha of species-poor marshy grassland to the east of the stream will be retained, in addition to a number of scattered trees along the stream and the southern periphery of the site (circa 1.37 ha). The existing species poor marshy grassland in the eastern part of the site will be subject to management to enhance its condition and encourage the establishment of a range of flora and fauna including breeding birds.

There are potential losses of breeding habitat during construction until the site is landscaped. Newly installed bird boxes on retained trees within the site, and adjacent habitats will provide additional nesting habitat during construction. It is also noted that suitable habitats for breeding birds surround the site, and which could be used during construction.

As described in Section 7.9, landscaping will provide new habitats within the site around the proposed development (circa 5.39 ha). These will comprise a mosaic of species rich grassland, native shrubs and woodland. Landscaping will also include SuDS which will provide new waterbodies which will be established with native planting. Newly created habitats are likely to be rapidly utilised by birds within the site and local area including notable species, for breeding as well as foraging/shelter.

The provision of species rich grassland, shrubs and woodland will benefit all of the key bird species recorded within the site. The creation of broadleaved woodland to replace conifer woodland is likely to support a larger population of breeding birds currently present in the site and newly created permanent waterbodies may also support new species not previously recorded within the site such as reed bunting and other waterbirds. Furthermore, the marshy grassland which will be enhanced through management is likely to be more favourable to breeding birds such as lapwing and snipe.

With the implementation of the construction mitigation there would be no significant effects on local valued breeding bird populations as a result of habitat loss.

Management of retained and newly created habitats will be required to ensure the that they provide favourable conditions for breeding birds currently present within the site.

Breeding bird habitats could also be disturbed or degraded during construction for example as a result of pollution events or surface run-off with high sediment load. There is also the potential for breeding bird habitats adjacent to the proposed development to be adversely affected by changes in air quality during construction through dust and vehicle emissions, and that retained habitats could by physically disturbed for example by machinery.

As described in Section 7.8, good practice will be outlined in the CEMP and will include measures to prevent pollution events or surface run-off with a high sediment load. Management measures to minimise dust and vehicle emissions will

also be detailed within the CEMP, and protection measures for retained habitats such as the use of Heras fencing around retained marshy grassland and trees.

With the implementation of the construction mitigation there would be no significant effects on local valued breeding bird populations as a result of habitat disturbance/degradation.

Vegetation clearance and construction activities have the potential to result in the incidental injuring and killing of birds, and or destruction of nests and eggs, particularly if they occur during the breeding season (March to August), and therefore result in breaches of UK legislation. Additionally, there is the potential for breeding birds to collide with construction traffic.

As described in Section 7.8, and detailed within the outline CEMP, vegetation clearance will be undertaken sensitively to avoid harm/mortality to nesting birds, with clearance being undertaken outside of the nesting season where possible or employing a suitably qualified ecologist to undertake nesting bird checks of any areas to be cleared. Where any nesting birds are identified these will be protected from disturbance until all nesting has been completed. A traffic management plan will also limit speeds of construction vehicles on the site, reducing the risk of collision with breeding birds.

With the implementation of the construction mitigation there would be no significant effects on local valued breeding birds as a result of harm and mortality.

Construction activities may result in disturbance to breeding birds within retained habitats for example through artificial lighting if this is required or noise from construction machinery. No evidence of breeding Schedule 1 bird species (afforded protection from disturbance under UK legislation) has been found within or adjacent to the site, and therefore any disturbances would not result in breaches of UK legislation. As described in Section 7.8, good practice will be outlined in the CEMP and will include details of sensitive task lighting, during the breeding bird season, which is directional and avoids/minimises light spill onto retained habitats suitable for breeding birds i.e. retained marshy grassland in the eastern part of the site and retained trees along the stream and southern part of the site.

With the implementation of the construction mitigation there would be no significant effects on local valued breeding birds as a result of disturbance.

Badger

Four potential badger setts have been recorded within the site, with two setts being assessed as active, outlier setts. A badger hair was found at the entrance of sett three (one of the two potential active setts). Further monitoring found no signs of badger using the two active setts, supporting the assessment that these setts are likely to be outlier setts and used infrequently. As such the grassland and scrub habitats are also likely to be used by foraging/commuting badger, although similarly to the occupation of setts within the site, this activity is likely to be infrequent also.

Potential effects to badger could occur in the form of habitat loss and disturbance, habitat fragmentation, disturbance, harm and mortality. Any effects would be significant at a Less than Local Level, and therefore don't necessarily warrant inclusion in this assessment however there is the potential for harm and mortality to badger and disturbance/damage to setts and or badgers which would result in breaches of UK legislation. As such, potential disturbance impacts to badgers and badger setts are discussed below.

Clearance of the majority of habitats within the project boundary will be required to facilitate construction, including woodland, grassland and scrub habitats, which are likely to be used infrequently by foraging/commuting badger. Additionally, all four setts including two likely active outlier setts, and two disused setts, will be lost from the woodland, as a result of the required site clearance activities.

Landscaping of the site will comprise the creation of new species rich habitats (circa 5.39 ha) including grassland, waterbodies and tree planting, which will also be suitable for foraging badgers post construction, and potentially sett construction. The retained marshy grassland (3.45 ha), east of the main stream running through the site, will be enhanced post construction through long term management and will also provide additional foraging habitat for badgers within the site.

With the implementation of the construction mitigation there would be no significant effects on less than local valued badger as a result of habitat loss.

Badger habitats could also be disturbed or degraded during construction for example as a result of pollution events or surface run-off with high sediment load. There is also the potential for badger habitats adjacent to the proposed development to be adversely affected by changes in air quality during construction through dust and vehicle emissions, and that retained habitats could by physically disturbed for example by machinery.

As described in Section 7.8, good practice will be outlined in the CEMP and will include measures to prevent pollution events or surface run-off with a high sediment load. Management measures to minimise dust and vehicle emissions will also be detailed within the CEMP, and protection measures for retained habitats such as the use of Heras fencing around retained marshy grassland.

With the implementation of the construction mitigation there would be no significant effects on less than local valued badgers as a result of habitat disturbance/degradation.

There is the potential for harm and or mortality to badger as a result of vegetation clearance and construction activities, including the destruction of setts; which would result in a breach of UK legislation. This could result in the injury/mortality of any occupying badger. Additionally, there is the potential for injury/mortality to badger as a result of entrapment within open excavations, if travelling through the site, and or collision with vehicle traffic. As previously discussed, the likely occurrence of foraging/commuting badger within the site is limited, and likely to be infrequent; and, as such the potential for harm/injury is also low.

As described in Section 7.8, potential badger setts will be closed under licence from NRW, to ensure that no badgers are present within setts during site clearance; thereby avoiding harm and or mortality of this species.

In addition, good practice will be outlined in the CEMP and will include ensure that open excavations are covered at night-time or provided with ramps suitable for badger; and there will be limitations on vehicle traffic speeds within the site.

With the implementation of the construction mitigation there would be no significant effects less than local valued badgers as a result of harm and mortality.

Construction activities may result in disturbance to badger for example through artificial lighting if works require task lighting and noise from construction machinery. As previously discussed, the likely occurrence of foraging/commuting badger within the site is limited, and likely to be infrequent; and, as such the potential for disturbance to badger is also low.

As described in Section 7.8, good practice will be outlined in the CEMP and will include details of sensitive task lighting, which is directional and avoids/minimises light spill onto retained habitats suitable for foraging badger i.e. retained marshy grassland in the eastern part of the site. Furthermore, any active setts will be closed under licence and therefore there will be no badgers using any of the setts on site during construction.

With the implementation of the construction mitigation there would be no significant effects on less than local valued badgers as a result of disturbance.

Otter

No otter resting or breeding places have been recorded within the site, or within adjacent habitats; and no signs of otter activity were recorded during surveys. It is considered possible that that otter may use the site, although it is likely to be infrequent and that this would be limited to foraging and commuting. The nearby Carno reservoir and adjoining River Ebbw to the east/south east (circa 200 m) is considered likely to be provide key habitat for otter within the local area.

Potential effects to otter, could occur in the form of habitat loss and disturbance, habitat fragmentation, disturbance to species, harm and mortality. Any effects would be significant at a Less than Local Level, and therefore don’t necessarily warrant inclusion in this assessment however there is the potential for impacts to otter and their habitat which would result in breaches of UK legislation. As such, potential disturbance impacts to otter are discussed below.

Clearance of the majority of habitats within the project boundary will be required to facilitate construction. This comprises a mosaic of species rich grassland, marshy grassland, scrub, ephemeral waterbodies and ditches, and plantation woodland/trees. As detailed above, these habitats are not considered to be suitable for breeding/resting otter and are unlikely to be used by foraging/commuting otter.

The main stream running through the site (Waterbody 5, Appendix D9), circa 0.15 ha in length, will be retained, in addition to a watercourse (Waterbody 2,

Appendix D9) and attenuation lagoon (Waterbody 3, Appendix D9), which occur outside of the project boundary.

As described in Section 7.9, the main stream running through the site will be retained, and enhanced by re-planting native trees and scrub along the existing bank therefore providing shelter to any foraging/commuting otter within the area. Mixed plantation woodland lost during construction will be re-planted along the southern periphery of the site and enhanced by using a native mix of broadleaved trees and shrubs. These habitats will provide habitat to any foraging/commuting otter within the site, and potentially resting/breeding otter; although it is likely that similar to the existing baseline situation, the site will provide sub optimum habitat for otter compared to those available in the nearby Carno reservoir and connecting Ebbw River. Attenuation lagoons will also be created as part of the site's SuDS design, which will provide a permanent waterbody for any foraging otter should they visit the site. These new and enhanced habitats will be established post construction, and as such there is the potential for effects on otter during the period of construction, as a result of habitat loss; however, as previously described otter are considered unlikely to occur within the site, and any occurrence is likely to be infrequent.

With the implementation of the construction mitigation there would be no significant effects on less than local valued otter as a result of habitat loss during construction.

Hydrologically connected habitats such as the Carno reservoir and River Ebbw, could be affected by changes in water quality and quantity during construction. It is possible that otter habitats could by physically disturbed for example by machinery, during construction in addition to being adversely affected by changes in air quality during construction through dust and vehicle emissions. As previously discussed, the likely occurrence of foraging/commuting otter within the site is limited, and likely to be infrequent; and, as such the potential for effects from habitat disturbance is also low. Potential changes to water quality/quantity which could affect the Carno reservoir and River Ebbw could have a more significant effect on otter – since they are known to occur in these wetland habitats.

As described in Section 7.8, good practice will be outlined in the CEMP and will include measures to prevent pollution events or surface run-off with a high sediment load. In addition, dewatering activities will be managed to ensure groundwater levels are maintained. As such no effect to connecting aquatic habitats such as the Carno Reservoir or Ebbw River are considered likely.

Retained habitats such as the stream within the site will be protected from incidental damage during construction through the use of Heras fencing and potential changes in air quality will be avoided/minimised by dust management and traffic management. These measures will be set out in the CEMP.

With the implementation of the construction mitigation there would be no significant effects on less than local valued otter as a result of habitat disturbance/degradation.

No effects to otter are anticipated as a result of habitat fragmentation, since habitats within the site are only considered likely to support otter infrequently; and, habitats within the site are not well connected to other suitable habitats for otter in the wider area for example the main stream running through the site is culverted below the A465, with the A465 providing a barrier to otter movement, and west of the site supports the Rassau Industrial Estate.

There is the potential for harm and or mortality, should otter be present within the site during construction, as a result of open excavations, which could trap and injure animals. Additionally, there is the potential for animals to collide with construction vehicular traffic. As previously discussed, the likely occurrence of foraging/commuting otter within the site is limited, and likely to be infrequent; and, as such the potential for harm/injury is also low.

As described in Section 7.8, good practice will be outlined in the CEMP and will include ensure that open excavations are covered at night-time or provided with ramps suitable for otter; and there will be limitations on vehicle traffic speeds within the site.

With the implementation of the construction mitigation there would be no significant effects on less than local valued otter as a result of harm and mortality during construction.

Construction activities may result in disturbance to otters for example through artificial lighting if works require task lighting and noise. As previously discussed, the likely occurrence of foraging/commuting otter within the site is limited, and likely to be infrequent; and, as such the potential for disturbance to otter is also low.

As described in Section 7.8, good practice will be outlined in the CEMP and will include details of sensitive task lighting, which is directional and avoids/minimises light spill onto retained habitats suitable for otter i.e. retained watercourse running through the centre of the site.

With the implementation of the construction mitigation there would be no significant effects on less than local valued otter as a result of disturbance during construction.

Bats (not associated with Internationally and Nationally designated sites)

No structures or buildings are present within the site which could support bat roosts. Two buildings occur to the south of the site (within the Tech-board site), which support a number of bat roosts of different species including small numbers of common pipistrelle, lesser horseshoe, brown long-eared and Myotid (likely Daubenton's) bats. Only small numbers of non-breeding male and female bats (of the different species) were recorded during summer months.

One tree with low suitability for roosting bats occurs within the Site, and another occurs in adjacent habitats. In addition, one tree in adjacent habitats was found to support a number of bat boxes including a maternity roost box.

Varying levels of bat foraging activity were recorded at locations monitored within the site, by bat species known to be roosting within the site in addition to other species including noctule and soprano pipistrelle. Highest levels of bat activity were recorded during the between spring and summer and tailing off in autumn. The most abundantly recorded species was common pipistrelle bats. Low numbers of lesser horseshoe bats were also recorded. Foraging activity was concentrated around the plantation woodland on and adjacent to the site.

Any impacts to bats would be significant at a Local Level, in addition there is the potential for harm and disturbance to bats and their roosts to result in breaches of UK legislation.

Potential effects to roosting and foraging/commuting bats could occur in the form of habitat loss, habitat fragmentation, habitat disturbance/degradation, harm and mortality, and disturbance of bats.

Clearance of the majority of habitats within the project boundary will be required to facilitate construction, including woodland, grassland and scrub habitats. The main stream running through the site will be retained, along with trees along the stream and in the southern part of the site. In addition, the majority of marshy grassland to the east of the site will be retained.

As described in Section 7.9, the main stream running through the site will be retained, and enhanced by re-planting native trees and scrub along the banks, therefore providing continued habitat to any foraging/commuting bats within the area. Mixed plantation woodland lost during construction will be re-planted along the southern periphery of the site and enhanced by using a native mix of broadleaved trees and shrubs. These habitats will provide habitat to any foraging/commuting bats within the site, and as trees mature they are also likely to provide roosting opportunities for bats; therefore, supporting a higher number of roosting bats than are currently present within the site.

Landscaping design will comprise suitable planting along the site's southern periphery, which provides connectivity between existing planting to the south of the Rassau Industrial Estate and along the A465 - to the wider landscape in the east, including Usk Bat Site SAC and Mynydd Llangatwyg SSSI, and other SSSIs within 10 km.

As described in Section 7.9, key commuting and foraging routes for bats, including plantation woodland along the southern peripheries of the site, and along the main stream running through the site, will be retained during construction and enhanced post construction with additional woodland planting.

With the implementation of the construction mitigation there would be no significant effects on locally valued bats as a result of habitat loss and fragmentation.

Management of retained and newly created habitats will be required to ensure the that they provide favourable conditions for bat species currently present within the site.

Suitable habitats for foraging/commuting bast could also be disturbed or degraded during construction for example as a result of pollution events or surface run-off

with high sediment load. There is also the potential for bat habitats adjacent to the proposed development to be adversely affected by changes in air quality during construction through dust and vehicle emissions, and that retained habitats could by physically disturbed for example by machinery.

As described in Section 7.8, good practice will be outlined in the CEMP and will include measures to prevent pollution events or surface run-off with a high sediment load. Management measures to minimise dust and vehicle emissions will also be detailed within the CEMP, and protection measures for retained habitats such as the use of Heras fencing around retained marshy grassland and trees.

With the implementation of the construction mitigation, it considered that there would be no significant effects on locally valued bats as a result of habitat disturbance/degradation during construction.

Roosting bats would be subject to an increased risk of mortality during construction activities namely vegetation clearance which is likely to be required prior to/during construction. No bat roosts will be lost as a result of the construction activities although it is acknowledged that trees within the site could become suitable for roosting bats by the time construction activities commence. As described in Section 7.8, pre-construction surveys will be undertaken to ensure that any new potential bat roosts are identified, and roosting activity confirmed. Where any roosts are identified which will be lost as a result of site clearance, a licence will be obtained from NRW and the appropriate mitigation implemented.

With the implementation of the construction mitigation there would be no significant effects on locally valued bats as a result of harm and mortality.

There is the potential for disturbance to roosting bats, although at >85m, any disturbance effects from noise, lighting, vibration etc. as a result of construction activities, will be buffered by existing planting surrounding the Tech-board site. Furthermore, the Tech-board site is proposed for redevelopment with a compensatory roost being provided to the south west (>300m).

Disturbance to foraging/commuting bats, is considered more likely since retained habitats (which will continue to provide a foraging/commuting corridor through the Site during construction) will be in close proximity to potential disturbances during construction.

As described in Section 7.8, good practice will be outlined in the CEMP and will include details of sensitive task lighting, which is directional and avoids/minimises light spill onto retained habitats suitable for foraging/commuting bats i.e. retained stream running through the centre of the site, trees along the stream and in the southern part of the site, in addition to marshy grassland to the east of the stream.

With the implementation of the construction mitigation there would be no significant residual effects on locally valued bats as a result of disturbance.

Notable Mammals

There is the potential for the site to support notable mammal species, including west European hedgehog, polecat and brown hare. In addition, the site supports common mammals species including fox and rabbit. There are potential effects on these species as a result of habitat loss and disturbance/degradation, and harm and mortality.

Any effects on west European hedgehog, polecat and brown hare are considered to be significant at a Local level. Effects on other common species such as fox and rabbit would be significant at a less than local level. However, all mammals are protected from unintended suffering, and therefore any harm/mortality could result in breaches of UK legislation. As such potential impacts to locally valued and less than locally valued mammals are discussed below.

Clearance of the majority of habitats within the project boundary will be required to facilitate construction, including woodland, grassland and scrub habitats, which are likely to be used by small mammals such as west European hedgehog. The approximate extent of foraging/commuting habitat loss totals 12.24 ha. Additionally, four badger setts will be lost from the woodland, which were also shown to be used by fox.

Landscaping of the site will comprise the creation of new species rich habitats (circa 5.39 ha) including grassland, waterbodies and tree planting, which will also be suitable for a range of notable mammals including west European hedgehog post construction. The retained marshy grassland, east of the main stream running through the site, will be enhanced post construction and will also provide additional foraging habitat for a range of mammals.

With the implementation of the construction mitigation it considered that there would be no significant effects on locally value notable mammals as a result of habitat loss.

Suitable habitats for notable mammals could also be disturbed or degraded during construction for example as a result of pollution events or surface run-off with high sediment load. There is also the potential for these habitats adjacent to the proposed development to be adversely affected by changes in air quality during construction through dust and vehicle emissions, and that retained habitats could by physically disturbed for example by machinery.

As described in Section 7.8, good practice will be outlined in the CEMP and will include measures to prevent pollution events or surface run-off with a high sediment load. Management measures to minimise dust and vehicle emissions will also be detailed within the CEMP, and protection measures for retained habitats such as the use of Heras fencing around retained marshy grassland and trees.

With the implementation of the construction mitigation there would be no significant effects on locally valued notable mammals as a result of habitat disturbance/degradation.

There is the potential for harm and mortality to mammals as a result of entrapment within open excavations and collision with vehicles. In addition, there is the

potential for mammals to be harmed where rabbit burrows or fox dens are destroyed during site clearance.

As described in Section 7.8, setts will be closed under a badger licence from NRW, which will also ensure any other mammals such as foxes using the setts, will not be harmed when these are destroyed during site clearance. Due to the presence of reptiles within the site, the destructive searching will also be undertaken under ecological supervision which will ensure that any other small mammals including rabbits within burrows will be able to escape.

As described in Section 7.8, good practice will be outlined in the CEMP and will include ensure that open excavations are covered at night-time or provided with ramps suitable for small mammals; and there will be limitations on vehicle traffic speeds within the site during construction.

With the implementation of the construction mitigation there would be no significant effects on locally valued notable mammals as a result of harm/mortality.

Construction activities may result in disturbance to mammals for example through artificial lighting if works during winter require task lighting and noise.

As described in Section 7.8, good practice will be outlined in the CEMP and will include details of sensitive task lighting, which is directional and avoids/minimises light spill onto retained habitats suitable for mammals i.e. retained marshy grassland in the eastern part of the site.

With the implementation of the construction mitigation it considered that there would be no significant effects on notable mammals as a result of disturbance.

INNS

The site is known to support Rhododendron and cotoneaster species. These species have the potential to be disturbed during site clearance and construction, and potentially spread from the site. Potential effects from disturbance on INNS may therefore result in breaches of UK legislation which make it an offence to spread them from the site.

As described in Section 7.8, good practice will be outlined in the CEMP including the cleaning of all equipment and footwear, before entering and leaving the site, and specific measures to avoid disturbance or treat these species during construction. The CEMP will also detail how any disturbed rhododendron or cotoneaster will be disposed of, ensuring that it is treated as controlled waste in accordance with the Environmental Protection Act 1990.

With the implementation of the construction mitigation it considered that there would be no significant effects on negative impact of INNS as a result of disturbance.

7.10.1 Assessment of Operational Effects

The assessment of operational effects assumes that landscaping of the site around the proposed development has been completed to create new habitats and enhance existing habitats within the site, and that the these have fully established. It is assumed that these habitats are capable of supporting the range of species present within the local area/adjacent habitats, including those translocated from the area of construction to adjacent retained habitats (such as reptiles), and that the majority of these species will re-inhabit these newly created and enhanced habitats around the proposed development.

Badgers are excluded from this section; due to being a less than locally valued species which is only included in the construction effects section due to the potential breaches of UK legislation relating to disturbance to badgers and their setts.

Internationally and Nationally Designated Sites

Due to the distance of designated sites from the site, potential effects on the nearby SACs, SSSIs and ancient woodland habitats are limited to water quality effects and air quality effects during operation.

None of the Internationally or nationally protected sites are hydrologically connected to the Project area, and therefore there is no pathway for effects from changes in water quality or quantity during operation.

The design has been amended where possible to minimise emissions, for example through the addition of a Selective Catalytic Reduction (SCR) and ammonia removal technology to reduce levels of emissions as much as possible. As a result, potential effects on the majority of Internationally and nationally designated sites as a result of air quality changes during operation have been screened out (Chapter 6: Air Quality). Effects from NH3 are screened out due to being below the 1% threshold. There are potential impacts from NOx and SO2 to Usk bat SAC and Mynydd Llangatwg SSSI, and also Mynydd Llangynidr (in relation to acidity only), since the 1% critical thresholds are exceeded for both of these pollutants. However as discussed below potential effects are considered within a minimum and maximum total deposition ranges.

Total nitrogen deposition at one of the two closest receptor locations in Usk bat SAC and Mynydd Llangatwg SAC is at 1.06% when compared with the lower critical load (5 kg N/ha/yr). This change is therefore a marginal exceedance of the 1% screening threshold. When compared with the higher critical load (10 kg N/ha/yr), total nitrogen deposition is below the 1% threshold. The higher critical load is considered more appropriate due to higher levels of precipitation at this location[109], which would limit effects of nitrogen deposition as a result of leaching.

Total acidity (SO2) is over the 1% threshold when comparing against the minimum critical load, at both the Usk bat SAC and Mynydd Llangatwg SAC

[109] Metrological data (2015-2019) indicated that it rained on 71% of days at the met station location

location and also the Mynydd Llangynidr SSSI location. When compared to the maximum critical load however, total acidity is less than the 1% threshold. It is noted that Mynydd Llangynidr SSSI is designated for its geomorphology and as such minor changes in air quality are not considered likely to affect any of its qualifying features.

As such, when considering a range rather than just a minimum critical load, potential effects from acidity and nitrogen deposition, are considered to be minor to negligible, and not likely to result in a significant effect on either the Usk bat SAC or Mynydd Llangatwg SAC.

Furthermore, background levels of both pollutants are very high at the location of Usk bat SAC and Mynydd Llangatwg SSSI, with levels of nitrogen deposition at 19.3 (kg N/ha/yr) and acid deposition at 1.38/0.29 (kg N/ha/yr), and guidance states that where baselines are already high, scope for further declines in air quality will necessarily be limited[110]; since if a site is currently exceeding its critical loads and not achieving its relevant biodiversity objectives, then damage to the site is already likely to be occurring or has already happened. Therefore, it is considered, that these small changes in air quality would not result in further deterioration of the designated sites and their qualifying habitats.

None of the ancient woodland sites exceed the 1% screening threshold for Nitrogen deposition or total acidity.

Considering results and project design, there would be no significant effects on qualifying habitats of Internationally and nationally designated sites.

Qualifying Features – lesser Horseshoe bats and other bat species

Bat species, including lesser horseshoe bats, Daubenton and brown long-eared bats, which are qualifying species of Internationally and nationally designated sites in the area, are known to occur within the site namely the Usk Bat SAC and Mynydd Llangatwyg SSSI. In addition, lesser horseshoe and Daubenton bats are qualifying features of other SSSIs within 10 km: Cwm Clydach, River Usk – Upper Usk, River Usk – Tributaries, Siambre Ddu and Buckland Coach and Ice House. It is not considered that the presence of non-breeding males and females (of these species) within the site, and adjacent habitats, comprise a significant component of the Usk Bat SAC or Mynydd Llangatwyg SSSI, in addition to other SSSIs within 10 km (Cwm Clydach, River Usk – Upper Usk, River Usk – Tributaries, Siambre Ddu and Buckland Coach and Ice House); although their presence within the site needs to be considered. Additionally, it is acknowledged that suitable habitats for foraging/commuting by these bat species also occurs extensively to the north and east of the site, and which would be in good connectivity to these Internationally and nationally designated sites.

Habitats suitable for bats, which may be qualifying species of the above mentioned Internationally and nationally designated sites will be re-established post construction as described within the site in Section 7.9, including the replanting of native broadleaved woodland to the north, east and south of the

[110] CIEEM (2021) Advisory note: Ecological Assessments of Air Quality Impacts

proposed development. Planting will buffer existing trees, which have been retained on the site along the stream, which runs through the site, and along the southern periphery of the site. In addition, to the south of the proposed development, a mosaic of species rich grassland and waterbodies will be created, with waterbodies being created as part of the SuDS design and including permanent areas of water. Additionally, retained marshy grassland in the eastern part of the site will be subject to long term management to enhance its condition and encourage a greater diversity for flora and fauna including foraging bats. These habitats, which are created and or enhanced as part of the proposed development, will be suitable for a range of commuting and foraging bats, including those occurring within the site which are qualifying features of nearby Internationally and nationally designated sites.

Potential degradation/damage of retained and newly created habitats, which are suitable for foraging bats, could occur as a result of changes in water and or air quality during the site's operation, in addition to changes in water quantity/flow. Additionally, there is also the potential for disturbance to bat habitats from site vehicles and staff/visitors.

As described in Section 7.9, SuDS design will ensure that water quality is maintained, and water flow is also regulated during the site's operation. Potential significant effects from changes in air quality during operation, are discussed in Section 7.8.2, with regard to Internationally and nationally protected sites.

Although retained habitats within the site have not been included as ecological receptors in any air quality modelling (which based on best practice guidance which only considers protected sites – see Chapter 6: Air Quality), as discussed under protected sites section, the design has been amended to reduce emissions as far as possible.

The landscaping design provides paths/boardwalks through retained habitats to ensure disturbance by site workers, to sensitive habitats are avoided/minimised. There will also be no access to these areas by site vehicular traffic.

There are potential effects of harm and mortality to foraging and commuting bats as a result of collision with operational traffic associated with the proposed development, at least where there is traffic at times when bats are active, i.e. overnight and between spring and autumn.

As described in Section 7.8, traffic management will be provided on the operational site, to ensure that traffic by site staff and visitors, is limited to low speeds, and therefore reducing the risk of collision with foraging/commuting bats.

There are potential effects from disturbance to any foraging and commuting bats using the operational site in particular from any lighting, where this is required.

Sensitive lighting design will ensure that light spill is avoided or minimised onto the retained stream within the site, and adjacent woodland and waterbodies. This will need to follow best practice guidance by the Bat Conservation Trust[106].

With the implementation of the operational mitigation there would be no significant effects on bat species which are a qualifying feature of Internationally and nationally designated sites.

Locally Designated Sites

None of the SINCs or LNRs exceed the 1% screening thresholds for N deposition of total acidity, and therefore no effects from changes in air quality on any locally designated sites are predicted.

Due to the lack of hydrological connections via surface and groundwater to the majority of SINCs and LNRs within the local area, potential impacts from changes in water quality or quantity are not anticipated. However, there is a potential pathway for effect to the River Ebbw SINC however through the watercourse which runs through the site and connects to the River Ebbw downstream, through one of its tributaries. As such there is the potential for pollutants during operation, as well as sediment in surface water run-off to adversely affect the River Ebbw SINC.

As described in Section 7.8, good practice will be outlined in the CEMP and will include measures to prevent pollution events or surface run-off with a high sediment load.

There is also the potential for an increased flow during operation as a result of less permeable surfaces within the site, resulting in changes to water levels downstream and potential adverse effects on the River Ebbw.

As described in Section 7.8 the incorporation of SuDS into the design, will ensure however, that water quality and flow, is regulated prior to reaching any connecting water downstream.

With the implementation of the operational mitigation there would be no significant effects on locally designated sites.

Habitats

Habitats will be re-established post construction as described within the site in Section 7.9, including the replanting of native broadleaved tree species along the retained stream within the site, and additional woodland planting south and north of the buildings (buffering retained scattered trees along the watercourse and the southern periphery of the site). To the south of the buildings, there will be a mosaic of grassland and waterbodies, which will be created as part of the SuDS design. Additionally, retained marshy grassland in the eastern part of the site will be subject to long term management to enhances its condition and species diversity.

Potential degradation/damage of retained and newly created local and county valued habitats could occur as a result of changes in water (including groundwater and surface water). In addition, there is the potential for changes in water quantity/flow. As discussed in Chapter 15: Water, potential effects on water quality/quantity during operation are considered to be negligible due to the design of drainage to convey foul flows and contaminated materials from the site. Additionally, it is not considered that there would be a significantly increased flow of surface water as a result of the proposed development, due to existing materials within the site being relatively impermeable. Furthermore, SuDS design within the site will capture and store surface water run-off within the site.

Changes in air quality could also have adverse impacts on habitats. Potential significant effects from changes in air quality during operation, are discussed in Section 7.8.2, with regard to Internationally and nationally protected sites. Although retained and newly created habitats within and adjacent to the site have not been included as ecological receptors in any air quality modelling (which based on best practice guidance which only considers protected sites – see Chapter 6: Air Quality), the following points, discussed under protected sites, are considered relevant to potential impacts on retained habitats within the site:

- When considering a range rather than just minimum critical load, potential effects from acidity and nitrogen deposition are considered to be minor to negligible.
- It is acknowledged that the baseline levels of these pollutants are high within the local area, and further minor changes in emissions/deposition, are not likely to result in further deterioration of the any sensitive habitats.

There is also the potential for disturbance to adjacent retained habitats from site vehicles and staff/visitors. The marshy grassland to the east of the stream would be particularly sensitive to further disturbances. The landscaping design provides paths/boardwalks through retained habitats to ensure disturbance by site workers, to sensitive habitats are avoided/minimised. There will also be no access to these areas by site vehicular traffic.

With the implementation of the operational mitigation there would be no significant effects from disturbance on local and county valued habitats.

Fungi

Potential air quality impacts during operation on retained habitats within and adjacent to the site, which may support notable fungi, are not anticipated for the reasons described under ‘habitats’ above.

None of the LNRs to which some of the notable fungi will be translocated to (i.e. Parc Bryn Bach and Sirhowy woodlands LNR) exceed the 1% screening thresholds for N deposition of total acidity, and therefore no effects from changes in air quality on these sites or fungi they support are anticipated.

Management and monitoring of these habitats will essential to ensure that conditions within woodlands benefit the establishment of fungi including notable species which are translocated from the site.

With the implementation of the operational mitigation there would be no significant effects on local or county valued fungi habitats.

Invertebrates

Habitats suitable for invertebrates, will be re-established post construction as described within the site in Section 7.9, including the replanting of native broadleaved tree species along the retained stream within the site, and additional woodland planting south of the buildings, which connect to this. To the south of the buildings, there will be a mosaic of grassland and waterbodies, which will be

created as part of the SuDS design. These will be suitable for invertebrates, to re-establish from adjacent habitats, and will be managed to ensure they support notable invertebrate populations. Additionally, retained marshy grassland in the eastern part of the site will be subject to long term management to enhances its condition and encourage a greater diversity for flora and fauna including invertebrates.

Potential degradation /damage of retained and newly created habitats could occur as a result of changes in water and or air quality during the site's operation. Additionally, there is also the potential for disturbance to invertebrate habitats from site vehicles and staff/visitors.

As described in Section 7.8, SuDS design will ensure that water quality is maintained, and water flow is also regulated during the site's operation. Potential air quality impacts during operation on retained habitats within and adjacent to the site, which may support notable invertebrates, are not anticipated for the reasons described under 'habitats' above.

The landscaping design provides paths/boardwalks through retained habitats to ensure disturbance by site workers, to sensitive habitats are avoided/minimised. There will also be no access to these areas by site vehicular traffic.

With the implementation of the operational mitigation there would be no significant effects on local valued invertebrates.

Amphibians and Reptiles

Habitats suitable for reptiles and amphibians, will be re-established post construction as described within the site in Section 7.9, including the replanting of native broadleaved tree species along the retained stream within the site, and additional woodland planting south of the buildings, which connect to this. Additionally, to the south of the buildings, there will be a mosaic of grassland and waterbodies, which will be created as part of the SuDS design. These will be suitable for reptiles and amphibians, to re-establish from adjacent habitats, and will be managed to ensure they support reptiles and amphibians within the site. Retained habitats i.e. marshy grassland will be enhanced for reptiles and amphibians through the long term management and addition of refugia and hibernacula.

Potential degradation/damage of retained and newly created habitats could occur as a result of changes in water and or air quality during the site's operation. Additionally, there is also the potential for disturbance to reptile and amphibians habitats from site vehicles and staff/visitors.

Potential air quality impacts during operation on retained habitats within and adjacent to the site, which may support amphibians and reptiles, are not anticipated for the reasons described under 'habitats' above.

The landscaping design provides paths/boardwalks through retained habitats to ensure disturbance by site workers, to sensitive habitats are avoided/minimised. There will also be no access to these areas by site vehicular traffic.

Sensitive lighting design will ensure that light spill is avoided or minimised onto the retained and newly established habitats within the site, and adjacent planting.

Hard landscaping will also be provided which will ensure the continuity of habitat corridors where they are breached by the new road in the form of newt underpasses. Additionally, these underpasses will be supplemented by permanent newt fences which will direct newts into the underpass entrances and prevent them wandering onto roads.

With the implementation of the operational mitigation there would be no significant effects on county valued reptiles and local valued amphibians.

Breeding birds

Habitats suitable for breeding birds, will be re-established post construction as described within the site in Section 7.9, including the replanting of native broadleaved tree species along the retained stream within the site, and additional woodland planting south of the buildings, which connect to this. Additionally, to the south of the buildings, there will be a mosaic of grassland and waterbodies, which will be created as part of the SuDS design. These will be suitable for breeding birds, to re-establish from adjacent habitats and will be managed to ensure they continue to support breeding birds.

Potential degradation/damage of retained and newly created habitats could occur as a result of changes in water and or air quality during the site's operation. Additionally, there is also the potential for disturbance to breeding bird habitats from site vehicles and staff/visitors.

Potential air quality impacts during operation on retained habitats within and adjacent to the site, which may support breeding birds including notable species, are not anticipated for the reasons described under 'habitats' above.

The landscaping design provides paths/boardwalks through retained habitats to ensure disturbance by site workers, to sensitive habitats are avoided/minimised. There will also be no access to these areas by site vehicular traffic.

Sensitive lighting design will ensure that light spill is avoided or minimised onto the retained and newly established habitats within the site, and adjacent planting.

There are potential effects of harm and mortality to breeding birds as a result of collision with operational traffic associated with the proposed development.

As described in Section 7.8, traffic management will be provided on the operational site, to ensure that traffic by site staff and visitors, is limited to low speeds, and therefore reducing the risk of collision with animals that may be present within the site.

There are potential effects from disturbance to any breeding birds using the operational site in particular from any lighting that may be required.

Sensitive lighting design will ensure that light spill is avoided or minimised onto the retained watercourse within the site, and adjacent planting.

With the implementation of the operational mitigation there would be no significant effects on local valued breeding birds.

Otter and Notable Mammals

Habitats suitable for otter and other notable mammals such as hedgehog, will be re-established post construction as described within the site in Section 7.9, including the replanting of native broadleaved tree species along the retained stream within the site, and additional woodland planting south of the buildings, which connect to this. Additionally, to the south of the buildings, there will be a mosaic of grassland and waterbodies, which will be created as part of the SuDS design.

Potential degradation /damage of retained and newly created habitats could occur as a result of changes in water and or air quality during the site's operation. Additionally, there is also the potential for disturbance to otter/other notable mammal habitats from site vehicles and staff/visitors.

Potential air quality impacts during operation on retained habitats within and adjacent to the site, which may support otter and or other notable mammals, are not anticipated for the reasons described under 'habitats' above.

The landscaping design provides paths/boardwalks through retained habitats to ensure disturbance by site workers, to sensitive habitats are avoided/minimised. There will also be no access to these areas by site vehicular traffic.

There are potential effects of harm and mortality to otter and other notable mammals as a result of collision with operational traffic associated with the proposed development.

As described in Section 7.8, traffic management will be provided on the operational site, to ensure that traffic by site staff and visitors, is limited to low speeds, and therefore reducing the risk of collision with animals that may be present within the site.

There are potential effects from disturbance to any foraging/commuting otter and notable mammals using the operational site in particular from any lighting that may be required.

Planting alongside the watercourse and around new waterbodies within the site will provide a buffer to any otter using these habitats for foraging and commuting. Sensitive lighting design will ensure that light spill is avoided or minimised onto the retained watercourse within the site, and adjacent planting.

With the implementation of the operational mitigation there would be negligible significant effects on locally valued otter and or notable mammals.

Bats (Roosting and Foraging)

Habitats suitable for bats, will be re-established post construction as described within the site in Section 7.9, including the replanting of native broadleaved tree species along the retained stream within the site, and additional woodland planting

south of the buildings, which connect to this. To the south of the buildings, there will be a mosaic of grassland and waterbodies, which will be created as part of the SuDS design. These habitats will be suitable for a range of commuting and foraging bats and will be managed to ensure they support notable invertebrate populations. Additionally, retained marshy grassland in the eastern part of the site will be subject to long term management to enhances its condition and encourage a greater diversity for flora and fauna including foraging bats.

Potential degradation/damage of retained and newly created habitats could occur as a result of changes in water and or air quality during the site's operation. Additionally, there is also the potential for disturbance to bat habitats from site vehicles and staff/visitors.

As described in Section 7.9, SuDS design will ensure that water quality is maintained, and water flow is also regulated during the site's operation. Potential air quality impacts during operation on retained habitats within and adjacent to the site, which may support foraging/commuting bats, are not anticipated for the reasons described under 'habitats' above.

The landscaping design provides paths/boardwalks through retained habitats to ensure disturbance by site workers, to sensitive habitats are avoided/minimised. There will also be no access to these areas by site vehicular traffic.

There are potential effects of harm and mortality to bats as a result of collision with operational traffic associated with the proposed development.

As described in Section 7.8, traffic management will be provided on the operational site, to ensure that traffic by site staff and visitors, is limited to low speeds, and therefore reducing the risk of collision with foraging/commuting bats.

There are potential effects from disturbance to any foraging/commuting bats using the operational site in particular from any lighting that may be required.

Sensitive lighting design will ensure that light spill is avoided or minimised onto the retained watercourse within the site, and adjacent planting.

With the implementation of the operational mitigation there would be no significant effects on locally valued bats.

INNS

INNS including Rhododendron and cotoneaster species will be treated during construction, and where necessary removed to a licensed landfill. The retained and newly created habitats within the site should therefore be clear of any INNS currently present within the site, although there a risk that new INNS will spread into the site during its operation. Any new stands of INNS should not need to be disturbed and therefore accidentally or intentionally spread from the site, resulting in a beach of UK legislation. However, management of any new INNS should be in place to protect the ecological value of retained and newly created habitats.

With the implementation of the operational mitigation there would be no significant effects on INNS during operation.

7.10.2 Potential Effects from climate change

This section, in addition to Chapter 6: Climate change, considers effects related to climate change as per the requirements of EU Directive 2014/52 and the 2017 EIA Regulations. The combined effects relating to ecological receptors of the proposed development and potential climate change include the following:

- Increased temperatures and drier/drought conditions leading to low flows and decreases in water levels which may adversely affect hydrologically connected habitats or Ground water dependant terrestrial ecosystems and species that these habitats support;
- Increase in frequency and intensity of heavy rainfall events and flooding leading to habitat loss/damage; and
- Variation in temperature and rainfall patterns making areas unsuitable for certain species and habitats.

During operation, the above climate changes have the potential to influence effects of the proposed development on ecological receptors within the site, namely: habitat loss, fragmentation and degradation (through the inability of plants to survive changes in temperature and weather patterns i.e droughts / flooding and high wind). These changes to habitats would also increase the likelihood of soil erosion, surface run-off and flooding within catchments. Rare or endangered species at the edge of their distribution are likely to be susceptible to changes in climate particularly increases in temperature, and changes in habitat / prey availability.

Therefore, mitigation to address impacts from the proposed development during operation, also needs to consider the additional impacts of climate change.

Mitigation measures to address the climate change impacts are detailed in Section 7.8 and 7.9, and are also summarised here:

- Management of changes in water levels and potential pollution events through SuDS;
- Creation of a mosaic of habitats which will be suitable for a range of species within the local area;
- Planting to enhance connectivity of habitats within the site and surrounding habitats; and
- The planting of a range of native tree and shrubs, including species which are more tolerant of higher temperatures.

7.11 Mitigation and Enhancement

Where it has not been possible to mitigate for potential impacts to ecological receptors through the embedded design and implementation of best practice construction practices (detailed within a CEMP), and where residual impacts are likely to occur it is necessary to provide further details on mitigation. Mitigation measures will therefore avoid or minimise potential effects, and where appropriate will comprise compensatory measures where this is not possible.

Enhancement measures are proposed, in addition to any mitigation and or compensatory measures, to provide further benefit to ecological receptors, beyond what is required. Biodiversity enhancement and the promotion of ecosystem resilience is a material consideration in planning decisions, due to its requirement by the Environment (Wales) Act 2016 and PPW 11. As such enhancement measures would be in accordance with legislation and policy.

7.11.1 Mitigation of effects from construction

The majority of potential construction effects can be mitigated for as detailed in Section 7.8 and 7.9, through the implementation of avoidance and mitigation measures which are proposed as part of the embedded design, best practice construction practices and licence requirements.

However, as discussed in Section 7.8.1, there is a likely significant residual impact on county valued habitats from habitat loss as a result of clearance required to facilitate construction. Although the proposed landscaping on site to create a mosaic of species rich habitats and enhancement of species poor marshy grassland within the site, is considered sufficient to mitigate/compensate for the loss of local value habitats from the site, there will still be a loss of circa 5.88 ha of county value habitats including species rich grassland mosaic (acid and marshy grassland and short perennial vegetation). Therefore, it is necessary to provide further mitigation/compensation.

Due to the lack of suitable areas within the site, it is proposed that the proposed development also supports the long term management of 'off-site' habitats similar to those lost as a result of the site clearance, therefore providing similar conditions for species currently using the site. These habitats will comprise woodland and species rich grassland. Woodland sites will include Parc Bryn Bach LNR, Roseheyworth LNR and Sirhowy woodlands LNR, which will be subject to management. Woodland management measures will include but are not limited to coppicing within areas well used by visitors to enrich planting, gradual reduction of conifer species and encouragement of the natural regeneration of native species, management of bracken scrub, control of INNS, creation of public paths, and the establishment of fencing and long term maintenance.

Grassland habitats at Roseheyworth and Parc Nant Y Waun LNRs will also be subject to management. This will comprise scrub removal, annual grassland cuts in later summer with all arisings being removed from the area, and management of INNS.

Full details of management for woodland and grassland habitats are set out in each management plan which has been produced for each site[111][112][113][114]. These management measures will aim to benefit fungi communities, foraging and roosting bats, invertebrates, nesting birds and reptiles. Due to the lack of resources, there is currently no management activity within these sites and

[111] Steve Amber and Sons Tree Specialists Ltd (2015) Parc Bryn Bach Woodland management plan
[112] BGCBC (2018) Draft Sirhowy Woodland Management Plan
[113] BGCBC (2009) Roseheyworth Community Woodlands Ecological Management Plan
[114] BGCBC (2018) Parc Nant y Waun ecological management plan

therefore the contribution towards management of these site's habitats as a result of this project will be additional to what has/is currently being achieved on the sites.

As described in Section 7.8.1, additional mitigation/compensation will also need to be provided to compensate for the loss of habitats of county value which support notable fungi (i.e. 1.46 ha mixed woodland). It is proposed that off-site woodland habitats will therefore be managed to provide similar conditions to those required for notable fungi species. Additionally, these woodlands, will be used to re-locate any dead willow with the Hypocrea fungi, and also support any deadwood collected from the site during clearance.

Table 7.15: Local Nature Reserves proposed for long-term management in accordance with existing management plans.

Local Nature Reserve – habitat	Extent of habitat subject to management
Parc Bryn Bach LNR – woodland	40 ha
Sirhowy LNR - woodland	78 ha
Roseheyworth LNR – woodland and grassland	18.75 ha
Parc nant y Waun LNR - grassland	22 ha
Sub total	158.75 ha

As shown in Table 7.15 above, a total of 158.75 ha of woodland and grassland habitat within a number of LNRs, are proposed for long term management. This would enhance the condition of these habitats and encourage a greater diversity of flora and fauna.

The proposed mitigation for landscaping to create a mosaic of species rich habitats within the site will also require long term management to ensure they fully establish and provide suitable conditions for the range of species present within the local area. As such it is crucial that management prescriptions set out in their respective management plans are implemented.

To ensure that these the proposed management measures are implemented a Landscape and Ecology Management Plan (LEMP) will need to be produced for habitats which are newly created and enhanced within the site. The LEMP will include:

- Details of the ecological baseline, including ecological survey results (where relevant). It will also detail information of existing landownership, management and use, as well as geology/ground conditions, hydrology and topography, which will be essential to inform habitat establishment proposals.
- Details of the newly established habitats and the enhancement of existing habitats. It will include details of how these habitats will provide suitable habitat for notable species.
- Suitable prescriptions, for the management of newly created habitats and existing habitats (to be enhanced), which maintains and enhances their value for biodiversity post development. This will include specific management

measures for notable habitats and species within the site including notable fungi, invertebrates, amphibians, reptiles, breeding birds, foraging/commuting bats, otter and notable mammals. This will include information on methods/equipment/timing etc.

- To protect and enhance important ecological features within and adjacent to the site, the management plan will also detail how INNS will be eradicated from the site, and long-term management that is required to ensure INNS do not re-establish.
- A programme detailing the duration of each survey/habitat creation/management activity, what time of year it will need to be undertaken, and how frequently.
- The duration of the LEMP is to be agreed with the LPAs/NRW and anticipated to be for 25 years. A programme detailing all management prescriptions for the first 25 years post-construction, which will be subject to review and extension.
- Full details for the monitoring of the site post development, to provide information on changes in habitat condition/species populations and additional mitigation / management measures that may be required. In addition, mechanisms to feedback and agree/implement such remedial measures will be detailed for example the establishment of an ecological management committee of relevant stakeholders and regular meetings.

7.11.2 Mitigation of effects from operation

As detailed in Section 7.8.2, no further operational mitigation is considered to be required, in addition to the embedded design and proposed lighting scheme and traffic management.

To ensure that these the proposed management measures are successful a management plan including details of monitoring will also need to be provided, as discussed above under ‘construction mitigation’ in Section 7.9.1.

7.11.3 Enhancements

The project offers opportunities to provide further ecological enhancements within the scheme design post construction, for operation, and in doing so meet the requirements of PPW 11 and the Environment Act (Wales) 2016, for biodiversity enhancement and the promotion of ecosystem resilience. This will also support the resilience of ecosystems to likely future threats of climate change.

Habitats

Due to the requirement for additional mitigation/compensation of higher value habitats (i.e. county value) which cannot be provided within the site, it is proposed to provide off-site habitat compensation. This will be achieved through the delivery of management prescriptions set out in existing management plans for a number of LNRs within BGCBC. Circa 158 ha of woodland and grassland habitats will be managed to enhance their condition and increase their value for

biodiversity compared to the loss of circa 7.34 ha of similar habitats (mixed woodland and species rich grassland) from the site. As such it is considered that this off-site habitat provision will also deliver enhancements, which will be of benefit to local biodiversity.

Bats

A range of bat boxes (no less than 30) will be provided on mature trees, within the site and also off-site (i.e. nearby LNRs which will also be subject to long term management). The exact number and location will be selected by the ECoW and would be informed by the number of appropriate trees available.

Breeding birds

A range of bat boxes (no less than 15) will be provided on mature trees, off-site (i.e. nearby LNRs which will also be subject to long term management). The exact number and location will be selected by the ECoW and would be informed by the number of appropriate trees available.

7.11.4 Monitoring

Long term monitoring of habitats within the site, in addition to off-site habitats, will be undertaken during the construction period and post-construction (period to be defined by the LPA/NRW), in accordance with the LEMP. The monitoring will include:

- Condition monitoring of newly established/retained and habitats on an annual basis for a period of at least 5 years. The specific attributes of each habitat, for monitoring, will be detailed in the LEMP to include: extent, vegetation composition, vegetation structure and physical structure. Targets for each attribute will also be detailed. Where habitats aim to support notable species, attributes and targets will also account for this. Methods of monitoring will be determined once the attributes/targets have been set, but will follow published methods[115],[116],[117],[118].
- Monitoring of notable species, of county value, including: fungi, breeding birds, bat activity, invertebrates, amphibians and reptiles (with surveys following relevant best practice, and based on previous surveys undertaken to establish the baseline). It is proposed that reptile, amphibians, breeding bird, bat activity and invertebrate monitoring surveys will be in year 1, 3 and 5 post construction, and fungi monitoring will be undertaken in year 5, 10 and 15 post construction. Species, attributes, targets and monitoring methods will be agreed, in consultation with the LPA and NRW.

[115] JNCC, 2010. Handbook for Phase 1 habitat survey – a technique for environmental audit (2010) 2016.
[116] Jerram, R. & Drewitt, A. (1998). Assessing vegetation condition in the English uplands. Peterborough: English Nature Research Reports, No. 264.
[117] JNCC (2009). Common Standards Monitoring Guidance for Upland habitats, Version July 2009.
[118] JNCC (2004). Common Standards Monitoring Guidance for Woodland habitats, Version July 2004

- Monitoring results will be reported through a Steering Group, led by the site owners in partnership with BGCBC, NRW, and invited interested parties such as users / managers, advisory consultants/independent experts and local interested parties (e.g. tenant grazers) as appropriate. The site owner and the local authority shall agree where additional remedial measures are required to ensure the objectives of the LEMP are implemented.

7.11.5 Ecosystem Resilience

A separate assessment of ecosystem resilience has been undertaken, which considers the existing ecosystem resilience and how likely this is to change as a result of the implementation of the scheme.

The assessment considers the key attributes of resilience; diversity, extent, condition and connectivity, for each broad ecosystem type.

Table 7-18 (Appendix D13), shows the resilience assessment along with an indication of how the scheme will change this resilience (increase + / decrease -).

There are some decreases in resilience as a result of the scheme, in terms of overall extent of the majority of habitats with the exception of wetland habitat. Although grassland and woodland habitats will be reduced in extent as a result of the proposed development, the creation of species rich native habitats on site, and their long term management as well as long term management over 150 ha of similar off site habitats within LNRs, will result in the increase in condition of these habitats. The proposed development will result in the increase in extent of wetland habitat, and also wetland habitat condition. The diversity, extent and condition of scrub habitats are likely to decrease due to the proposed landscaping and management measures reducing the coverage of scrub habitat to favour the species rich grassland. It is acknowledged however that scrub is likely to regenerate and be maintained to some extent within the site, as well as formal landscaping providing introduced scrub. As scrub itself as limited value within the site for protected and notable species, and is of local value only, the change in this habitat is not considered to significantly effect the overall ecosystem resilience of the site.

Positive changes in ecosystem resilience, particularly habitat condition, are subject to habitats being protected and enhanced, and newly created in accordance with the LEMP, and long-term monitoring will also be essential to ensure changes are favourable.

7.12 Residual effects

Table 7-16 provides a summary of residual effects for ecological receptors during construction, and Table 7-17 provides a summary of residual effects for ecological receptors during operation.

Providing the embedded avoidance through design and mitigation measures as outlined in section 7.8 and 7.9, including: landscaping, best practice construction practices and licence requirements are implemented as outlined with the design landscaping and outline CEMP, in addition the providing management to these habitats and offsite LNR habitats, it is not anticipated that there would be any residual effects during construction or operation.

The proposed long-term monitoring will confirm any residual effects to habitats and or species, and where necessary identify further mitigation measures that may be required.

With the inclusion of enhancement measures (as detailed in section 7.9.3) which will also be detailed within the LEMP, it is considered likely that there would be an overall positive residual effect from the project for some habitats and species as a result of LNR management; namely woodland, marshy grasslands, acid grassland, invertebrates, amphibians, reptiles, bats, breeding birds, and notable mammals such as hedgehog.

Table 7.16: Summary of assessment of residual construction effects for ecological receptors of local and above value and/or legal protection

Ecological receptor	Potential impact	Embedded mitigation	Value of receptor	Residual effect considering best practice and embedded mitigation	Additional Mitigation and or Compensation measures	Residual effects with implementation of further mitigation and or compensation measures[119]
Usk Bat SAC	Habitat degradation through changes in air quality, effects on qualifying habitats. Disturbance, harm/mortality, habitat loss and fragmentation effects on qualifying bat species (Lesser Horseshoe).	Potential impacts from changes in air quality during construction will be mitigated for through the implementation of best practice dust management and management of traffic during construction. Habitat loss for foraging/commuting bats (that may be linked to SAC populations) will be mitigated for through the creation of a mosaic of habitats post construction. Adjacent habitats including marshy grassland will be enhanced through management. The stream and tree lines will be retained within the site. A sensitive lighting plan will be produced which ensure	International	Negligible significance	Newly created habitats and retained habitats within the site will be subject to long term management as detailed within a LEMP. Off-site habitats will be enhanced for the benefit of local bat populations through long term management.	Minor beneficial significance = not significant (in accordance with CIEEM guidance)

[119] The description of residual effects i.e. minor beneficial, aligns with other chapters in terms of describing the nature of the effect. However, in accordance with CIEEM, clarification as to whether the effects are significant or not have also been detailed.

		light spill avoids key foraging/commuting corridors A traffic management plan for the operational site will ensure that traffic speeds are limited to avoid potential collisions.				
Cwm Clydach SAC	Habitat degradation through changes in air quality, effects on qualifying habitats.	Potential impacts from changes in air quality during construction will be mitigated for through the implementation of best practice dust management and management of traffic during construction.	International	Negligible significance		NA
Mynydd Llangatwyg	Habitat degradation through changes in air quality, effects on qualifying habitats. Disturbance, harm/mortality, habitat loss and fragmentation effects on qualifying bat species (Lesser Horseshoe, and also Daubenton and brown long-eared bats).	Potential impacts from changes in air quality during construction will be mitigated for through the implementation of best practice dust management and management of traffic during construction. Habitat loss for foraging/commuting bats (that may be linked to SAC populations) will be mitigated for through the creation of a mosaic of habitats post construction. Adjacent habitats including	International	Negligible significance	Newly created habitats and retained habitats within the site will be subject to long term management as detailed within a LEMP. Off-site habitats will be enhanced for the benefit of local bat populations through long term management.	Minor beneficial significance= not significant (in accordance with CIEEM guidance)

		marshy grassland will be enhanced through management. The stream and tree line will be retained within the site. A sensitive lighting plan will be produced which ensure light spill avoids key foraging/commuting corridors A traffic management plan for the operational site will ensure that traffic speeds are limited to avoid potential collisions.				
Mynydd Llangynidyr	Designated for geological features	None anticipated – no pathways for impact	International	NA	NA	NA
Ancient Woodland	Habitat degradation through changes in air quality.	Potential impacts from changes in air quality during construction will be mitigated for through the implementation of best practice dust management and management of traffic during construction.	County	Negligible	NA	NA
River Ebbw SINC	Habitat degradation through pollution and surface run off with a high sediment load/changes in volume of run-off.	The incorporation of SuDS into the design, will ensure however, that water quality and flow, is regulated prior to reaching any connecting water downstream.	County	Negligible	NA	NA

Other SINCs designated for terrestrial habitats	Habitat degradation through changes in air quality.	Potential impacts from changes in air quality during construction will be mitigated for through the implementation of best practice dust management and management of traffic during construction.	County	Negligible	NA	NA
Habitats (County)	Loss of habitats within the site, and degradation/disturbance of retained habitats which are adjacent to the site and or in the local area.	None proposed within the site – as insufficient land available	County	Moderate adverse significance	Off-site mitigation/compensation is proposed due to insufficient land being available on site. It is proposed that a number of LNR woodland and grassland habitats will be subject to long term management to enhance the condition of these habitats, and provide suitable habitat for local populations of species present within the site including bats, invertebrates and breeding birds. Off-site woodland will also provide a habitat for translocated notable fungi, and deadwood to create a suitable habitat for a range of fungi with new habitat.	Moderate - high beneficial significance = positive significance (in accordance with CIEEM guidelines)

					Off-site habitat provision comprises: 40 ha woodland within Parc bryn Bach LNR 78 ha woodland within Sirhowy woodland 18.75 ha woodland and grassland within Roseheyworth LNR 22 ha woodland and grassland within Parc Nant y Waun LNR These habitats will be subject to long term management as detailed within a LEMP.	
Habitats (Local value)	Loss of habitats within the site, and degradation/disturbance of retained habitats which are adjacent to the site and or in the local area.	Habitat loss will be mitigated for through the creation of a mosaic of habitats including 3.22 ha species rich grassland, 1.78 ha broadleaved woodland and 0.3 ha wetland post construction. Adjacent habitats including 3.45 ha marshy grassland will be enhanced through management, and the stream will be retained within the site.	Local	Negligible	NA	Minor beneficial significance = not significant (in accordance with CIEEM guidance)

		These habitats will be subject to long term management as detailed within a LEMP. The incorporation of SuDS into the design, will ensure however, that water quality and flow, is regulated prior to reaching any connecting water downstream or connecting wetland habitats. The landscaping design provides paths/boardwalks through retained habitats to ensure disturbance by site workers, to sensitive habitats are avoided/minimised. There will also be no access to these areas by site vehicular traffic. Potential impacts from changes in air quality during construction will be mitigated for through the implementation of best practice dust management and management of traffic during construction.				
Fungi	Loss of habitats within the site, and	Where possible, broadleaved trees of value to fungi will be	County (mixed	Minor adverse	Off-site woodlands will be subject to long term	Minor beneficial significance = not

	degradation/disturbance of retained habitats which are adjacent to the site and or in the local area.	retained on site during construction. Translocation of willow with Hypocrea fungi to nearby woodland with a suitable microclimate, and which will also be subject to long term management to enhance its condition (i.e. Parc Bryn bach, Sirhowy or Roseheyworth woodlands). A proportion of the trunks and larger branches will stacked within the same off site woodland to provide habitat for fungi as they break down. Potential impacts from changes in air quality on retained fungi habitats on site during construction will be mitigated for through the implementation of best practice dust management and management of traffic during construction.	woodland habitats) and Local (other habitats)		management to enhance conditions for fungi including notable species.	significant (in accordance with CIEEM guidance)
Invertebrates	Degradation/disturbance of retained habitats which are adjacent to the site and or in the local area.	Habitat loss will be mitigated for through the creation of a mosaic of habitats including 3.22 ha species rich grassland, 1.78 ha woodland and 0.3 ha wetland post construction. Adjacent	Local	Negligible	Newly created habitats and retained habitats within the site will be subject to long term management as detailed within a LEMP.	Minor beneficial significance = not significant (in accordance with CIEEM guidance)

		habitats including 3.45 ha marshy grassland will be enhanced through management, and the stream will be retained within the site. The landscaping design provides paths/boardwalks through retained habitats to ensure disturbance by site workers, to sensitive habitats are avoided/minimised. There will also be no access to these areas by site vehicular traffic. The incorporation of SuDS into the design, will ensure however, that water quality and flow, is regulated prior to reaching any connecting water downstream or connecting wetland habitats. Potential impacts from changes in air quality on retained fungi habitats on site during construction will be mitigated for through the implementation of best practice dust management and management of traffic during construction.			Off-site habitats will be enhanced for the benefit of local invertebrate populations through long term management.	
Amphibians	Habitat loss. Degradation/disturbance	Habitat loss will be mitigated for through the creation of a	Local	Negligible	Newly created habitats and retained habitats	Minor beneficial significance = not

	of retained habitats which are adjacent to the site and or in the local area. Species disturbance and mortality risk associated with site clearance and draining down waterbodies.	mosaic of habitats including 3.22 ha species rich grassland, 1.78 ha woodland and 0.3 ha wetland post construction. Adjacent habitats including 3.45 ha marshy grassland will be enhanced through management, and the stream will be retained within the site. Enhancement of adjacent, retained marshy grassland including provision of at least 10 reptile refugia/hibernacula. The landscaping design provides paths/boardwalks through retained habitats to ensure disturbance by site workers, to sensitive habitats are avoided/minimised. There will also be no access to these areas by site vehicular traffic. A trapping and relocation programme will be implemented prior to site clearance along with destructive searching and trapping of waterbodies. Any amphibians will be relocated to adjacent marshy grassland.			within the site will be subject to long term management as detailed within a LEMP. Off-site habitats will be enhanced for the benefit of local amphibian populations through long term management.	significant (in accordance with CIEEM guidance)

		Potential impacts from changes in air quality on retained habitats on site during construction will be mitigated for through the implementation of best practice dust management and management of traffic during construction.				
Reptiles	Degradation/disturbance of retained habitats which are adjacent to the site and or in the local area. Species disturbance and mortality risk associated with collision.	Habitat loss will be mitigated for through the creation of a mosaic of habitats including 3.22 ha species rich grassland, 1.78 ha woodland and 0.3 ha wetland post construction. Adjacent habitats including 3.45 ha marshy grassland will be enhanced through management, and the stream will be retained within the site. Enhancement of adjacent, retained marshy grassland including provision of at least 10 reptile refugia/hibernacula. The landscaping design provides paths/boardwalks through retained habitats to ensure disturbance by site workers, to sensitive habitats are avoided/minimised.	County	Negligible significance	Newly created habitats and retained habitats within the site will be subject to long term management as detailed within a LEMP. Off-site habitats will be enhanced for the benefit of local reptile populations through long term management.	Minor beneficial significance = not significant (in accordance with CIEEM guidance)

		There will also be no access to these areas by site vehicular traffic. Reptiles will be trapped and relocated to adjacent marshy grassland as part of trapping programme, under supervision of a suitably qualified ecologist. Potential impacts from changes in air quality during construction will be mitigated for through the implementation of best practice dust management and management of traffic during construction.				
Breeding birds	Degradation/disturbance of retained habitats which are adjacent to the site and or in the local area. Species disturbance and mortality risk associated with collision.	Habitat loss will be mitigated for through the creation of a mosaic of habitats including 3.22 ha species rich grassland, 1.78 ha woodland and 0.3 ha wetland post construction. Adjacent habitats including 3.45 ha marshy grassland will be enhanced through management, and the stream will be retained within the site. A range of bird boxes (no less than 30) will be provided on mature trees, within the	Local	Negligible significance	Newly created habitats and retained habitats within the site will be subject to long term management as detailed within a LEMP. Off-site habitats will be enhanced for the benefit of local breeding bird populations through long term management. The provision of at least 30 bird boxes would be provided as additional nesting habitat for bird	Minor beneficial significance = not significant (in accordance with CIEEM guidance)

		site. The exact number and location will be selected by the ECoW and would be informed by the number of appropriate trees available. The landscaping design provides paths/boardwalks through retained habitats to ensure disturbance by site workers, to sensitive habitats are avoided/minimised. There will also be no access to these areas by site vehicular traffic. The incorporation of SuDS into the design, will ensure however, that water quality and flow, is regulated prior to reaching any connecting water downstream or connecting wetland habitats. Potential impacts from changes in air quality during construction will be mitigated for through the implementation of best practice dust management and management of traffic during construction.			species in habitats off-site (i.e. nearby LNR's).	
Badger	Degradation/disturbance of retained habitats which are adjacent to the site and or in the	Habitat loss will be mitigated for through the creation of a mosaic of habitats 3.22 ha species rich grassland, 1.78	Less than Local	Negligible significance	Newly created habitats and retained habitats within the site will be subject to long term	Minor beneficial significance = not

	local area. Species disturbance from lighting and mortality risk associated with collision.	ha woodland and 0.3 ha wetland post construction. Adjacent habitats including 3.45 ha marshy grassland will be enhanced through management, and the stream will be retained within the site. The landscaping design provides paths/boardwalks through retained habitats to ensure disturbance by site workers, to sensitive habitats are avoided/minimised. There will also be no access to these areas by site vehicular traffic. Potential impacts from changes in air quality during construction will be mitigated for through the implementation of best practice dust management and management of traffic during construction. A sensitive lighting plan will be produced which ensure light spill avoids key foraging/commuting corridors A traffic management plan for the operational site will ensure that traffic speeds are			management as detailed within a LEMP. Off-site habitats will be enhanced for the benefit of local badger populations through long term management.	significant (in accordance with CIEEM guidance)

		limited to avoid potential collisions.				
Otter	Degradation/disturbance of retained habitats which are adjacent to the site and or in the local area. Species disturbance from lighting and mortality risk associated with collision.	The stream which runs through the site will be retained and enhanced through additional planting. This will continue to provide connectivity to suitable habitats to the north and east. The incorporation of SuDS into the design, will ensure however, that water quality and flow, is regulated prior to reaching any connecting water downstream or connecting wetland habitats. The landscaping design provides paths/boardwalks through retained habitats to ensure disturbance by site workers, to sensitive habitats are avoided/minimised. There will also be no access to these areas by site vehicular traffic. A sensitive lighting plan will be produced which ensure light spill avoids key foraging/commuting corridors A traffic management plan for the operational site will	Local	Negligible significance	Newly created habitats and retained habitats within the site will be subject to long term management as detailed within a LEMP. Off-site habitats will be enhanced for the benefit of local otter populations through long term management. Otter holt to be created along Carno reservoir or Ebbw River as an enhancement measure.	Minor beneficial significance = not significant (in accordance with CIEEM guidance)

		ensure that traffic speeds are limited to avoid potential collisions.				
Bats	Degradation/disturbance of retained habitats which are adjacent to the site and or in the local area. Species disturbance from lighting and mortality risk associated with collision.	Scattered trees will be retained along the southern periphery of the site, and along the stream during construction therefore providing continued connectivity. Habitat loss will be mitigated for through the creation of a mosaic of habitats including 3.22 ha species rich grassland, 1.78 ha woodland and 0.3 ha wetland post construction. Adjacent habitats including 3.45 ha marshy grassland will be enhanced through management, and the stream will be retained within the site. The incorporation of SuDS into the design, will ensure however, that water quality and flow, is regulated prior to reaching any connecting water downstream or connecting wetland habitats. Potential impacts from changes in air quality during construction will be mitigated for through the	Local	Negligible significance	Newly created habitats and retained habitats within the site will be subject to long term management as detailed within a LEMP. Off-site habitats will be enhanced for the benefit of local bat populations through long term management. The provision of at least 30 bat boxes within the development site and also off-site within nearby woodlands (i.e. identified LNRs).	Minor beneficial significance = not significant (in accordance with CIEEM guidance)

		implementation of best practice dust management and management of traffic during construction. A sensitive lighting plan will be produced which ensure light spill avoids key foraging/commuting corridors. A traffic management plan for the operational site will ensure that traffic speeds are limited to avoid potential collisions.				
Notable mammals	Degradation/disturbance of retained habitats which are adjacent to the site and or in the local area. Species disturbance from lighting and mortality risk associated with collision.	Scattered trees will be retained along the southern periphery of the site, and along the stream during construction therefore providing continued connectivity. Habitat loss will be mitigated for through the creation of a mosaic of habitats including 3.22 ha species rich grassland, 1.78 ha woodland and 0.3 ha wetland post construction. Adjacent habitats including 3.45 ha marshy grassland will be enhanced through management, and the stream will be retained within the site.	Local	Negligible significance	Newly created habitats and retained habitats within the site will be subject to long term management as detailed within a LEMP. Off-site habitats will be enhanced for the benefit of local mammal populations through long term management.	Minor beneficial significance = not significant (in accordance with CIEEM guidance)

		The incorporation of SuDS into the design, will ensure however, that water quality and flow, is regulated prior to reaching any connecting water downstream or connecting wetland habitats. Potential impacts from changes in air quality during construction will be mitigated for through the implementation of best practice dust management and management of traffic during construction. A sensitive lighting plan will be produced which ensure light spill avoids key foraging/commuting corridors A traffic management plan for the operational site will ensure that traffic speeds are limited to avoid potential collisions.				

Table 7.17: Summary of assessment of residual operation effects for ecological receptors of local and above value and/or legal protection

Ecological receptor	Potential impact	Embedded mitigation	Value of receptor	Residual effect considering best practice and embedded mitigation	Additional Mitigation and or Compensation measures	Residual effects with implementation of further mitigation and or compensation measures
Usk Bat SAC	Habitat degradation through air quality effects on qualifying habitats. Disturbance, harm/mortality, habitat loss (within the site) and fragmentation effects on qualifying bat species (Lesser Horseshoe).	When considering a range rather than just a minimum critical load, potential effects from acidity and nitrogen deposition, are considered to be minor to negligible, and not likely to result in a significant effect on the Usk bat SAC. Furthermore, background levels of both pollutants are very high at the location of Usk bat SAC and small changes in air quality are not likely to result in further deterioration of the designated sites and their qualifying habitats. Habitat loss for foraging/commuting bats (that may be linked to SAC populations) will be mitigated for through the creation of a mosaic of habitats within the site including 3.22 ha species rich grassland, 1.78 ha	International	Negligible significance	Newly created habitats and retained habitats within the site will be subject to long term management as detailed within a LEMP. Off-site habitats will be enhanced for the benefit of local bat populations through long term management.	Minor beneficial significance = not significant (in accordance with CIEEM guidance)

Ecological receptor	Potential impact	Embedded mitigation	Value of receptor	Residual effect considering best practice and embedded mitigation	Additional Mitigation and or Compensation measures	Residual effects with implementation of further mitigation and or compensation measures
		woodland and 0.3 ha wetland post construction. Adjacent habitats including 3.45 ha marshy grassland will be enhanced through management. The stream and tree lines will be retained within the site providing connectivity through the site. A sensitive lighting plan will be produced which ensure light spill avoids key foraging/commuting corridors A traffic management plan for the operational site will ensure that traffic speeds are limited to avoid potential collisions.				
Cwm Clydach SAC	No pathway for effects		International	NA	NA	NA
Mynydd Llangatwyg	Habitat degradation through changes in air quality, effects on qualifying habitats. Disturbance, harm/mortality, habitat loss and fragmentation	When considering a range rather than just a minimum critical load, potential effects from acidity and nitrogen deposition, are considered to be minor to negligible, and not likely to result in a significant	International	Negligible significance	Newly created habitats and retained habitats within the site will be subject to long term management as detailed within a LEMP. Off-site habitats will be enhanced for the benefit of local bat	Minor beneficial significance = not significant (in accordance with CIEEM guidance)

Ecological receptor	Potential impact	Embedded mitigation	Value of receptor	Residual effect considering best practice and embedded mitigation	Additional Mitigation and or Compensation measures	Residual effects with implementation of further mitigation and or compensation measures
	effects on qualifying bat species (Lesser Horseshoe, and also Daubenton and brown long-eared bats).	effect on Mynydd Llangatwyg. Furthermore, background levels of both pollutants are very high at the location of Mynydd Llangatwyg and small changes in air quality are not likely to result in further deterioration of the designated sites and their qualifying habitats. Habitat loss for foraging/commuting bats (that may be linked to SAC populations) will be mitigated for through the creation of a mosaic of habitats including 3.22 ha species rich grassland, 1.78 ha woodland and 0.3 ha wetland post construction. Adjacent habitats including 3.45 ha marshy grassland will be enhanced through management, and the stream will be retained within the site. A sensitive lighting plan will be produced which ensure light			populations through long term management.	

Ecological receptor	Potential impact	Embedded mitigation	Value of receptor	Residual effect considering best practice and embedded mitigation	Additional Mitigation and or Compensation measures	Residual effects with implementation of further mitigation and or compensation measures
		spill avoids key foraging/commuting corridors A traffic management plan for the operational site will ensure that traffic speeds are limited to avoid potential collisions.				
Mynydd llangynidyr	No pathways for effects	Designated for its geology	International	NA	NA	NA
Ancient Woodland	Habitat degradation through changes in air quality.	Nitrogen and acidity were less than the 1% threshold for the critical loads at these sites. As such no significant effect is likely.	County	Negligible significance.	NA	NA
River Ebbw SINC	Habitat degradation through pollution and surface run off with a high sediment load/changes in volume of run-off.	The incorporation of SuDS into the design, will ensure however, that water quality and flow, is regulated prior to reaching any connecting water downstream.	County	Negligible significance.		
Other terrestrial SINCs	Habitat degradation through changes in air quality.	Nitrogen and acidity were less than the 1% threshold for the critical loads at these sites. As such no significant effect is likely.	County	Negligible Significance	NA	NA

Ecological receptor	Potential impact	Embedded mitigation	Value of receptor	Residual effect considering best practice and embedded mitigation	Additional Mitigation and or Compensation measures	Residual effects with implementation of further mitigation and or compensation measures
Habitats (County value)	Loss of habitats within the site, and degradation/disturbance of retained habitats which are adjacent to the site and or in the local area.	None proposed within the site – due to limited space available	County	Negligible significance	Off-site mitigation/compensation is proposed due to insufficient land being available on site. It is proposed that a number of LNR woodland and grassland habitats will be subject to long term management to enhance the condition of these habitats, and provide suitable habitat for local populations of species present within the site including bats, invertebrates and breeding birds. Off-site woodland will also provide a habitat for translocated notable fungi, and deadwood to create a suitable habitat for a range of fungi with new habitat. Off-site habitat provision comprises: 40 ha woodland within Parc bryn Bach LNR 78 ha woodland within Sirhowy woodland 18.75 ha woodland and grassland within Roseheyworth LNR	Minor beneficial significance = not significant (in accordance with CIEEM guidance)

Ecological receptor	Potential impact	Embedded mitigation	Value of receptor	Residual effect considering best practice and embedded mitigation	Additional Mitigation and or Compensation measures	Residual effects with implementation of further mitigation and or compensation measures
					22 ha woodland and grassland within Parc Nant y Waun LNR These habitats will be subject to long term management as detailed within a LEMP.	
Lower biodiversity value habitats	Loss of habitats within the site, and degradation/disturbance of retained habitats which are adjacent to the site and or in the local area.	Habitat loss will be mitigated for through the creation of a mosaic of habitats including 3.22 ha species rich grassland, 1.78 ha woodland and 0.3 ha wetland post construction. Adjacent habitats including 3.45 ha marshy grassland will be enhanced through management. The stream and tree lines will be retained within the site. Although potential air quality effects on nearby habitats, which do not form part of designated sites, have not been modelled, it is considered that there would be some potential degradation of sensitive habitats including those which are retained and those newly created within the site, as part of	Local	Negligible significance	Newly created habitats and retained habitats within the site will be subject to long term management as detailed within a LEMP. Off-site habitats will be enhanced for the benefit of local invertebrate populations through long term management.	Minor beneficial significance = not significant (in accordance with CIEEM guidance)

Ecological receptor	Potential impact	Embedded mitigation	Value of receptor	Residual effect considering best practice and embedded mitigation	Additional Mitigation and or Compensation measures	Residual effects with implementation of further mitigation and or compensation measures
		the proposed development. The assessment is based on the results of impacts on designated sites which shows small changes in levels of nitrogen and acidity, but when considering the existing high baseline levels in the local area – it is considered that such changes would not result in further deterioration of these habitats. The incorporation of SuDS into the design, will ensure however, that water quality and flow, is regulated prior to reaching any connecting water downstream or connecting wetland habitats. The landscaping design provides paths/boardwalks through retained habitats to ensure disturbance by site workers, to sensitive habitats are avoided/minimised. There will also be no access to these areas by site vehicular traffic.				

Ecological receptor	Potential impact	Embedded mitigation	Value of receptor	Residual effect considering best practice and embedded mitigation	Additional Mitigation and or Compensation measures	Residual effects with implementation of further mitigation and or compensation measures
Fungi	Loss of habitats within the site, and degradation/disturbance of retained habitats which are adjacent to the site and or in the local area.	Translocation of willow with Hypocrea fungi to nearby woodland with a suitable microclimate, and which will also be subject to long term management to enhance its condition (i.e. Parc Bryn bach, Sirhowy or Roseheyworth woodlands). A proportion of the trunks and larger branches will stacked within the same off site woodland to provide habitat for fungi as they break down. Off-site woodlands will be subject to long term management to enhance conditions for fungi including notable species.	County (mixed woodland habitats) and Local (other habitats)	Minor adverse significance	Newly created habitats and retained habitats within the site will be subject to long term management as detailed within a LEMP. Off-site habitats will be enhanced for the benefit of notable fungi through long term management.	Minor beneficial significance = not significant (in accordance with CIEEM guidance)
Invertebrates	Degradation/disturbance of retained habitats which are adjacent to the site and or in the local area.	Habitat loss will be mitigated for through the creation of a mosaic of habitats including 3.22 ha species rich grassland, 1.78 ha woodland and 0.3 ha wetland post construction.	Local	Negligible significance	Newly created habitats and retained habitats within the site will be subject to long term management as detailed within a LEMP.	Minor beneficial significance = not significant (in accordance with CIEEM guidance)

Ecological receptor	Potential impact	Embedded mitigation	Value of receptor	Residual effect considering best practice and embedded mitigation	Additional Mitigation and or Compensation measures	Residual effects with implementation of further mitigation and or compensation measures
		Adjacent habitats including 3.45 ha marshy grassland will be enhanced through management. The stream and tree lines will be retained within the site. Although potential air quality effects on nearby habitats, which do not form part of designated sites, have not been modelled, it is considered that there would be some potential degradation of sensitive habitats including those which are retained and those newly created within the site, as part of the proposed development. The assessment is based on the results of impacts on designated sites which shows small changes in levels of nitrogen and acidity, but when considering the existing high baseline levels in the local area – it is considered that such changes would not result in			Off-site habitats will be enhanced for the benefit of local invertebrate populations through long term management.	

Ecological receptor	Potential impact	Embedded mitigation	Value of receptor	Residual effect considering best practice and embedded mitigation	Additional Mitigation and or Compensation measures	Residual effects with implementation of further mitigation and or compensation measures
		further deterioration of these habitats. The landscaping design provides paths/boardwalks through retained habitats to ensure disturbance by site workers, to sensitive habitats are avoided/minimised. There will also be no access to these areas by site vehicular traffic. The incorporation of SuDS into the design, will ensure however, that water quality and flow, is regulated prior to reaching any connecting water downstream or connecting wetland habitats.				
Amphibians	Degradation/disturbance of retained habitats which are adjacent to the site and or in the local area. Species disturbance and mortality risk associated with collision.	Habitat loss will be mitigated for through the creation of a mosaic of habitats including 3.22 ha species rich grassland, 1.78 ha woodland and 0.3 ha wetland post construction. Adjacent habitats including 3.45 ha marshy grassland will be enhanced through management.	Local	Negligible significance	Newly created habitats and retained habitats within the site will be subject to long term management as detailed within a LEMP. Off-site habitats will be enhanced for the benefit of local amphibian populations through long term management.	Minor beneficial significance = not significant (in accordance with CIEEM guidance)

Ecological receptor	Potential impact	Embedded mitigation	Value of receptor	Residual effect considering best practice and embedded mitigation	Additional Mitigation and or Compensation measures	Residual effects with implementation of further mitigation and or compensation measures
		The stream and tree lines will be retained within the site. Although potential air quality effects on nearby habitats, which do not form part of designated sites, have not been modelled, it is considered that there would be some potential degradation of sensitive habitats including those which are retained and those newly created within the site, as part of the proposed development. The assessment is based on the results of impacts on designated sites which shows small changes in levels of nitrogen and acidity, but when considering the existing high baseline levels in the local area – it is considered that such changes would not result in further deterioration of these habitats. The landscaping design provides paths/boardwalks			Enhancement of adjacent, retained marshy grassland including provision of at least 10 reptile refugia/hibernacula (which will also be beneficial to amphibian's).	

Ecological receptor	Potential impact	Embedded mitigation	Value of receptor	Residual effect considering best practice and embedded mitigation	Additional Mitigation and or Compensation measures	Residual effects with implementation of further mitigation and or compensation measures
		through retained habitats to ensure disturbance by site workers, to sensitive habitats are avoided/minimised. There will also be no access to these areas by site vehicular traffic. In addition newt underpasses will provide habitat connectivity.				
Reptiles	Degradation/disturbance of retained habitats which are adjacent to the site and or in the local area. Species disturbance and mortality risk associated with collision.	Habitat loss will be mitigated for through the creation of a mosaic of habitats including 3.22 ha species rich grassland, 1.78 ha woodland and 0.3 ha wetland post construction. Adjacent habitats including 3.45 ha marshy grassland will be enhanced through management. The stream and tree lines will be retained within the site. Enhancement of adjacent, retained marshy grassland including provision of at least 10 reptile refugia/hibernacula.	County	Negligible significance.	Newly created habitats and retained habitats within the site will be subject to long term management as detailed within a LEMP. Off-site habitats will be enhanced for the benefit of local reptile populations through long term management.	Minor beneficial significance = not significant (in accordance with CIEEM guidance)

Ecological receptor	Potential impact	Embedded mitigation	Value of receptor	Residual effect considering best practice and embedded mitigation	Additional Mitigation and or Compensation measures	Residual effects with implementation of further mitigation and or compensation measures
		Although potential air quality effects on nearby habitats, which do not form part of designated sites, have not been modelled, it is considered that there would be some potential degradation of sensitive habitats including those which are retained and those newly created within the site, as part of the proposed development. The assessment is based on the results of impacts on designated sites which shows small changes in levels of nitrogen and acidity, but when considering the existing high baseline levels in the local area – it is considered that such changes would not result in further deterioration of these habitats. The landscaping design provides paths/boardwalks through retained habitats to ensure disturbance by site workers, to sensitive habitats				

Ecological receptor	Potential impact	Embedded mitigation	Value of receptor	Residual effect considering best practice and embedded mitigation	Additional Mitigation and or Compensation measures	Residual effects with implementation of further mitigation and or compensation measures
		are avoided/minimised. There will also be no access to these areas by site vehicular traffic.				
Breeding birds	Degradation/disturbance of retained habitats which are adjacent to the site and or in the local area. Species disturbance and mortality risk associated with collision.	Habitat loss will be mitigated for through the creation of a mosaic of habitats including 3.22 ha species rich grassland, 1.78 ha woodland and 0.3 ha wetland post construction. Adjacent habitats including 3.45 ha marshy grassland will be enhanced through management. The stream and tree lines will be retained within the site. Although potential air quality effects on nearby habitats, which do not form part of designated sites, have not been modelled, it is considered that there would be some potential degradation of sensitive habitats including those which are retained and those newly created within the site, as part of the proposed development. The assessment is based on the	Local	Negligible significance	Newly created habitats and retained habitats within the site will be subject to long term management as detailed within a LEMP. Off-site habitats will be enhanced for the benefit of local mammal populations through long term management. The provision of at least 30 bird boxes would be provided as additional nesting habitat for bird species in retained habitats in the site, and habitats off-site (i.e. nearby LNR's).	Minor beneficial significance = not significant (in accordance with CIEEM guidance)

Ecological receptor	Potential impact	Embedded mitigation	Value of receptor	Residual effect considering best practice and embedded mitigation	Additional Mitigation and or Compensation measures	Residual effects with implementation of further mitigation and or compensation measures
		results of impacts on designated sites which shows small changes in levels of nitrogen and acidity, but when considering the existing high baseline levels in the local area – it is considered that such changes would not result in further deterioration of these habitats. The landscaping design provides paths/boardwalks through retained habitats to ensure disturbance by site workers, to sensitive habitats are avoided/minimised. There will also be no access to these areas by site vehicular traffic. The incorporation of SuDS into the design, will ensure however, that water quality and flow, is regulated prior to reaching any connecting water downstream or connecting wetland habitats.				

Ecological receptor	Potential impact	Embedded mitigation	Value of receptor	Residual effect considering best practice and embedded mitigation	Additional Mitigation and or Compensation measures	Residual effects with implementation of further mitigation and or compensation measures
Badger	Degradation/disturbance of retained habitats which are adjacent to the site and or in the local area. Species disturbance from lighting and mortality risk associated with collision.	Habitat loss will be mitigated for through the creation of a mosaic of habitats including 3.22 ha species rich grassland, 1.78 ha woodland and 0.3 ha wetland post construction. Adjacent habitats including 3.45 ha marshy grassland will be enhanced through management. The stream and tree lines will be retained within the site. Although potential air quality effects on nearby habitats, which do not form part of designated sites, have not been modelled, it is considered that there would be some potential degradation of sensitive habitats including those which are retained and those newly created within the site, as part of the proposed development. The assessment is based on the results of impacts on designated sites which shows small changes in levels of nitrogen	Less than Local	Negligible significance	Newly created habitats and retained habitats within the site will be subject to long term management as detailed within a LEMP. Off-site habitats will be enhanced for the benefit of local badger populations through long term management.	Minor beneficial significance = not significant (in accordance with CIEEM guidance)

Ecological receptor	Potential impact	Embedded mitigation	Value of receptor	Residual effect considering best practice and embedded mitigation	Additional Mitigation and or Compensation measures	Residual effects with implementation of further mitigation and or compensation measures
		and acidity, but when considering the existing high baseline levels in the local area – it is considered that such changes would not result in further deterioration of these habitats. The landscaping design provides paths/boardwalks through retained habitats to ensure disturbance by site workers, to sensitive habitats are avoided/minimised. There will also be no access to these areas by site vehicular traffic. A sensitive lighting plan will be produced which ensure light spill avoids key foraging/commuting corridors A traffic management plan for the operational site will ensure that traffic speeds are limited to avoid potential collisions.				
Otter	Degradation/disturbance of retained habitats	The stream which runs through the site will be retained and	Local	Negligible significance	Newly created habitats and retained habitats within the site	Minor beneficial significance = not

Ecological receptor	Potential impact	Embedded mitigation	Value of receptor	Residual effect considering best practice and embedded mitigation	Additional Mitigation and or Compensation measures	Residual effects with implementation of further mitigation and or compensation measures
	which are adjacent to the site and or in the local area. Species disturbance from lighting and mortality risk associated with collision.	enhanced through additional planting. This will continue to provide connectivity to suitable habitats to the north and east. The incorporation of SuDS into the design, will ensure however, that water quality and flow, is regulated prior to reaching any connecting water downstream or connecting wetland habitats. The landscaping design provides paths/boardwalks through retained habitats to ensure disturbance by site workers, to sensitive habitats are avoided/minimised. There will also be no access to these areas by site vehicular traffic. A sensitive lighting plan will be produced which ensure light spill avoids key foraging/commuting corridors A traffic management plan for the operational site will ensure that traffic speeds are limited to avoid potential collisions.			will be subject to long term management as detailed within a LEMP. Off-site habitats will be enhanced for the benefit of local otter populations through long term management. An otter holt will be created on the Carno reservoir or nearby Ebbw River, as an enhancement.	significant (in accordance with CIEEM guidance)

Ecological receptor	Potential impact	Embedded mitigation	Value of receptor	Residual effect considering best practice and embedded mitigation	Additional Mitigation and or Compensation measures	Residual effects with implementation of further mitigation and or compensation measures
Bats	Degradation/disturbance of retained habitats which are adjacent to the site and or in the local area. Species disturbance from lighting and mortality risk associated with collision.	Habitat loss will be mitigated for through the creation of a mosaic of habitats including 3.22 ha species rich grassland, 1.78 ha woodland and 0.3 ha wetland post construction. Adjacent habitats including 3.45 ha marshy grassland will be enhanced through management. The stream and tree lines will be retained within the site. The incorporation of SuDS into the design, will ensure however, that water quality and flow, is regulated prior to reaching any connecting water downstream or connecting wetland habitats. Although potential air quality effects on nearby habitats, which do not form part of designated sites, have not been modelled, it is considered that there would be some potential degradation of sensitive habitats including those which are retained and those newly	Local	Negligible significance	Newly created habitats and retained habitats within the site will be subject to long term management as detailed within a LEMP. Off-site habitats will be enhanced for the benefit of local bat populations through long term management. The provision of at least 30 bat boxes within the development site and also off-site within nearby woodlands (i.e. identified LNRs).	Minor beneficial significance = not significant (in accordance with CIEEM guidance)

Ecological receptor	Potential impact	Embedded mitigation	Value of receptor	Residual effect considering best practice and embedded mitigation	Additional Mitigation and or Compensation measures	Residual effects with implementation of further mitigation and or compensation measures
		created within the site, as part of the proposed development. The assessment is based on the results of impacts on designated sites which shows small changes in levels of nitrogen and acidity, but when considering the existing high baseline levels in the local area – it is considered that such changes would not result in further deterioration of these habitats. A sensitive lighting plan will be produced which ensure light spill avoids key foraging/commuting corridors. A traffic management plan for the operational site will ensure that traffic speeds are limited to avoid potential collisions.				
Notable mammals	degradation/disturbance of retained habitats which are adjacent to the site and or in the local area. Species	Habitat loss will be mitigated for through the creation of a mosaic of habitats including 3.22 ha species rich grassland, 1.78 ha woodland and 0.3 ha	Local	Negligible significance	Newly created habitats and retained habitats within the site will be subject to long term	

Ecological receptor	Potential impact	Embedded mitigation	Value of receptor	Residual effect considering best practice and embedded mitigation	Additional Mitigation and or Compensation measures	Residual effects with implementation of further mitigation and or compensation measures
	disturbance from lighting and mortality risk associated with collision.	wetland post construction. Adjacent habitats including 3.45 ha marshy grassland will be enhanced through management. The stream and tree lines will be retained within the site. The incorporation of SuDS into the design, will ensure however, that water quality and flow, is regulated prior to reaching any connecting water downstream or connecting wetland habitats. Although potential air quality effects on nearby habitats, which do not form part of designated sites, have not been modelled, it is considered that there would be some potential degradation of sensitive habitats including those which are retained and those newly created within the site, as part of the proposed development. The assessment is based on the results of impacts on designated sites which shows small			management as detailed within a LEMP. Off-site habitats will be enhanced for the benefit of local mammal populations through long term management.	

Ecological receptor	Potential impact	Embedded mitigation	Value of receptor	Residual effect considering best practice and embedded mitigation	Additional Mitigation and or Compensation measures	Residual effects with implementation of further mitigation and or compensation measures
		changes in levels of nitrogen and acidity, but when considering the existing high baseline levels in the local area – it is considered that such changes would not result in further deterioration of these habitats. A sensitive lighting plan will be produced which ensure light spill avoids key foraging/commuting corridors A traffic management plan for the operational site will ensure that traffic speeds are limited to avoid potential collisions.				

8 Health

8.1 Introduction

This report considers how the proposed development in Rassau may affect health outcomes within the local population.

The health assessment applies a broad definition of health, encompassing physical and mental wellbeing and quality of life. This understanding of health is captured in the World Health Organisation (WHO) definition:

"Health is a state of complete physical, mental and social wellbeing and not merely an absence of disease or infirmity".

The assessment is based on the identification of 'health determinants' i.e. the social, economic and environmental factors that can influence the health and wellbeing of the population. It assesses the beneficial and adverse health effects associated with changes to health determinants resulting from the proposed development.

The assessment predominantly focuses on the population and local communities in areas surrounding the site and follows the study areas of other studies that have been prepared in support of the planning application, including an Air Quality assessment (EIA Chapter 5) and a Noise Impact Assessment (EIA Chapter 10).

8.2 Legislation, policy context and guidance

8.2.1 Legislation

Well-being of Future Generations (Wales) Act 2015[120]

This legislation sets a requirement for public bodies to consider improving social, economic, environmental and cultural well-being of Wales. There are seven well-being goals in relation to these objectives, including 'a healthier Wales'. This aims to create a society which maximises people's physical and mental wellbeing. It seeks to create:

- a compassionate nation;
- an active nation;
- place making and designing-in community health and wellbeing that supports health communities; and
- seamless, preventative organisations and services that benefit health.

Whilst this is not a public sector proposal, the principles of the Act are also being encouraged across the private sector.

[120] Commissioner for Wales. Well-being of Future Generations (Wales) Act, 2015. Available at: https://futuregenerations.wales/about-us/future-generations-act/

Equality Act 2010[121]

The Equality Act came into force in October 2010, and *'provides a legal framework to protect the rights of individuals and advance equality of opportunity for all'.*

Section 149 of the Act sets out the Public Sector Equality Duty ('the Duty'). This requires that public bodies have due regard to the need to:

- Eliminate discrimination, harassment, victimisation and any other conduct that is prohibited under the Act;
- Advance equality of opportunity between persons who share a relevant protected characteristic and persons who do not share it; and
- Foster good relations between persons who share a relevant protected characteristic and persons who do not share it.

The Act identifies nine protected characteristics:

- Age;
- Disability;
- Gender reassignment;
- Pregnancy and maternity;
- Race;
- Religion or belief;
- Sex; and
- Sexual orientation.

Whilst the Applicant is not a public body and therefore does not have a public sector equality duty placed upon them, the list of protected characteristics is a focus for identifying which people within the study community should be considered as vulnerable in consideration of health impacts.

8.2.2 Policy Context

National planning policy

Planning Policy Wales, Edition 11 (2021)[122]

PPW11 aims to deliver the vision set out in the Well-being of Future Generations Act. A key planning principle as part of this document is to facilitate accessible and healthy environments, which includes creating high quality and inclusive environments in which people can live, work, travel and play.

[121] UK Government, Equality Act 2010 Available at: https://www.legislation.gov.uk/ukpga/2010/15/contents
[122] Welsh Government. Planning Policy Wales, 2021. Available at: https://gov.wales/sites/default/files/publications/2021-02/planning-policy-wales-edition-11_0.pdf

Future Wales: The National Plan 2040[123]

Future Wales is Wales' national development framework, setting the direction for the country until 2040. One of the aims of the framework is to improve the health and wellbeing outcomes of communities in Wales.

Local planning policy

Blaenau Gwent Local Development Plan up to 2021

Challenge 9 of the LDP is to promote health and well-being for all through the creation of environments that promote safety, health and a sense of well-being for all.

- Policy SP9: Active and health communities.

  This policy aims to create active and healthy communities by promoting leisure activities, promoting and improving existing open space, sport and leisure facilities and protecting and enhancing accessibility to natural greenspace for all members of the community.

Blaenau Gwent Replacement Local Development Plan 2018 - 2033

Challenge 7 of the LDP is to promote physical and mental health and well-being for all. Challenge 10 of the LDP relates to environmental quality and the need to ensure that the physical environment is safe and healthy.

The need to address all determinants of health is included throughout the LDP.

- Strategic Policy 12: social and community Infrastructure - This policy aims to maintain and improve the quality of life and health and well-being of residents.
- Strategic Policy 13: Protection and Enhancement of the Natural Environment – identifies ways that the distinctive natural environment and landscape of Blaenau Gwent will be protected and where possible enhanced.

Blaenau Gwent Local Well-Being Plan – the Blaenau Gwent We Want (2018-2023)

This well-being plan outlines objectives for improving well-being in Blaenau Gwent and for meeting duties under the Well-being of Future Generations Act (2015). There are five objectives identified to reflect the aims of the people within the County:

- The best start for everyone
- Safe and friendly communities
- To look after and protect the natural environment
- To forge new pathways to prosperity

[123] Future Wales: The national plan 2040. Available at: https://gov.wales/sites/default/files/publications/2021-02/future-wales-the-national-plan-2040.pdf

- To encourage healthy lifestyles

Brecon Beacons National Park Local Development Plan[124], December 2013

Statutory Purposes of the National Park are to:

"to conserve and enhance the natural beauty, wildlife and cultural heritage of the National Park

to promote opportunities for public enjoyment and understanding of the special qualities of the National Park"

Relevant Special Qualities of the Brecon Beacon National Park's (BBNP) include:

"*A feeling of vitality and healthfulness that comes from enjoying the Park's fresh air, clean water, rural setting, open land and locally produced foods."*

Policy SQ1 Special Qualities sets out "*to conserve and enhance the special qualities of the Brecon Beacons National Park*"

The proposed development is located outside of the BBNP but would be situated within close proximity to the National Park's boundary at approximately 400m.

The health assessment considers the following determinants scoped into the assessment including air quality, noise environment, community safety and access to work and training. The air quality assessment considers the potential impacts on both human and ecological receptors in proximity to the proposed development. It is considered that nearby receptors are closer to the emission sources in comparison to the users of the BBNP and will therefore represent a worst case.

8.2.3 Guidance and standards

Rapid Health Impact Assessment Tool, National Health Service (NHS) London Healthy Urban Development Unit (HUDU) (2017)[125]

HUDU work with local and national organisations across the UK on behalf of the NHS to enable health and planning sectors to work together. The HUDU tool is designed to assess the likely health impacts of development plans and proposals and identifies those determinants of health which are likely to be influenced by a specific development proposal.

[124] Brecon Beacons National Park, Local Development Plan, December 2013. Microsoft Word - Brecon text print.doc (beacons-npa.gov.uk)
[125] NHS, 2019. Health Impact Assessment Tool, Healthy Urban Design Unit (HUDU). Available online at: https://www.healthyurbandevelopment.nhs.uk/our-services/delivering-healthy-urban-development/health-impact-assessment/

IMPACT Urban Health Impact Assessment methodology (UrHIA), Liverpool University (2015)[126]

The IMPACT UrHIA methodology sets out a process for assessing health effects and improving health outcomes, particularly in the context of urban settings. The guidance was developed through EU funding to further understanding and improve HIAs.

Wales Health Impact Assessment Support Unit (WHIASU) Health Impact Assessment – A practical guide (2011)[127]

The WHIASU Guidance describes the process and methods used to undertake a health assessment and provides resources to support the assessment. It includes checklists for identifying the health determinants relevant to the health assessment being undertaken.

8.3 Study area

The study area for the health and wellbeing assessment is based on the spatial distribution of the environmental and socio-economic impacts of the proposed development and the location of sensitive receptors. It predominantly focuses on local communities surrounding the site and also follows the study areas of other topics, such as transport, noise and air quality assessments. Baseline data is generally assessed at ward level with the following wards being included due to their proximity to the development site:

- W05000936: Badminton ward
- W05000937: Beaufort ward
- W05000942: Ebbw Vale North ward
- W05000764; Sihowy ward
- W05000945: Rassau ward

Figure 8.1 (ES Volume III) illustrates the location of each of these wards. Comparisons in baseline are provided at the County (Blaenau Gwent) and Country level (Wales).

8.4 Consultation

An EIA Scoping Report was prepared and submitted to BGCBC on 20th May 2021. The EIA Scoping Report sets out the proposed scope for the assessment of health and can be found on BGCBC's planning portal.

A Scoping Opinion was received from BGCBC on the 24th June 2021. This can be viewed on BGCBC's planning portal (application reference C/2021/0128) and

[126] Liverpool University, 2015. Urban Health Impact Assessment Methodology. Available online at: https://livrepository.liverpool.ac.uk/2018902/
[127] Wales Health Impact Assessment Support Unit, 2011. Health Impact Assessment, a Practical Guide. Available online at: https://whiasu.publichealthnetwork.cymru/files/1415/0710/5107/HIA_Tool_Kit_V2_WEB.pdf

has been summarised with responses to explain where the Scoping Opinion comments have been incorporated in the assessment. Table 8.1 below provides responses to relevant comments to health raised in this correspondence.

Table 8.1: Local authority response to scope of health assessment

Scoping opinion comment	Applicant response
BGCBC Environmental Health: Light impats. There is a very brief mention of light nuisance on page 26, just want to ensure the applicant gives due consideration to any potential impacts from the operating of lighting systems both during development and operation of the plant in the EIA	Lighting will be provided by a combination of building mounted, column mounted and bollard luminaires. The strategy adopted to minimise light pollution will be careful selection of positioning of luminaires to avoid obtrusive light, light trespass beyond the boundary and to minimise glare. Luminaires will be selected and positioned to prevent light spill into neighbouring properties, residential accommodation and towards the Brecon Beacons. It is therefore not considered to be a health concern and is not considered within the health assessment.
Public Health Wales: Agree with approach, note the following comments: Regarding environmental considerations, PPW11 highlights the need to consider aspects of climate change, including; □ Will the causes and impacts of climate change be fully taken into account through the location, design, build, operation, decommissioning and restoration; and □ Does it support decarbonisation and transition to a low carbon economy? PHW suggest that coverage of population and human health are considered as a discrete section within the ES. It would be also useful to consider the following five key principles that should underpin the coverage of population and human health within EIA □ Comprehensive approach to health □ Proportionate □ Consistency □ Equity □ Reasonableness	Climate change considerations are made throughout the EIA for all topic areas in addition to a separate climate change chapter considering Greenhouse gas emissions, and resilience to climate change. A separate ES chapter covers population health (this chapter – Chapter 8:Health). It is considered that the assessment has followed the five principles listed. Health outcomes for the identified relevant health determinants considered within the assessment are discussed in the assessment of effects section of the health assessment (Section 8.8-8.11).

Scoping opinion comment	Applicant response
The end point of EIA population and human health analysis should, where possible, describe the predicted health and well-being outcomes as outlined in Planning Policy for Wales Edition 11.	

8.5 Methodology

8.5.1 Overview

There is no established or widely accepted framework for assessing the significant health effects of a development proposal. The health assessment methodology is however based on a review of evidence, linking changes in health determinants to potential health outcomes within the study population.

The health and wellbeing assessment considers the health determinants scoped into the assessment based on the type of development being proposed, i.e. air quality, noise environment, community safety and access to work and training. The assessment considers the beneficial and adverse health effects associated with changes to health determinants resulting from the proposed development being introduced into the local community.

A standard list of health determinants generally included within a health assessment (see guidance listed in 8.2.3) include:

- Housing design and affordability
- Access to health and social care services and other social infrastructure
- Access to open space and nature
- Air quality, noise and neighbourhood amenity
- Accessibility and active travel
- Crime reduction and community safety
- Access to healthy food
- Access to work and training
- Social cohesion and inclusive design
- Minimising the use of resources

- Climate change

Based on an understanding of the environmental permits required, and the activities that would be carried out at the proposed development during both construction and operation, health determinants scoped into the assessment include air quality, noise environment, community safety and access to work and training.

It is considered that the other listed health determinants are not relevant to this proposal and have therefore been scoped out.

These determinants were agreed with BGCBC during scoping.

8.5.2 Methodology for establishing baseline conditions

Using publicly available data, a community profile (i.e. the baseline) is presented to provide a summary of the demographic, social and health characteristics of the population. Sources include Office for National Statistics (ONS) census and mid-year data, the Welsh Index of Multiple Deprivation 2019, StatsWales, NHS Wales Informatic Services and the Public Health Wales Observatory.

The community profile aims to provide an overview of the population's resilience to health effects, and the prevalence and distribution of vulnerable sub-groups who may be more sensitive to changes in health determinants (e.g. deprived communities, people with existing health problems or disabilities, older people and children).

8.5.3 Evidence review

Publicly available literature has been reviewed to identify evidence linking health determinants with health outcomes, including government publications, research papers and peer-reviewed journal articles. The evidence review is set out within Appendix E2.

8.5.4 Assessment methodology

Once the community profile has been established, the assessment is undertaken in the following stages.

8.5.5 Assessment of effects

A qualitative assessment of the likely significant health effects is carried out, based on the level of exposure of the population to changes in health determinants. The assessment identifies potential impacts related to the different stages of development (i.e. construction and operation) and identifies whether these would result in changes to health determinants that would be beneficial or adverse, direct or indirect and long-term or temporary. It also takes into account any mitigation measures embedded into the design of the proposed development. The approach for defining significance considers:

- the magnitude of the impact on a health determinant; and
- the size and sensitivity of the population exposed to the impact.

Most potential health effects cannot be reliably quantified because there are currently no robust or scientifically widely agreed upon methods for quantifying them, or because the types of data required cannot realistically be obtained. It is possible in theory to quantify health effects from increased exposure of a large population to noise and air emissions. However, given the relatively short duration of the study, it would not be possible to identify a statistically significant effect. Therefore, a quantitative assessment of health effects is scoped out.

8.5.6 Magnitude

The magnitude of an impact relates to its severity and/or scale. Magnitude is determined by professional judgement, based on defined assessment criteria (Table 8.2). The characteristics of an impact (i.e. whether direct or indirect, secondary or cumulative, short, medium or long-term, permanent or temporary, reversible or irreversible) is assessed and the magnitude classified as high, medium, low or very low. The assessment of magnitude also considers the nature of potential health outcomes associated with the change, e.g. effects on physical or mental health conditions, quality of life, or comfort.

Table 8.2 Methodology for assessing magnitude of impact

Magnitude	Guidelines
High	A substantial change to a health determinant, with two or more of the following characteristics: assessed as 'major' by relevant environmental topics (where applicable[128]); likely to be perceived by the population as a major change; has the potential to affect the occurrence of acute or chronic mental or physical illness; long term duration or permanent.
Medium	A moderate change to a health determinant, with two or more of the following characteristics: assessed as 'moderate' by relevant environmental topics (where applicable[128]); likely to be perceived by the population as a moderate change; has the potential to improve / reduce mental wellbeing or quality of life, exacerbate / alleviate symptoms of existing illness, or cause nuisance impacts; medium to long-term duration.
Low	A minor change to a health determinant, with two or more of the following characteristics:

[128] Other EIA topics' assessment results are not always relevant to the health assessment. For example, a 'major' effect on an individual receptor would not necessarily constitute a major change to a health determinant that would affect the population as a whole. Professional judgement is required when using information from other topics in the health assessment.

Magnitude	Guidelines
	assessed as 'minor' by relevant environmental topics (where applicable[128]); likely to be perceived by the population as a minor change; has the potential to lower or raise wellbeing in terms of levels of comfort and contentment (for example in relation to noise, odour, or visual amenity); short to medium term duration.
Negligible	A 'negligible' magnitude of impact is likely to be perceptible and localised. It may have the potential to lower or raise wellbeing in terms of levels of comfort and contentment.

8.5.7 Population exposure

The level of population exposure is defined by a combination of two factors: the size of the population exposed to an impact and its vulnerability to health effects. The size of the exposed population is judged on a scale of high, medium, low and very low, dependent on geographical area and number of people exposed. The vulnerability of the population is also judged on a scale of high, medium, low and very low based on indicators of the health and social status of the population (Table 8.3). More vulnerable populations include those with higher levels of social deprivation or relatively poor health status.

Table 8.3: Guidelines for the assessment of population exposure and vulnerability

Rating	Guidelines	
	Population exposure	Population vulnerability
High	A high level of exposure would occur over a wide geographical area and/or be likely to affect a large number of people (e.g. over 500).	Affected population includes a higher than national average proportion of vulnerable or disadvantaged groups (such as children or older people) who are more likely to experience adverse health effects as a result of the impact in question.
Medium	A medium level of exposure would occur over a relatively localised area and/or be likely to affect a moderate-large number of people (e.g. 100-500).	Affected population includes an average or close to average proportion of vulnerable or disadvantaged groups who are more likely to experience adverse health effects as a result of the impact in question.
Low	A low level of exposure would over a small, local area and/or affect a small number of people (e.g. fewer than 100).	Affected population includes a below average proportion of vulnerable or disadvantaged groups who are more likely to experience adverse health effects as a result of the impact in question.
Very low	A very low level of exposure would affect a small number of individuals.	Not applicable (no population is considered

Population exposure and population vulnerability are then combined to give an overall judgement on population sensitivity, on a scale of high, medium, low or very low (Table 8.4).

Table 8.4: Population sensitivity matrix

Population exposure	**Population vulnerability**			
	High	**Medium**	**Low**	**Very low**
High	High	High	Medium	Low
Medium	High	Medium	Low	Low
Low	Medium	Low	Low	Very low
Very low	Low	Low	Very low	Very low

8.5.8 Significance Criteria

To determine overall significance of impact, the assessment matrix provided in Table 8.5 was used. This classifies significance of health impacts as major, moderate, minor or negligible. For the purpose of the EIA, a significant impact is defined as any health impacts identified as moderate and above.

Table 8.5: Significance of impact

Magnitude of impact	**Population sensitivity**			
	High	**Medium**	**Low**	**Very low**
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Minor
Low	Moderate	Minor	Minor	Minor
Negligible	Minor	Minor	Negligible	Negligible

8.5.9 Mitigation

If required, a description of further measures to be incorporated to reduce the adverse and/or enhance the beneficial effects of the proposed development on health determinants is described.

8.5.10 Limitations and assumptions

The assessment draws on the assessment outputs from other assessments within the EIA such as the air quality assessment and noise assessment.

The assessment considers the residual impacts identified by the above disciplines, that is, after mitigation measures have been taken into account. It also assumes that any mitigation outlined by these topics would be effective. The findings from these assessments inform the judgements made within the assessment.

Literature and baseline data used in the health assessment is limited to readily available public and published sources.

The health assessment identifies the impacts on the determinants of health, but there is less certainty regarding the resulting health effects of that impact as it is often dependent on a range of other factors. For example, the proposed development may increase opportunities for employment in the local area, but the uptake of those opportunities by the population is less certain due to the individual choices people make.

8.6 Baseline environment

The health and health determinants baseline is presented on the basis of the wards within the study area, i.e. Rassau (W05000945), Beaufort (W05000937), Badminton (W05000936), Sihowy (W05000764) and Ebbw Vale North (W05000942). The project site sits within the ward of Rassau, but is surrounded by the other wards listed (see Figure 8.1).

Full baseline data is set out in Appendix E1 whilst a summary is provided below.

8.6.1 Health profile summary

In summary, the study area has a relatively even split between males and females with a slightly older age than the regional average. When reviewing the Welsh Index of Multiple Deprivation, the population within the study area is below the national average (i.e. is more deprived), with three of the 13 Lower Super Output Areas[129] (LSOAs) being in the 10% most deprived areas in relation to health. The population is considered to be of high vulnerability in terms of health, medium vulnerability in terms of employment, high vulnerability in terms of education and low vulnerability in terms of physical environment[130].

The high vulnerability in terms of health is a result of the high prevalence of several health conditions within the study area. This includes:

- Significantly higher death rates from respiratory disease than the Wales average;
- Higher hospital admissions due to respiratory disease;
- Higher self-reported rates of ‘bad health’ and ‘very bad health’ than the Welsh average;
- Significantly more people with long term illness or disability; and
- Lower life expectancy than the Welsh average.

8.6.2 Wider determinants of health

Wider determinants of health are factors which influence health outcomes and are set out in Appendix E1. In summary, the following is relevant to the study populations:

[129] LSOAs are the smallest areas of communities measured. They usually contain 1,500 people
[130] These are domains measured by the Welsh Index of Multiple Deprivation

- There is a higher proportion (than Wales average) of universal credit claimants in all wards except for Badminton Ward;
- There is a high proportion of people employed within industrial occupations when compared to other sectors;
- Educational attainment is significantly below the Welsh Average; and
- Anti-social behaviour, and violence and sexual offences are the most reported crime within the study area.

8.6.3 Sensitive receptors

As well as establishing the baseline for health determinants, it is helpful to identify what sensitive human receptors there are in the vicinity of the proposed project site.

Discrete receptors relevant to the assessment are the same as those identified for the air quality assessment and include residential properties, schools, hospitals as well as other sensitive locations and facilities in the area, such as designated ecological sites and protected wildlife sites. Discrete human receptors have been selected based on relevant sensitive receptors in the vicinity of the site, these are shown in Figure 5.1 Location of sensitive human receptors, and detailed in Table 8.6.

Table 8.6: Discrete human receptors

ID	Name	NGR (m)		Height (m)	Distance to site (m) and direction
		X	Y		
1	Rhos Y Fedwen Primary School	315748.6	211960.1	1.5	644 NE
2	Buds to Blossoms Day Nursery	316538.2	211674.9	1.5	1070 N
3	Mrs Puddleduck Day Nursery	315961.3	211748.5	1.5	833 N
4	Glyn Coed Primary School	316572.4	211149.0	1.5	1,572 N
5	Beaufort Hill Primary School	317515.9	211578.9	1.5	1,675 NW
6	Ysbyty'r Tri Chwm Hospital	316189.7	211096.5	1.5	1,509 N
7	Bank House Care Home	316869.0	212498.5	1.5	601 NW
8	Sonael Care Home	316494.1	211526.2	1.5	1,193 N
9	Residential dwelling: Chestnut Close	316201.5	212511.7	1.5	170 N
10	Residential dwelling: Maple Way	316002.8	212373.1	1.5	223 N

ID	Name	NGR (m)		Height (m)	Distance to site (m) and direction
		X	Y		
11	Residential dwelling: Pen-Y-Crug	315834.5	212303.0	1.5	291 N
12	Residential dwelling: Llangynidr Road	316720.3	212811.5	1.5	397 E
13	Residential dwelling: Stonebridge Road	315481.0	212137.3	1.5	516 N
14	Residential dwelling: Nant-T-Croft	314856.8	211566.6	1.5	1,296 NE
15	Residential dwelling: Honeyfield Road	316275.3	212077.7	1.5	600 N
16	Wells Farm	314435.0	211623.0	1.5	1,550 SW
17	Coates Row 1	314489.3	211646.5	1.5	1,467 SW
18	Coates Row 2	314543.5	211727.2	1.5	1,382 SW
19	Residential Dwelling: Beaufort Wells	314568.3	211583.5	1.5	1,467 SW
20	Residential Dwelling: A4046	314619.1	211526.9	1.5	1,472 SW
21	Residential Dwelling: Unnamed Road	314318.5	211324.2	1.5	1,816 SW

8.7 Embedded mitigation

The proposed development would include best practice air quality controls for emissions from the chimney and generators. The best practice controls are detailed within the Part A2 Glass Manufacturing guidance[16].

In accordance with BAT, the following controls are proposed to be installed:

- A chimney 75m in height for each of the main furnaces to allow sufficient dispersion of emissions;
- Secondary abatement measures (Selective Catalytic Reduction) to control emissions of gasses from the furnaces; and
- Filtration of particulate matter from furnace.

The assessment assumes the following or equivalent measures (refer to Appendix B for details on assumed mitigation):

- The selection of plant items, in particular generators and compressors within the Utility Building, have been modelled with embedded attenuation in the form of attenuators in the outlet and inlet;

- Acoustic louvres with a minimum of Rw15-17dB[131] have been included for all louvre opening which overlooks the receptors located to the south. In particular, the southern façade of the Furnace Building and on all the roof louvres of the Furnace Buildings should be acoustic louvres;
- The envelope of the proposed building has been modelled with an acoustic sound reduction index of approximately R_w30-32dB;
- No openable windows for ventilation are included on the southern façade of the Furnace Building or the Batch Building;
- Outdoor fans and associated ductwork serving the furnace stacks have been enclosed;
- The stack case is assumed to be built out of concrete around the flue exhaust and therefore emissions through the body of the stack itself are negligible. Should the stack case change material, then consideration should be given to noise emissions through it and it should be made sure that noise is minimised; and
- Any outdoor ductwork serving the stack exhaust has been modelled as lined to control noise break-out.

8.8 Assessment of effects

This section assesses the potential health effects resulting from construction and operation of the proposed development. Each of the health determinants being considered are assessed in turn and includes a review of the health evidence base relating to each of the scoped in health determinants, i.e. air quality, noise environment, community safety and access to work and training.

8.8.1 Air quality

8.8.2 Construction assessment – air quality

During construction, air quality impacts would be related to construction dust and construction traffic. Construction dust would be generated due to demolition, earthworks, construction and trackout whilst construction traffic includes plant on the site and also traffic that brings construction workers to the site.

There are no residential receptors within 100m of the site although there are 9 high-sensitivity receptors within 1km of the site boundary. This includes:

1. Rhos Y Fedwen Primary School – 644m (NE)
3. Mrs Puddleduck Day Nursery – 833m (N)
7. Bank House Care Home – 601m (NW)
9. Residential dwelling: Chestnut Close – 170m (N)

[131] Sound Reduction Index based on BS 2750/3-1980 (ISO 140/3-1978)

10. Residential dwelling: Maple Way – 223m (N)
11. Residential dwelling: Pen-Y-Crug – 291m (N)
12. Residential dwelling: Llangynidr Road – 397m (E)
13. Residential dwelling: Stonebridge Road – 516m (N)
15. Residential dwelling: Honeyfield Road – 600m (N)

The population as a whole is considered to be highly vulnerable to dust which may lead to increased risk of respiratory disease.

The air quality assessment identifies the risk to human health as being low in relation to dust from earthworks and negligible for construction and trackout, concluding an overall non-significant effect. Based on the health profile, the population are highly vulnerable in terms of changes in air quality. Combined with a low risk of exposure this results in a population sensitivity of medium. A medium sensitivity to changes in air quality combined with low magnitude of effect (as determined in the air quality assessment), results in an adverse health outcome of minor significance.

Construction traffic has been scoped out of the air quality assessment because the number of construction vehicles is below the threshold where it is considered there would be any significant effects. The threshold levels are below 100 heavy duty vehicles (HDVs) or 500 light duty vehicles (LDVs) per day. Construction traffic air quality effects are therefore also not considered within the health assessment.

8.8.3 Operational assessment – air quality

The air quality assessment (EIA Chapter 6) examined the changes in air pollutant concentrations in the surrounding area that would result from the operation of the site at full capacity. Significance levels are based on percentage change in concentrations relative to air quality standards.

As described in the construction assessment, it is considered that the population surrounding the proposed development would have a medium sensitivity to changes in air quality, based on a low exposure and a high vulnerability to changes in health resulting from air quality. For the air pollutant concentrations assessed within the air quality assessment, all have been noted as being of negligible significance for human health. When taking account of the local population (rather than the general risk factors used in the air quality assessment), this results in a change in air quality health determinant of minor significance.

8.9 Noise environment

8.9.1 Construction assessment – noise environment

Most construction activities would take place during the daytime with some work being carried out at night on an infrequent basis if no other time permits.

The noise assessment that has been undertaken for the proposed development concludes that none of the residential receptors studied would experience a significant noise effect, although in some cases there would be a relatively small increase in noise.

In relation to outdoor receptors (such as Public Rights of Way) and other areas within the Industrial Estate the noise assessment also identifies no significant noise effects.

Construction traffic also plays a part in the noise environment during construction as a result of increased numbers of HGVs and construction worker traffic coming to the site. The noise assessment concludes that whilst there are likely to be increases in noise as a result of construction traffic, this would only be negligible.

Construction vibration has been scoped out of the noise assessment due to the distance between the proposed development site and residential properties. It is therefore unlikely to result in any adverse health outcomes.

Due to the nature of the construction being temporary, and based on the assumption that the construction activities would be conducted in accordance with a Code of Construction Practice (CoCP) with Best Practicable Means being employed throughout the construction period, changes to this health determinant are considered to be of low magnitude. The population has a medium vulnerability to changes in noise, with a predicted low noise exposure. This means that the population has a low sensitivity to changes in noise. This low sensitivity alongside the low magnitude of change to noise, results in a minor significant effect in relation to health.

However, it should be noted that noise effects can be very subjective, and it is recommended that the local community is kept informed of planned construction activities so that any associated noise is expected and understood within context.

8.9.2 Operational assessment - noise environment

The facility would be operational 24/7 and therefore would generate industrial noise at all times. The proposed development includes a number of noise sources, each of which have their own acoustic characteristic and sound power levels. The noise assessment has mapped these data to determine levels likely to be experienced at each of the assessed receptors.

The noise assessment identifies that there is likely to be noise exceedance at two receptor locations (R2; Llangynidr Road and R3; Pen Y Bryn Road) of 0.6dB and 2.8-3.6dB respectively. These exceedances are considered to be only marginal and occur during night-time only.

Noise would also be generated from operational traffic; the increase in traffic flows would be due to the increase in staff vehicle trips, HGV increases due to raw materials delivery, and HGV increases due to glass transportation. Changes in noise levels as a result of increased traffic have been identified as being of negligible magnitude in the noise assessment (ranging in increases of between 0.3 and 1.6 dBA in the day and 0.2 and 0.4 dBA in the night).

These changes in levels of noise from industrial and traffic sources represent a low magnitude of impact and have been identified as not significant in the noise assessment. Due to the low levels of noise exceedances and the low numbers of people who would be exposed, this represents a low population exposure to noise. However, people who are most vulnerable to changes in noise include young children, older people and those who are suffering with ill health. This part of the population is considered to be of high vulnerability to increased levels of noise, which combined with the low exposure results in medium sensitivity to noise. Combined with the low magnitude of noise impact, this results in a minor adverse significant operational health impact and is not considered to be significant.

8.10 Crime and community safety

8.10.1 Construction assessment – community safety

During peak periods of construction there would be an influx of up to 450 construction workers to the area (at peak construction), who may reside temporarily in the area, but are more likely to travel into the site from the wider regional area and therefore only be there during working hours (Likely 8am – 6pm Monday to Friday and 12pm – 6pm Saturdays). Some local people may have the necessary skills for construction employment opportunities, but for the purpose of the assessment, it is assumed that the majority travel into the area from elsewhere (i.e. worst case).

There may be crime and community safety impacts as a result of construction workers coming to the area which are discussed below in relation to increased construction traffic and plant movement and also increased potential for crime.

Increased construction traffic and plant movements

The plant used on site would be confined to the site construction areas, except when being transported to site. Access onto construction sites is tightly controlled and any risk to public safety from plant would therefore be minimal. The implementation of a Code of Construction Practice would also seek to achieve minimal disruption to the local highway network, thereby maintaining public safety.

HGV movements during construction to and from the site would increase but as identified in the transport assessment, these HGVs would utilise the existing A465 Heads of the Valley road, exiting onto the local road which runs into Rassau Industrial Estate. Whilst this means that the HGVs would pass by residential receptors on this part of the road, it is considered that there would be low risk to the local population from construction traffic.

Increased potential for crime

Where there are more people, there is a higher chance that crime will be committed. With an influx of 450 construction workers (at peak construction) into relatively small communities, this could present opportunities for increased crime.

However, it is anticipated that most construction workers would commute from the regional areas and therefore only be present during working hours. Most crime recorded in the area relates to anti-social behaviour and violent and sexual offences (See Appendix E1, Table E.13).

Anti-social behaviour covers a wide range of behaviours including misuse of public space (includes drug use and dealing, street drinking, begging, prostitution, kerb crawling, sexual acts, abandoned cars inappropriate vehicle use), disregard for community/personal well-being (includes noise, rowdy behaviour, nuisance behaviour, hoax calls, animal related problems), acts directed at people (includes intimidation/harassment) and environmental damage (includes criminal damage/vandalism, litter and rubbish).

It is not yet known how the construction staff would be managed, but it is anticipated that construction workers would mostly be confined to the construction site and only during working hours.

Within the study community, those most vulnerable to crime and safety issues include younger people, older people and those who are physically or mentally disadvantaged. As there are higher than average numbers of older people and those with poor health, the community is considered to be of high vulnerability to change. The population exposure is considered to be low resulting in a population sensitivity of medium (see Table 9.3). The magnitude of change to crime rates and community safety concerns is considered to be low. Combining magnitude and sensitivity results in a health impact of minor significance as a result of changes in this health determinant.

8.10.2 Operational assessment - community safety

Increased operation traffic

As with the construction phase, there would be an increase in traffic associated with the glass factory during operation; both from employees travelling to/from the site and also HGVs transporting materials to/from the site. Table 8.7 presents the vehicular trip generation for future staff of the proposed development site as reported in the Transport Statement. It should be noted that for illustrative purposes, not all hours where vehicle trips occur are shown.

Table 8.7: Proposed Development – Daily Staff Trips

	Time	Arrivals	Departures	Total
AM Peak Period	07:00-08:00	276	0	276
	08:00-09:00	0	98	98
	09:00-10:00	2	0	2
PM Peak Period	16:00-17:00	0	190	190
	17:00-18:00	0	0	0
	18:00-19:00	0	86	86
	Total (24 Hour)	**490**	**490**	**981**

Table 8.8 presents the vehicular trip generation for HGVs associated with the delivery of materials and glass transportation to/from the site daily.

Table 8.8: Proposed Development – Daily HGV Trips

	Time	Arrivals	Departures	Total*
AM Peak Period	07:00-08:00	18	18	36
	08:00-09:00	61	55	116
	09:00-10:00	10	10	19
PM Peak Period	16:00-17:00	10	10	19
	17:00-18:00	3	10	13
	18:00-19:00	3	3	6
	Total (24 Hour)	**190**	**190**	**380**

*Number subject to rounding

Table 8.9 presents the total vehicular trip generation expected to be associated with the proposed development site, including both staff and HGVs.

Table 8.9: Total Proposed Development Trips

	Time	Arrivals	Departures	Total*
AM Peak Period	07:00-08:00	294	18	312
	08:00-09:00	61	153	214
	09:00-10:00	12	10	21
PM Peak Period	16:00-17:00	10	199	209
	17:00-18:00	3	10	13
	18:00-19:00	3	89	92
	Total (24 Hour)	**680**	**680**	**1,361**

*Number subject to rounding

Table 8.9 shows that the proposed development could be associated with up to 679 two-way daily trips (1,358 total). The table also shows that generally these are fairly well distributed across the day and as a result, there is likely to be an additional 197 trips in the typical AM peak hour (08:00–09:00) and up to 12 additional vehicular trips in the PM Peak hour (17:00–18:00).

Most of these vehicles are likely to have travelled most of their journeys on the A465 which has capacity to absorb these additional volumes of traffic. Once it leaves the A465 onto the local dual carriageway into the industrial estate, from a health perspective an increase in 1,358 vehicle movements represents potential for safety impacts. The transport assessment (EIA Chapter 12) provides an analysis of Crashmap accident data within the study area. No correlations were identified between highway layout, design or condition that were considered contributory factors in the pattern of collisions. However, the cause of accident is unknown, therefore it is considered that any increases in traffic resulting from the proposed

development are anticipated to have a negligible effect with regards to accidents and safety, resulting in no health impacts.

Increased potential for crime

As described above in the construction impact section, crime, and fear of crime, is related (in this context) to the increased number of people coming into the area for employment. During operation it is anticipated that there would be approximately 670 direct employment opportunities. These roles are likely to be filled locally and regionally resulting in people travelling into the site.

The assessment during operation is the same as that for construction (see section 8.10.2), i.e. impacts of minor significance.

8.11 Access to work and training

8.11.1 Construction assessment – employment and training

During peak periods of construction activity there may be 400-500 workers on site. These would be specific construction jobs, some of which could be filled by local people who work in construction. However, within the study area (based on 2011 census data) there were 624 people working in construction (7.5% of the local workforce) who are likely to be employed elsewhere on construction projects and may therefore not be readily available for work on this project. It is not currently known where the contractor would source its employees; sourcing locally would depend on the skills needed and whether they are available locally.

It is considered a reasonable assumption that many of the construction workers are likely to come from outside the local area, the number of jobs and training opportunities available for local people is therefore likely to be relatively low (low exposure). The local population is highly vulnerable to changes in employment which combined with a low exposure leads to a population that is of medium sensitivity. Combined with a low magnitude of impact (job opportunities), it is anticipated that this would lead to positive health outcomes of minor significance.

8.11.2 Operational assessment – employment and training

During operation there are likely to be approximately 670 direct employment opportunities; this includes 80% technical, 18% engineering and administrative and 2% managerial. It is likely that these roles would be filled by people who live regionally, with some potentially living within the local communities that are the subject of the health assessment. It is not possible to predict how many local people would benefit from employment opportunities or whether these employees would be displaced from other roles they already hold. However, the local community is highly vulnerable to changes in employment due to the high level of unemployment experienced. Exposure to new employment and training opportunities is considered to be low because there is likely to be a mismatch between qualifications needed to gain employment and those held by the population within the local wards. This results in a medium sensitivity to change.

However, the inward investment into an area which experiences high levels of unemployment is likely to represent a medium magnitude change, which when combined with a moderate sensitivity results in a prediction that changes in this health determinant would result in positive effects of moderate significance.

This would be enhanced further should the proposed development offer training opportunities which are specifically aimed at people within the local communities.

8.11.3 Potential impacts due to climate change

When considering health impacts, it is important to consider whether health outcomes resulting from the proposed development are likely to change (or become more intense) as a result of climate change. It is considered that climate change would not affect the conclusions of the health assessment.

8.12 Mitigation and enhancement

8.12.1 Mitigation of effects from construction

Mitigation in relation to noise and air quality impacts are covered within ES chapter 11; Noise and chapter 6; Air quality and mostly relates to embedded mitigation required by the CEMP. The only additional mitigation measure includes the recommendation to keep local residence informed of the construction programme and to inform them when particularly noisy construction practices are going to be taking place.

Positive effects results from potential employment opportunities for local communities during construction will be enhanced through the use of local procurement strategies.

8.12.2 Mitigation of effects from operation

During operation no mitigation measures are considered necessary in relation to changes in determinants of health.

The beneficial impact resulting from increased employment opportunities for local communities would be enhanced further through the adoption of a local procurement policy.

8.13 Residual effects

Based on the assessment of changes to health determinants resulting from the proposed development, and incorporating the mitigation measures identified, the following residual effects would result:

Table 8.10 Residual Health effects during construction

Sensitivity of population to changes in health determinant[132]	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Air quality: Medium	Exposure to dust from demolition, earthworks, construction and trackout	Minor	Following measures set out in CEMP	Minor
Noise: Low	Exposure to noise	Minor	Following measures set out in CEMP	Minor
Crime and community safety: Medium	Increased traffic and influx of construction workers	Minor	None	Minor
Access to work and training: Medium	Increased opportunities for training and work	Minor (+)	Local procurement and recruitment plan	Minor (+)

Table 8.11 Residual Health effects during construction

Sensitivity of population to changes in health determinant[1]	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Air quality: Medium	Exposure to pollutants	Minor	None (assumed adherence to Environmental Permit)	Minor
Noise: Low	Exposure to operational noise and traffic	Minor	Utilisation of Best Available Techniques (BAT)	Minor
Crime and community safety: Medium	Increased traffic (HGVs)	Minor	None	Minor
Access to work and training: Medium	Increased opportunities for training and work	Moderate (+)	Local procurement and recruitment plan	Moderate (+)

[132] Health assessments are based on consideration of the population as a whole rather than individuals within that population. Reference is therefore made in terms of how sensitive the population as a whole is to changes in health determinants.

9 Materials and waste

9.1 Introduction

This chapter of the ES provides an assessment of the likely significant environmental effects of material resource use associated with the construction and operation and waste generation associated with the construction of the proposed development. Operational wastes have been scoped out of this assessment as described in this chapter.

Material resources, in the context of this chapter, are defined as substances and objects used during the construction and operation of the proposed development. During construction these would include primary raw materials, such as aggregates and minerals, and manufactured products, including concrete. During operation these would include materials required for the manufacture of glass bottles, including sand, feldspar and recycled materials in the form of cullet. The assessment presented in this chapter considers the types and quantities of the materials required and the impact of using these materials on the availability of materials.

Waste is defined by the Waste Framework Directive (Directive 2008/98/EC)[133] as 'any substance or object which the holder discards or intends or is required to discard'. An assessment of the effects due to waste generation during the construction and operation of the proposed development was scoped out of the EIA on the basis that the local and regional waste management facilities have sufficient capacity for the expected waste produced. However, following submission of the scoping to BGCBC, changes in the earthworks design associated with the development platform has resulted in an expected excess of earthworks materials to be disposed of. On this basis a construction waste assessment has been included in the assessment, to consider the effects of the management and disposal of the excess excavation materials. Further to this, an outline Site Waste Management Plan (SWMP) has been produced (See Appendix A3). The SWMP is a live document and will be further refined by the contractor to support the sustainable management of materials and waste during construction.

It is outside the scope of the assessment to assess any indirect environmental effects associated with the extraction of raw materials from their original source, the manufacture of construction products which occur off-site and the offsite disposal of waste. It is also outside the scope of this chapter to undertake an assessment of greenhouse gas emissions associated with the use and transportation of materials (refer to Chapter 6 Climate Change of this ES).

Safeguarding resources and limiting the environmental impact associated with their extraction will drive a sustainable approach to materials use in the construction and operation of the proposed development. The proposed

[133] European Commission, Waste Framework Directive (Directive 2008/98/EC)

development will employ principles of circular economy, which will reduce demand on materials during construction and operation.

9.2 Legislation, policy context and guidance

9.2.1 Legislation

The Environment (Amendment etc.) (EU Exit) Regulations 2019

These came into force in accordance with the European Union (Withdrawal) Act 2018 on 31 December 2020. Part 2 amends the following primary legislation of relevance to materials and waste:

- The Environmental Protection Act 1990 (summary provided below)
- The Environment Act 1995 (summary provided below)
- Pollution Prevention and Control Act 1999

Environmental Protection Act 1990

The Environmental Protection Act 1990 makes provision for the control of pollution arising from certain industrial and other processes and it re-enacts the provisions of the Control of Pollution Act 1974 relating to waste on land, defining all aspects of waste management and places a duty on local authorities to collect waste. Anyone who produces, imports, keeps, stores, transports, treats or disposes of waste must take all reasonable steps to ensure that waste is managed properly. This duty of care is imposed under section 34 of the Environmental Protection Act 1990.

Environment Act 1995

The Environment Act 1995 sets standards for environmental management, such as requiring national strategies for air quality and waste. It also deals with the establishment of the EA. It is amended by The Environment (Amendment etc.) (EU Exit) Regulations 2019.

The Environment Act 2021

The Environment Act 2021 does not revoke or replace the Environment Act 1995, but it does make amendments to strengthen and enforce adoption of the environmental provisions. Relevant to material and waste the Act includes requirements for the Secretary of State for DEFRA, to set long-term legally binding targets on resource efficiency and waste reduction within the UK, by late 2022.

The Environmental Permitting Regulations 2016

The Environmental Permitting Regulations 2016 consolidate the system of environmental permitting in England and Wales, replacing the Environmental Permitting (England and Wales) Regulations 2010. They widened the existing environmental permitting and compliance system in England and Wales by

integrating the existing permitting regimes covering pollution prevention and control and waste management licensing, water discharge consents, groundwater authorisations and radioactive substances regulation authorisations.

Additionally, they incorporate the outcomes of the Waste Exemptions Order Review and they also bringing together the amending regulations that implemented European legislation on mining waste and batteries into a single environmental permitting system.

The Waste (Circular Economy) (Amendment) Regulations 2020

This legislation transposes the EU's 2020 Circular Economy Package (2020 CEP) in England and Wales, and Scotland and Northern Ireland.

The Statutory Instrument (SI) transposes six amending EU Directives in the field of waste, including:

- Directive (EU) 2018/850 amended Directive 1999/31/EC on the landfill of waste ("the Landfill Directive")
- Directive (EU) 2018/851 amended 2008/98/EC on waste ("the Waste Framework Directive")
- Directive (EU) 2018/852 amended 94/62/EC on packaging and packaging waste ("the Packaging Directive")
- Commission Delegated Directive (EU) 2020/362 and Commission Delegated Directive (EU) 2020/363 amend Annex II of the ELV Directive

EU Waste Framework Directive 2008/98/EC

The overarching policy in relation to the handling of material resources for the proposed development is the EU Waste Framework Directive 2008/98/EC. This provides the framework legislation for the collection, transport, recovery and disposal of waste. It includes a common definition of 'waste', which is 'any substance or object which the holder discards or intends or is required to discard', with the term 'discard' including the disposal, recovery or recycling of a substance.

The overall purpose of the Waste Framework Directive is to set out measures to protect the environment and human health by preventing or reducing effects of waste generation and its management, and by improving the efficiency of resource use. Where waste is unavoidable the Waste Hierarchy (Figure 9.1) sets out how materials, subject to regulatory controls, should be used again for the same, or different, purpose. If not possible, resources should be recycled or value can also be gained through generating energy from waste but only if the other solutions are impossible.

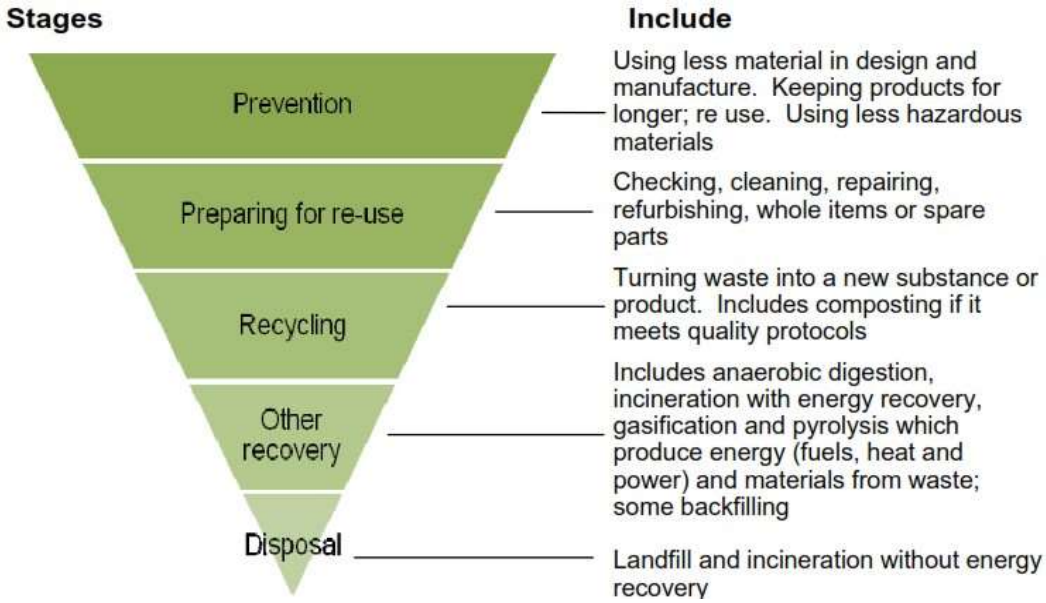


Figure 9.1: The Waste Hierarchy

The Waste (England and Wales) Regulations (2011)

Directive 2008/98/EC has now been transposed in Wales by the Waste (England and Wales) Regulations 2011 (S.I. 2011 No. 988) (as amended). In Wales, the Regulations are supplemented by the Waste (Miscellaneous Provisions) (Wales) Regulations 2011 (S.I. 2011 No. 971 (W.141)). In addition, the following legislation relating to material resources and waste management has been highlight as relevant to the content of this assessment:

The Controlled Waste (England and Wales) Regulations 2012 which classify waste as household, industrial or commercial and determine the meaning of 'controlled waste'.

The Hazardous Waste (England and Wales) Regulations 2005 which determine the control and monitoring of the movement of hazardous waste in order to implement the Hazardous Waste Directive (Directive 91/689/EC).

Well-being of Future Generations (Wales) Act 2015

The Well-being of Future Generations (Wales) Act 2015 places a statutory duty on public bodies in Wales to consider sustainable development in their decision-making and expands the concept of sustainability.

The Environment (Wales) Act 2016

The Environment (Wales) Act 2016 introduced the Sustainable Management of Natural Resources and set out a framework to achieve this as part of decision-making. The primary objective is to maintain and enhance the resilience of ecosystems and the benefits they provide. The Act requires a statutory Natural Resources Policy (NRP) to be published and implemented by the Welsh Government. This sets the direction for sustainable management of natural resources and NRW is required to produce a 'State of Natural Resources Report', accompanied by 'Area Statements' to inform action taken locally.

The NRP sets out three National Priorities, linked directly to achieving goals within the Well-being of Future Generations (Wales) Act. These are: delivering nature-based solutions; increasing renewable energy and resource efficiency; and taking a place-based approach. Minerals are noted in relation to the second priority (resource efficiency). The NRP promotes use of recycled and secondary aggregates and the optimal utilisation of primary aggregates.

9.2.2 Policy Context

National planning policy

Future Wales: The National Plan 2040

Future Wales is a plan promoting development that would enhance wellbeing and quality of life. The plan considers the sources and use of minerals and aggregate and requires regional Strategic Development Plans to consider strategic regional issues including minerals extraction, the circular economy, waste treatment and disposal.

Planning Policy Wales (Edition 11)

PPW11 sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs), Welsh Government Circulars, and policy clarification letters, which together with PPW11 provide the national planning policy.

PPW outlines need for conserving a sufficient supply of minerals that are required for the construction and requires a minimum ten-year landbank of crushed rock and minimum seven-year landbank for sand and gravel should therefore be maintained during the entire plan period.

The State of Natural Resources Report

The State of Natural Resources Report (SoNaRR2020) provides an assessment of the current state of natural resources in Wales, the ecosystems they are set within and the social and economic spheres that natural resources support. The report takes a broad view on sustainability and socio-ecological systems and highlights the importance of reducing consumption of all natural resources to limit impacts on key ecosystems including woodlands, mountains, moorlands and heath and freshwater ecosystems. This approach is presented as a method to achieve a more resilient, healthier future for people and the environment in Wales.

Towards Zero Waste, One Wales: One Planet 2010

Towards Zero Waste sets out the requirement for Wales to reach as close to zero waste as possible to tackle a number of challenges including climate change, sustainability, ecological footprint and security of resources. Minimising resource use by maximising resource use efficiency and maintaining high recycling rates is essential in reducing pressure on resources, including mineral resources.

Beyond Recycling: A strategy to make the circular economy in Wales a reality

The Strategy sets out Welsh Government's ambition and commitment over the course of the next decade to accelerate the transition to a circular, low carbon economy. The Strategy includes eight ambitious actions to keep resources and materials in use for as long as possible and thereby avoiding the generation of waste.

Minerals Technical Advice Note 1: Aggregates (MTAN1)

MTAN1 provides technical guidance to supplement the Welsh National minerals planning policy. It requires aggregates provision to be managed sustainably, ensuring provision of any necessary extraction whilst minimising demonstrable harm to any features of interests of acknowledged importance, whether these interests are environmental, economic or social. In line with the National Planning Policy Framework, MTAN1 outlines that a minimum 10-year landbank of crushed rock and a minimum 7 year landbank for sand and gravel should be maintained during the entire plan period of each local planning authority's development plan (except within National Parks and AONBs), as identified in the NPPF. Importantly, the MTAN1 also highlights that Blaenau Gwent is currently experiencing a shortfall of crushed rock aggregate of 1.7 million tonnes[136] which may cause issues for construction of vital infrastructure and housing in the region.

Regional Technical Statement for the North Wales and South Wales Regional Aggregate Working Parties – Second Review

The Regional Technical Statement for the North Wales and South Wales Regional Aggregate Working Parties – Second Review (Regional Technical Statement) sets the direction for sustainable use of aggregate for a 25 year period up to 2041 to ensure that the region can react to any significant change in circumstances. The Regional Technical Statement reflects changes in demand for aggregate up to 2041 during which an increase in aggregate demand is expected. By taking market changes into account, the Regional Technical Statement helps to more accurately guide the sustainable use of minerals in Wales.

Circular Economy Package Policy Statement

The Circular Economy Package introduces a legislative framework for the UK to move towards a more circular economy, with a view to reduce demand on resources so that they can remain in use for as long as possible and minimise waste.

The Aggregates Levy

The Aggregates Levy was introduced in April 2002 to encourage substitution of secondary aggregates for raw materials, by exempting secondary aggregates from taxation.

Local planning policy

Blaenau Gwent Local Development Plan Preferred Strategy

The Preferred Strategy sets out the long-term vision for Blaenau Gwent by indicating how much development is needed within the Borough and the likely locations for this development over the 15-year period 2018-2033. It identifies the key challenges for the Replacement Local Development Plan (RLDP) to address, a vision and set of objectives. The Preferred Strategy sets out 15 strategic policy to assist in the delivery of the vision and objectives.

Strategic Policy 6: Sustainable Minerals Management sets out Blaenau Gwent's aim to conserve a 10-year land bank of permitted aggregate reserves in line with objectives laid out by the National Planning Policy Framework.

Strategic Policy 7: Sustainable Waste Management highlights the importance of supporting the circular economy by minimising generation of waste and reusing and recycled materials waste materials where possible. The policy also stipulates that all proposals should adhere to the waste hierarchy.

9.2.3 Guidance and standards

IEMA Guide to Materials and Waste in Environmental Impact Assessment (the IEMA Guidance)

This document provides guidance and recommendations for EIA practitioners and stakeholders concerned with the impacts and effects of materials and waste on the environment.

9.3 Study area

The assessment considers two geographically distinct study areas. The first, the proposed development area, is shown in Figure 2.1 in Volume III Figures. The second is a larger or 'expansive study area' which incorporates the locations of feasible materials sources and waste management infrastructure within a defined region. This expansive study area extends to the availability of construction materials within a defined region. Whilst endeavours will be made to source materials locally, it is likely that some of the materials required will need to be sourced further afield and so the expansive study area extends to Wales and England. Some materials, in particular certain operational raw materials, will need to be sourced from overseas; an assessment of these materials is outside the scope of this chapter as the extent of the global baseline has not been possible to quantify.

9.4 Consultation

An EIA scoping report was prepared and submitted to BGCBC on the 20th May 2021. The EIA scoping report set out the proposed scope for the assessment of materials and can be found on BGCBC's planning portal (Application reference C/2021/0128).

A scoping opinion was received from BGCBC on the 24th June 2021. This can be viewed in Appendix A2 in Volume II Appendices and has been summarised with responses to explain where the scoping opinion comments have been incorporated in the assessment.

The scoping opinion confirmed the approach for the materials and waste assessment proposed in the Arup EIA scoping report. No further comments on other elements of the assessment were identified in the scoping opinion.

As reported in Section 9.1, since the submission of the scoping report to BGCBC, a development in the design which has resulted in a change in cut and fill balance associated with the creation of the development platform, means that there will now be an excess of excavated materials. For this reason, a construction waste assessment has now been included in the scope of the assessment to consider the potential impact for the excess excavated materials.

9.5 Methodology

The assessment of the effects of the proposed development on material resources and waste generation has been undertaken in line with the IEMA Guide to Materials and Waste in Environmental Impact Assessment (the IEMA Guidance)[134].

In terms of materials, the assessment considers the potential effects of the proposed development in relation to the sterilisation of the sources of unextracted material, due to construction, and in relation to the availability of primary materials due to their use in the construction and operational of the proposed development.

In terms of waste, the assessment considers the potential effects of the proposed development on landfill capacity during construction, due to the generation and disposal of waste.

The following information has been considered (where available) during the assessment:

- The type and volume of materials to be consumed during construction and operation
- Information on any materials that will comprise secondary or recycled content
- Information on any known sustainability credentials of materials to be consumed
- The region from which materials are likely to be sourced
- The volume or weight of excavated arisings that will be reused or recycled
- The type and volume of materials that will be recovered form off-site sources
- The presence of underlying or adjacent allocated mineral sites

[134] IEMA (2020) Guide to Materials and Waste in Environmental Impact Assessment. Guidance for a proportionate approach

- The cut and fill balance for the proposed development
- The type and volume of excavation waste to be generated during construction
- Details of on-site storage and segregation arrangements for waste
- The type and volume of waste to be discarded to landfill.

9.5.1 Assessing sensitivity

The sensitivity of materials relates to the availability and type of resources to be consumed by the proposed development. The sensitivity has been determined by identifying where one or more of the criteria in Table 9.1 (adapted from the IEMA Guidance) are met.

Table 9.1: Criteria for assessing sensitivity of materials

Negligible	Low	Medium	High	Very High
Are forecast (through trend analysis and other information) to be free from known issues regarding supply and stock	Are forecast (through trend analysis and other information) to be generally free from known issues regarding supply and stock	Are forecast (through trend analysis and other information) to suffer from some known issues regarding supply and stock	Are forecast (through trend analysis and other information) to suffer from known issues regarding supply and stock	Are known to be insufficient in terms of production, supply and/or stock
Are available comprising a very high proportion of sustainable features and benefits compared to industry-standard materials	Are available comprising a high proportion of sustainable features and benefits compared to industry-standard materials	Are available comprising some sustainable features and benefits compared to industry-standard materials	Comprise little or no sustainable features and benefits compared to industry-standard materials	Comprise no sustainable features and benefits compared to industry-standard materials

The sensitivity of waste receptors relates to the availability of regional landfill void capacity. The sensitivity has been determined by considering the volume of waste for disposal expected to be generated within the study area as a consequence of the proposed development alongside the remaining landfill void capacity. The criteria in Table 9.2 (adapted from the IEMA Guidance) has been used to identify the sensitivity of inert and non-hazardous landfill void capacity and hazardous landfill void capacity.

Table 9.2: Criteria for assessing sensitivity of regional landfill void capacity

Inert and non-hazardous landfill capacity				
Negligible	**Low**	**Medium**	**High**	**Very High**
Landfill void capacity is	Landfill void	Landfill void capacity is	Landfill void capacity is	Landfill void capacity is expected to reduce very

expected to remain unchanged or expected to increase through a committed change in capacity	capacity is expected to reduce minimally: by <1% as a result of wastes forecast.	expected to reduce noticeably: by 1-5% as a result of wastes forecast.	expected to reduce considerably: by 6-10% as a result of wastes forecast.	considerably (by >10%); end during construction or operation; is already known to be unavailable; or, would require new capacity or infrastructure to be put in place to meet forecast demand.
Hazardous landfill capacity				
Negligible	**Low**	**Medium**	**High**	**Very High**
Landfill void capacity is expected to remain unchanged, or is expected to increase through a committed change in capacity	Landfill void capacity is expected to reduce minimally, by <0.1% as a result of wastes forecast	Landfill void capacity is expected to reduce noticeably, by 0.1-0.5% as a result of the wastes forecast	Landfill void capacity is expected to reduce considerably, by 0.5-1% as a result of the wastes forecast	Landfill void capacity is expected to reduce very considerably (by >1%); end during construction or operation; is already known to be unavailable; or, would require new capacity or infrastructure to be put in place to meet forecast demand.

9.5.2 Assessing magnitude

A percentage-based approach that determines the influence of materials consumption on the baseline market capacity, in combination with the potential to sterilise one or more mineral sites has been undertaken to determine the magnitude of impact. The criteria for assessing magnitude of impacts is summarised in Table 9.3 (adapted from the IEMA guidance).

Table 9.3: Criteria to assess magnitude of impacts on material sources

No change	Negligible	Minor	Moderate	Major
No materials are required	No individual material type is equal to or greater than 1% by volume of the regional baseline availability	One or more materials is between 1-5% by volume of the regional baseline availability and/or the development has the potential to adversely and	One or more materials is between 6-10% by volume of the regional baseline availability and/or one allocated mineral site is substantially sterilised by the	One or more materials is >10% by volume of the regional baseline availability and/or more than one

No change	Negligible	Minor	Moderate	Major
		substantially impact access to one or more allocated mineral site (in their entirety) placing their future use at risk	development rendering it inaccessible for future use	allocated mineral site is substantially sterilised by the development rendering it inaccessible for future use

For waste, magnitude of effects has been determined through a percentage-based approach that assesses waste as a proportion of the landfill void capacity that would be filled as a result of the proposed development, as recommended in the IEMA Guidance and summarised in Table 9.4 below.

Table 9.4: Criteria to assess magnitude of impacts on landfill void capacity

Inert and non-hazardous waste				
No change	**Negligible**	**Minor**	**Moderate**	**Major**
Zero waste generation and disposal from the development	Waste generated by the development will reduce regional landfill void capacity baseline by <1%	Waste generated by the development will reduce regional landfill void capacity baseline by 1-5%.	Waste generated by the development will reduce regional landfill void capacity baseline by 6-10%	Waste generated by the development will reduce regional landfill void capacity baseline by >10%.
Hazardous waste				
No change	**Negligible**	**Minor**	**Moderator**	**Major**
Zero waste generation and disposal from development	Waste generated by the development will reduce national landfill void capacity baseline by <0.1%	Waste generated by the development will reduce national landfill void capacity baseline by <0.1-0.5%	Waste generated by the development will reduce national landfill void capacity baseline by 0.5%-1%	Waste generated by the development will reduce national landfill void capacity baseline by >1%

9.5.3 Determining the significance of effects

The overall significance of effects is determined by the sensitivity of receptors in combination with the magnitude of effects, as demonstrated by the matrix in Table 9.5. (adapted from the IEMA guidance).

Table 9.5: Significance of effects matrix, considering the magnitude of impact in the context of sensitivity of receptor

	Magnitude of impact

Sensitivity (or value) of receptor		No change	Negligible	Minor	Moderate	Major
	Very high	Neutral	Slight	Moderate or large	Large or very large	Very large
	High	Neutral	Slight	Slight or moderate	Moderate or large	Large or very large
	Medium	Neutral	Neutral or slight	Slight	Moderate	Moderate or large
	Low	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate
	Negligible	Neutral	Neutral or slight	Neutral or slight	Neutral or slight	Slight

The overall effects have been defined as significant or not significant using the thresholds in Table 9.6.

Table 9.6: Thresholds of determining if an effect is significant or not significant

Effect	Materials	Waste
Neutral	Not significant	Not significant
Slight		
Moderate	Significant	Significant
Large		
Very large		

9.6 Baseline environment

The baseline conditions for material resources and waste generation have been identified as the materials resources and waste management capacity that has potential to be impacted by the proposed development. The baseline conditions relating to material resources have been informed by a desk-based study (Volume II Appendix J1) and the following sources of information:

- BGS Aggregates Safeguarding and Mineral Resources Map
- Local Development Plan (Preferred Strategy) for Blaenau Gwent including relevant local development policies
- Minerals Technical Advice Note 1: Aggregates
- Regional Technical Statement for the North Wales and South Wales Regional Aggregate Working Parties – Second Review.

The following sources of information have informed the baseline conditions relating to waste:

- Waste Planning Monitoring Report, South East Wales (April 2016)
- Natural Resources Wales - Estimated Landfill Void Wales (2018)

- Welsh Government StatsWales – Rolling 12 month period of waste management data for Blaenau Gwent.

A list of the receptors which have the potential to be impacted by the proposed development is provided in Table 9.7 with the relevant phase of the proposed development. This section provides a description of the sensitivity of each receptor using the methodology outlined in Section 9.5.

Table 9.7: Receptors with potential to be impacted by each phase of the proposed development

Receptor	Phase
Primary onsite material sources	Construction
Primary offsite materials sources	Construction and operation
Manufactured offsite material sources	Construction and operation
Regional landfill capacity	Construction

9.6.1 Primary onsite material sources

The BGCBC LDP (Preferred Strategy) outlines Mineral Safeguarding Areas and Allocated Mineral Sites within the local authority area. The proposed development's 'development area', defined by the site footprint does not encroach onto any Allocated Mineral Sites or Mineral Safeguarding Areas and therefore the sensitivity of primary onsite material sources is considered to be low.

9.6.2 Primary offsite materials sources

9.6.2.1 Sources of material required for construction

The Regional Technical Statement reports that the current annual apportionment for Blaenau Gwent, based on 10-year aggregate sales, is 239,000 tonnes per year (t/yr). The South Wales Regional Aggregates Working Party Report (2018)[135] established that Blaenau Gwent had six years supply of crushed rock aggregate in 2018. Assuming that the use of aggregates ha matched the predicted rates over the three year period, at the time of writing, there are three years remaining, as it is understood that no new aggregate sources have been secured since 2018.

As all local authorities are required to maintain a ten year landbank of aggregates, as outlined in MTAN1 in alignment with the NPPF, the Blaenau Gwent region is experiencing a shortfall of crushed rock aggregate which equates to 1.7 million tonnes over 10 years[136]. Provision of aggregates for housing and other key buildings and infrastructure in the region have been identified as a priority in the LDP Preferred Strategy and MTAN1, and demand on aggregates for the proposed development could impact availability of local supply for these priority areas.

[135] Accessed on 05/25/2021 at: http://www.swrawp-wales.org.uk/Html/SWRAWP%20Annual%20Report%202018%20FINAL.pdf
[136] Regional Technical Statement for the North Wales and South Wales Regional Aggregate Working Parties – Second Review South Wales (September 2020)

The Regional Technical Statement confirms that the wider 'Gwent' region is also experiencing a shortfall in availability of mineral resources. As such, landbanks from other local authority areas cannot be relied upon to support the shortfall in Blaenau Gwent. Although there is a projected shortfall, there are aggregates available in the region at present. In line with Table 9.1, considering current availability over the next three years and the projected shortfall, the sensitivity of local sources of primary material required for construction is considered to be high.

9.6.2.2 Sources of material required for operation

The operational phase of the proposed development will require the use of raw and recycled materials to produce and package the glass bottles.

The main raw materials required for the production of the glass bottles would be silica sand, soda ash and feldspar. It is planned to source these materials from outside of the UK, due to lack of availability within the UK and to ensure high quality silica sand required for the glass bottle manufacturing facility. The supply of these material has therefore been scoped out of the assessment.

Other materials required for operation include flint and amber cullet, dolomite, limestone, sodium sulphate, zinc selenite, hematite, cerium, carbon and cardboard for packaging.

These materials will be sourced from the UK, expected to be within 200 miles of the facility. In 2014, the UK produced 3.73 million tonnes of dolomite[137]. This is the most up to date figure available for dolomite available, but a combined limestone and dolomite figure of 80.75mt is available for 2019. In 2019, the UK produced 129.3mt of limestone, another key mineral required for the manufacture of glass bottles. There are 304 limestone and dolomite workings in the UK. The UK produced 346 tonnes of cerium compounds in 2019. It was not possible to obtain figures for UK production of carbon, sodium sulphate, zinc selenite, or haematite but based on the identification of various established UK suppliers for these minerals and compounds the sensitivity of off-site primary material sources relating to operation is considered to be low.

Once the facility is fully operational, approximately 38% of the material required for the production of flint glass bottles and 25% of the material required for the production of amber glass bottles will be cullet, thereby limiting the demand on sources of minerals and chemical compounds.

On site, there will be two cullet buildings for the storage and processing of rejected and recycled glass and a batch building and silos for the storage and mixing of raw materials.

[137] https://www2.bgs.ac.uk/mineralsuk/download/ukmy/UKMY2020.pdf (Accessed 06/07/2021)

9.6.3 Availability of manufactured offsite material sources

9.6.3.1 Sources of material required for construction

Manufactured materials required for the construction of the proposed development include concrete, steel, other metals, asphalt and permeable paving blocks. There are numerous suppliers of construction materials within the regional and national supply chain which can provide materials for local, regional and national construction projects. As such, materials required for the construction of the facility are not considered to be in short supply and sensitivity is considered to be low.

9.6.4 Regional landfill capacity

There is limited recent data available relating to the generation of construction and demolition waste arisings in the region. The last survey of construction and demolition waste in Wales took place in 2012. A new survey is underway, with the data expected to be published early 2022. The 2012 report[138] confirms that 87% of construction and demolition waste produced in 2012 was recovered or recycled.

The Waste Planning Monitoring Report for South East Wales (2016)[139] considers earlier projections for waste generation and notes that the rate at which landfill void would be filled had previously been overestimated. It noted that the development of waste infrastructure in the South East Wales region which would divert waste from landfill was progressing. The report concludes that there is no further need for landfill capacity across all waste types within the region, including construction and demolition.

Whilst the Waste Planning Monitoring Report for South East Wales notes that earlier projections were overestimated, the projection set out in the Collections, Infrastructure and Markets Sector Plan (CIMSP) (2012) estimated that in 2024/25 there would be a requirement for 200-250,000 tonnes of landfill capacity for residual construction and demolition waste at an all-Wales level. Forecasting was not available for South East Wales. As such, the forecast for Wales has been used as a worst-case forecast to determine the sensitivity of landfill capacity in accordance with the IEMA guidance.

The regional landfill capacity for inert and non-hazardous waste has been determined using data from Natural Resources Wales dated 2017 and 2018[140] which indicates a total remaining capacity of 4,533,861m3 in the region. A breakdown of landfill sites is provided in Table 9.8. Using the Wales forecast for 2024/25 of 250,000 tonnes per year as a worst-case scenario, the forecasted waste

[138] Natural Resources Wales (2012) Survey of Construction & Demolition Waste Generated in Wales 2012
[139] Flintshire County Council as Lead Authority (2016) Waste Planning Monitoring Report for South East Wales
[140] Natural Resources Wales (2018) Estimated Landfill Void Wales 2018. Accessed online at: https://naturalresourceswales.sharefile.eu/share/view/sb2191ade60e841a99cd356275d22f288/fof469c2-9669-4c96-80a5-a0cf8a41ac35

amounts for Wales amounts to a total of 4.6% of the South East Wales regional capacity. The sensitivity of inert and non-hazardous landfill capacity is therefore medium.

Projections for hazardous waste are unavailable however there is little disposal capacity in Wales for hazardous waste. Table 9.8 sets out the total hazardous waste void capacity based on NRW data. Due to the lack of available data, a worst-case sensitivity is considered necessary. As no new capacity has been deemed necessary in the Waste Planning Monitoring Report for South East Wales, it is not considered necessary to classify the sensitivity as very high. As such, the sensitivity is considered to be high.

Table 9.8: Landfill capacity

Landfill Name	**Estimated remaining void space (cubic metres)**
Regional landfill capacity (inert and non-hazardous waste)	
JLA Disposal Ltd (Palleg Landfill)	11,132
Cynon Valley Waste Disposal Company Ltd	2,162,048
Biffa Waste Services Ltd (Trecatti)	441,915
Newport City Council	572,306
RWE Npower plc (Aberthaw Quarry)	520,584
Tarmac Ltd (Hendy Quarry)	792,126
Cemex UK Materials Limited	33,750
TOTAL	4,533,861
National landfill capacity (hazardous waste)	
England total hazardous landfill capacity	19,275,567
Wales total hazardous landfill capacity	13,868
TOTAL	19,289,444

9.7 Embedded mitigation

9.7.1 Construction

Since EIA Scoping, design development has resulted in material no longer being required to be imported to the site from off-site primary sources, as the material can be won from on-site earthworks activity. This has removed the potential for adverse effects on material sources within the region.

The reuse of won material will be in line with a Materials Management Plan, as described in the CEMP.

Current earthwork calculations estimate that there will be an excess of 15,000m3 of material arising from the earthworks activity on site. This is a worst-case assumption and has reduced from 50,000m3 following resource efficient design, thereby reducing the extent of adverse effects on the region's waste management capacity.

Opportunities for using excess material both on-site, where required as part of the design, will continue to be sought however until the opportunities can be confirmed, the excess material is considered as waste for the purpose of this assessment.

9.7.2 Operation

A proportion of materials required to produce glass bottles will be cullet, contributing 38% of the overall volume of materials required for flint glass, and 25% of materials for amber glass, thereby reducing demand on raw materials.

9.8 Assessment of effects

9.8.1 Assessment of construction effects

9.8.1.1 Primary onsite material sources

On-site primary material sources have been considered to determine whether the proposed development will result in sterilisation of potential mineral resources at the site (and thereby in the region). Given that the site footprint does not impinge on any Allocated Mineral Sites or Mineral Safeguarding Areas, the sensitivity of the receptor is considered to be low and the magnitude of any impacts is considered negligible. The significance of effects is considered to be neutral, and not considered to be significant.

9.8.1.2 Primary offsite materials sources

The design earthwork calculations estimate that there will be an excess of 15,000m3 of material arising from the earthwork's activity on site. This assumes that the site won material will be suitable for the construction needs on the site, such as formation of any bunds, and so import of significant quantities of material to the site will not be required as part of the site preparation for construction.

As material is not required to be imported to site from offsite sources, the magnitude of effect is 'negligible'. The significance of effects is therefore considered to be neutral, and therefore not significant.

9.8.1.3 Availability of imported manufactured offsite materials

The proposed development will require manufactured structural materials to be imported for construction from the regional and national supply chain, including concrete, steel, asphalt and permeable paving blocks. The total quantity of materials that will be required for the proposed development is currently not available, due to the early stage of design. However, the scale of the proposed development is not considered to be significant, in relation to the regional supply chain. As the proposed development does not require imported manufactured materials on a large scale, the magnitude of impact on the availability of imported manufactured materials in the region is considered to be minor, and therefore

combined with the low sensitivity of the receptor, the significance of effects are considered to be neutral or slight and not considered significant.

9.8.2 Regional landfill capacity

The earthworks associated with the proposed development are estimated to result in a total of 15,000m3 of excess material. Opportunities for re-using this material will be sought however cannot be guaranteed at this stage. As such for the purpose of the assessment the material is to be considered as waste.

The waste arisings of 15,000m3 amount to a total of 0.3% of the currently available non-hazardous and landfill capacity of 4,533,861m3 in South East Wales. The magnitude of effects is therefore negligible. The significance of effects is therefore 'neutral or slight' and not significant.

A worst case consideration has been applied to the assessment of hazardous waste capacity. Ground investigations are ongoing and there are not currently data to identify the likely quantity of any contaminated materials, however the desk based study has not identify any high risk of contaminated soils. Therefore, an assumption that 1-2% of waste would be classified as hazardous can be made based on professional expertise. This amounts to between 0.008%-0.016% of hazardous landfill capacity for England and Wales, which means the magnitude of effects would be negligible and significance of effects is assessed as 'neutral or slight' and therefore not significant.

9.8.3 Assessment of operation effects

9.8.3.1 Primary offsite materials sources

Quantities of raw materials required for the operation of the proposed development, that will be sourced from within the UK, have been detailed in Table 9.9 below.

Table 9.9: Annual quantity of materials required compared to baseline

Material	Annual quantity required (tonnes)	UK availability (tonnes)	Proportion of regional availability used by facility (%)
Dolomite	54,062	3,730,000	1.45
Limestone	35,163	129,300,000	0.03
Sodium sulphate	25,627	Information not publicly available	Unknown
Zinc selenite	1588.2	Information not publicly available but available from chemical suppliers	Unknown
Haematite	344	Information not publicly available	Unknown
Cerium	2.77	346	0.8
Carbon	270	Information not publicly available but available from chemical suppliers	Unknown

As discussed above, figures for UK availability could not be accessed for all minerals and compounds required for the manufacture of glass, but these resources are assumed to be readily available from suppliers in the UK.

The amount of raw material required will be reduced through the use of cullet. For materials that baseline figures are available for, the proportion required for the proposed development does not exceed 1.5%. The magnitude is therefore considered to be minor (between 1 and 5% of regional availability). The significance of effects is considered to be neutral or slight and the use of raw materials for the manufacture of glass bottles is not considered significant.

9.8.4 Potential impacts due to climate change

Climate change impacts which have the potential to impact on receptors in combination with the impacts of the proposed development have been considered. The impacts with potential to impact on receptors include an increase in frequency of extreme weather events, in particular flood events.

An increase in frequency of extreme flood events could pose a risk to materials used during construction. For example, extreme flood events could impact excavated soils, turning valuable stockpile into waste but this is considered unlikely. Stockpiles on site will be managed in accordance with the Construction Code of Practice for the Sustainable Use of Soils on Construction Sites[141] which will ensure that soil stripping takes place in dry conditions. The stockpiles will

[141] Department for Environment, Food and Rural Affairs (2009) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites. Accessed online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/716510/pb13298-code-of-practice-090910.pdf

also be monitored during wet conditions to prevent loss of materials in the event of onsite flooding.

An increase in frequency of extreme flood events could result in a reduction in accessibility to primary material sources and/or a loss and reduction in the quality of available primary material sources required during operation. These extreme flood events may also reduce availability of waste products to be re-used or recycled on site. The materials and waste will be managed on site in accordance with the SWMP, thereby reducing any effects caused by extreme flood events.

9.9 Mitigation and enhancement

9.9.1 Mitigation of effects from construction

No significant impacts associated with material resources and waste generation were identified during construction. However, opportunities will continue to be sought to re-use material on site and on other local project to reduce the amount of waste generated and therefore the amount of waste sent to landfill. The SWMP will continue to be updated, through the construction phase, to include details of the strategy and the quantities of materials reused and recycled for both on and off-site use.

9.9.2 Mitigation of effects from operation

No significant impacts associated with materials supply were identified during operation. Therefore, no mitigation, in addition to the embedded mitigation of using cullet in the manufacturing process, is required.

9.10 Residual effects

No other residual effects have been predicted and therefore no additional mitigation measures are required.

Table 9.10: Construction - temporary effects on materials and waste that arise during the construction of the development

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Primary onsite materials sources	Risk of neutralising material resources on-site	Neutral	None	Not significant
Primary offsite materials sources	Primary materials imported from off-site required for construction of proposed development	Neutral	Embedded design mitigation - use of onsite won materials for site preparation.	Not significant
Manufactured materials offsite availability	Manufactured materials required for construction of proposed development	Neutral or slight	None	Not significant
Landfill and waste management	15,000m^3 excess material generated by proposed development	Neutral or slight	Embedded design mitigation to use onsite won material. Further opportunities to reuse materials on-site will be incorporated in the design where suitable.	Not significant

Table 9.11: Operation - effects on materials and waste that arise during the operation of the development

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Primary offsite materials sources	Use of raw materials to manufacture glass bottles	Neutral or slight	Materials from readily available sources. Use of glass cullet to reduce use of primary materials	Not significant

10 Noise

10.1 Introduction

This chapter of the Environmental Statement assesses the likely impacts from the construction and operation of the proposed development. The assessment is undertaken in line with national legislation and best practice guidance.

The assessment includes consideration of the likely noise generated by the proposed development and the effects on surrounding receptors, including:

- construction noise and vibration from the proposed development (on-site):
- construction traffic to and from the proposed development (offsite); and
- operational noise from the proposed development.

To inform the assessment, an environmental sound level survey has been undertaken to capture the prevailing conditions at the closest sensitive receptors.

The present programme for the project includes a phased approach for the construction and operation of the proposed development. The first glass making furnace is proposed to be operational by the end of 2023. Construction of the second furnace will be undertaken alongside the operational aspects of the first furnace, including the delivery and handling of materials. In-combination effects from construction and operation have been considered for this period of overlap. The development is expected to be fully operational in 2026.

Ecological receptors have not been considered as part of the noise and vibration assessment, but any significant effects have been considered within the ecology assessment informed by data from the noise and vibration assessment.

10.2 Legislation, policy context and guidance

10.2.1 Legislation

The Control of Pollution Act 1974

The Control of Pollution Act[142] provides LPAs with the power to control noise or vibration pollution from sites of construction. This may include specific controls to restrict activities identified as causing disturbance. Conditions regarding hours of operation will generally be specified and noise and vibration limits at certain locations may also be applied in specific cases.

The powers afforded to the LPA include prosecution for failure to comply with the requirements of a notice served under the act, and a system of providing prior consents for works to be carried out in a specified manner so as to reduce the likelihood of causing disturbance (‘section 61 consents’).

[142] Control of Pollution Act 1974. Accessed via https://www.legislation.gov.uk/ukpga/1974/40

Environmental Protection Act 1990

The Environmental Protection Act[143] provides LPAs with powers to serve, or request a magistrate to serve, abatement notices against noise (including vibration) from premises that are considered to be a nuisance[144]. Section 79 of the act, imposes a duty on local authorities to inspect its area to detect any statutory nuisances (noise emitted from premises so as to be prejudicial to health or a nuisance caused by vehicle, machinery or equipment) from time to time, and to investigate any complaint made by a person living in the area.

10.2.2 Policy Context

National planning policy

Planning Policy Wales, Edition 11

PPW11[145] sets out the land use planning policies of the Welsh Government. PPW11 aims to ensure that the planning system contributes towards the delivery of sustainable development and improve the social, economic, environmental and cultural well-being of Wales.

With regards to noise, PPW11 aims to promote healthier places by reducing exposure of local communities to noise pollution (paragraphs 3.20 and 3.22 of the PPW11, under section 3 Strategic and Spatial choices). It also notes that planning authorities must consider current and future sources of noise as part of developing their strategies for locating new development. The pattern of proposed development should be informed by the sensitivity and compatibility of uses in relation to the sources of noise and the importance of ensuring appropriate soundscapes.

Future Wales: The National Plan 2040

Future Wales outlines the national development framework, including the strategy for using the planning system to address key national priorities. It is focussed on a spatial plan for identifying areas for development and infrastructure investment, to ensure that this is complementary and is undertaken in a sustainable way. It refers to noise mostly in terms of ensuring noise from transport sources are minimised or at least reduced, and no unacceptable adverse impacts are allowed from renewable and low carbon energy projects qualifying as Developments of National Significance. The proposed development does not qualify as a Development of National Significance or a transport scheme and so the framework is not

[143] Environmental Protection Act 1990. Accessed 08/05/2021 via https://www.legislation.gov.uk/ukpga/1990/43/contents
[144] For noise to count as a statutory nuisance, it must do one of the following: unreasonably and substantially interfere with the use or enjoyment of a home or other premise injure health or be likely to injure health. From https://www.gov.uk/guidance/noise-nuisances-how-councils-deal-with-complaints
[145] The Welsh Government. Planning Policy Wales Edition 11 February 2021. Accessed 29/06/2021 via: https://gov.wales/sites/default/files/publications/2021-02/planning-policy-wales-edition-11_0.pdf

applicable to this development. It is noted that the intention of the document to mitigate and minimise noise from development is in line PPW11.

Technical Advice Note (TAN) 11 – 1997

TAN 11[146] provides guidance on the minimisation of adverse noise impacts through the planning system without placing unreasonable restrictions on development or adding unduly to the costs and administrative burdens of business. It outlines considerations for which LPAs should consider in drawing-up development plan policies and when determining planning applications for a development which will either generate noise or be exposed to existing noise sources.

With regards to the introduction of noise generating development, TAN 11 states that LPAs must ensure that noise generating development does not cause an unacceptable degree of disturbance. It also states that noise characteristics (e.g. sudden impulses, irregular noise, distinguishable sounds, etc.) are relevant and require special consideration, in particular for industrial developments.

TAN 11 provides advice on mitigation measures and describes the approach to assessment of noise from industrial and commercial developments, which refers to BS4142 [147].

Local planning policy

Blaenau Gwent County Borough Council (BGCBC) Local Development Plan (2021)

The LDP up to 2021[148] adopted in November 2012, aims to provide developers and the public with certainty about the planning framework for Blaenau Gwent County Borough Council (BGCBC), and the BGCBC will comply with the LDP when making decisions on planning applications.

With regards to noise, the LDP notes under Challenge 12: Sustainable use of natural resources, that noise has long blighted the area and affected people's health and well-being and this is a legacy which needs to be remedied.

The Development Management Policies within the LDP include Policy DM1 New Development. Policy DM1 states that development proposals will be permitted provided there would be no unacceptable risk of harm to health and/or local amenity from unacceptably high levels of noise, vibration, odour or light pollution. It notes that potential sources of disturbance such as noise, vibration, odour or light can potentially have a significant effect on the quality of life of those living or working close by or on protected species. Where a proposed

[146] The Welsh Government. Technical Advice Note (TAN) 11: Noise 1997. Accessed 08/05/2021 via: https://gov.wales/technical-advice-note-tan-11-noise
[147] BS4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound. BSI Standards Publication.
[148] Local Development Plan up to 2021. Adopted November 2021 – Written Statement. Blaenau Gwent County Borough Council, accessed via: https://www.blaenau-gwent.gov.uk/fileadmin/documents/Resident/Planning/Written_Statement__without_appendices_.pdf

development may adversely affect local amenity or protected species the applicant may be required to include both an assessment of the likely impact and proposed remedial or mitigatory measures to minimise the impact.

Brecon Beacons National Park Local Development Plan[149], December 2013

Statutory Purposes of the National Park are to:

"to conserve and enhance the natural beauty, wildlife and cultural heritage of the National Park

to promote opportunities for public enjoyment and understanding of the special qualities of the National Park"

Relevant Special Qualities of the Brecon Beacon National Park's (BBNP) include:

"*A National Park offering peace and tranquillity with opportunities for quiet enjoyment, inspiration, relaxation and spiritual renewal.*"

Policy SQ1 Special Qualities sets out "*to conserve and enhance the special qualities of the Brecon Beacons National Park*"

The proposed development is located outside of the BBNP but would be situated within close proximity to the National Park's boundary at approximately 400m.

Special Qualities such as 'tranquillity' are normally considered as part of a landscape character assessment. However, comments relating to the Special Qualities have been addressed within the Planning Statement and ES Chapter 8: Health, ES Chapter 10: Noise and vibration, and ES Chapter 13: Visual.

The BBNP special qualities have been considered as part of the noise assessment and the impact on the tranquillity and enjoyment of the area has been considered in relation to the existing measured sound levels. A Public Right of Way near to the proposed scheme has been selected to assess the existing noise levels at a location where the enjoyment of the National Park could be expected. This concludes that the noise levels predicted at this location are below the existing measured noise levels within the National Park.

10.2.3 Guidance and standards

The following best practice guidance is used for the assessment of the proposed development:

- Design Manual for Road and Bridges (DMRB) LA 111 Noise and Vibration[150];
- Calculation of Road Traffic Noise (CRTN)[151];

[149] Brecon Beacons National Park, Local Development Plan, December 2013. Microsoft Word - Brecon text print.doc (beacons-npa.gov.uk)
[150] Design Manual for Roads and Bridges. Sustainability & Environment Appraisal. LA 111 Noise and Vibration (formerly HD 213/11, IAN 185/15), Revision 2 – May 2020
[151] Calculation of Road Traffic Noise (CRTN) – 1988. Department of Transport (Welsh Office) HMSO.

- BS4142:2014 +A1 2019 Methods for rating and assessing industrial and commercial sound[152];
- BS5228 Part 1 (Noise) and Part 2 (Vibration): Code of practice for noise and vibration control on construction and open sites[153]
- BS8233:2014 Guidance on sound insulation and noise reduction for buildings[154]
- ISO 9613-2 Acoustics-Attenuation of sound during propagation outdoors[155].
- World Health Organization (WHO) Environmental Noise Guidelines for the European Region[156];
- World Health Organization (WHO) Guidelines for Community Noise[157];
- Night Noise Guidelines for Europe (NNG)[158] 2009.

10.3 Study area

The study area for noise and vibration assessment is dependent on the type of impact as set out below.

Direct effects are considered to be those effects arising during construction and operation of the proposed development site. For both construction and operation noise impacts have been identified for receptors within a study area of 300m of the site boundary.

Construction vibration impacts are identified for receptors within a study area of 100m. Only a small number of specific types of surface construction activities give rise to significant levels of vibration from surface works and then only where they are carried out close to sensitive receptors. Construction vibration effects will therefore be considered on an activity-by-activity basis and the study area for these effects will reflect the activity.

Noise and vibration impacts from construction and operational activities within the site are unlikely to give rise to direct effects beyond these distances. In limited circumstances, noise impacts may be created where particularly high noise levels reach distant receptors with very low ambient noise conditions, such as those measured in the vicinity of the proposed development. Any such circumstance where there is the potential for effects beyond these distances has been considered on a case by case basis.

[152] BS4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound. BSI Standards Publication.
[153] BS5228-1:2009+A1:2014 Code of Practice for noise and vibration on construction and open sites – Part 1: Noise, and Part: Vibration. BSI Standard Publication.
[154] BS8233:2014 Guidance on sound insulation and noise reduction for buildings. BSI Standard Publication.
[155] International Organization for Standardization (1996), ISO 9613-2:1996, Acoustics-Attenuation of sound during propagation outdoors – Part 2: General method of calculation, ISO
[156] World Health Organization (2018) Environmental Noise Guidelines for the European Region
[157] World Health Organization (1999) Guidelines for Community Noise
[158] World Health Organization (2009) Night Noise Guidelines for Europe

Indirect effects have been considered as those arising at distances greater than 300m of the site boundary. Indirect effects are likely to be as a result of changes in traffic flow on roads around the proposed development. The area of assessment for road traffic noise extends along all affected roads on the surrounding network (i.e. roads which are subject to a traffic noise change of >1dB due to one or a combination of flow/speed/composition changes), which have been identified as part of the Transport Assessment (see Chapter 12).

Construction traffic routes, diversion or road closures as a result of the construction works which result in changes to the traffic flow are also considered where impacts >1dB are indicated.

10.4 Consultation

Prior to the assessment, consultation undertaken with the Specialist Environmental Health Officer from the Blaenau Gwent County Borough Council (BGCBC) regarding the proposed development. The following items were agreed:

- The type and location of the environmental noise measurements around the proposed development site;
- Such measurements will be supplemented by a survey undertaken by Arup in 2019 in similar locations;
- The noise assessment of the proposed development to be undertaken in accordance with BS4142:2019;
- BGCBC would expect the rating level of the noise emitted from proposed development not to exceed the existing background level at any premises used for residential purposes when measured and corrected in accordance with BS4142:2019
- The assessment should cover the following sources:
    - Manufacturing process;
    - Fixed Plant and equipment (mechanical and electrical);
    - Loading and unloading of goods; and
    - Mobile plant and vehicles (these need to be an intrinsic part of the overall sound from premises or process).

An EIA Scoping Report was prepared and submitted to BGCBC on 20th May 2021. The EIA Scoping Report sets out the proposed scope for the assessment of noise and vibration and can be found on BGCBC's planning portal.

A Scoping Opinion was received from BGCBC on the 24th June 2021. This can be viewed on BGCBC's planning portal (Application reference C/2021/0128) and has been summarised with responses to explain where the Scoping Opinion comments have been incorporated in the assessment. Table 10.1 below provides responses to relevant comments raised in this correspondence.

Table 10.1: Local authority response on scope of noise assessment

Scoping opinion comment	Applicant response
Need to ensure the developer quotes the correct BS4142 reference. The most up to date one is BS4142:2014+A1:2019	The assessment considers the 2019 update to BS4142 and all references in the document are to BS4142:2014+A1:2019
Also during the construction phase of the project, I would like them to apply for a section 61 Control of Pollution Act 1974 consent	Not directly concerned with the assessment, however this requirement has been added as a requirement to the Outline Construction Environment Management Plan (CEMP)

10.5 Methodology

10.5.1 Methodology for establishing baseline conditions

In agreement with BGCBC, a survey was undertaken in 2020 to support this assessment. At the time, advice given by the Institute of Acoustics to professional organisations was that background noise levels in areas subject to transport noise were unlikely to be representative of typical weekday conditions, due to ongoing restrictions created by the Covid-19 pandemic. e.g. fewer vehicle movements, closed schools, reduced public transport, etc.

In order to provide additional data, the 2020 survey information has been complemented by an environmental survey undertaken in support of the A465 Heads of the Valleys (Section 3) project in August 2019, which covered a similar study area. This methodology has been discussed and agreed with BGCBC.

2020 Baseline survey

The attended environmental noise survey was undertaken on the 17th and 18th September 2020 with a series of attended measurements. The unattended survey was undertaken from Tuesday 17th to Monday 23rd November 2020 at the back of a residence at the junction between Rowan Way and Maple Way (R1) using a continuous logging sound level meter. Details of the survey are presented in Appendix F1.

The measured noise levels are summarised from Table 10.2 to Table 10.7 for the day, evening and night-time. Locations R1, R2, and R3 are representative of the nearest residential receptors, to the south and east of the proposed development (see section 10.6.2 for further details). Locations R4 and R5 (Public Right of Way and Rassau Industrial Estate respectively) are representative of non-residential receptors and therefore are sensitive only during the daytime.

Table 10.2: Summary of averaged sound pressure levels at location R1 (attended)

Period	Sound pressure level dB(A) (re 20 µPa)			
	L_{90}	L_{eq}	L_{10}	L_{max}
Day (07:00-19:00)	44	56	54	67 - 71
Evening (19:00-23:00)	39	52	48	66 - 69
Night (23:00-07:00)	34	43	43	50 - 56

Table 10.3: Summary of averaged sound pressure levels at location R1 (unattended)[159]

Period	Day of week	Sound pressure level dB(A) (re 20 µPa)			
		L_{90}	L_{eq}	L_{10}	L_{max}
Day (07:00-19:00)	Weekday	44	51	50	49 – 96
Evening (19:00-23:00)		39	44	45	44 – 72
Night (23:00-07:00)		36	43	41	33 - 79
Day (07:00-19:00)	Weekend	38	45	46	49 - 69
Evening (19:00-23:00)		36	40	41	45 – 58
Night (23:00-07:00)		35	40	40	44 - 65

Table 10.4: Summary of averaged sound pressure levels at location R2 (attended)

Period	Sound pressure level dB(A) (re 20 µPa)			
	L_{90}	L_{eq}	L_{10}	L_{max}
Day (07:00-19:00)	48	70	70	80 - 84
Evening (19:00-23:00)	38	63	54	75 - 78
Night (23:00-07:00)	28	47	41	49 - 71

Table 10.5: Summary of averaged sound pressure levels at location R3 (attended)

Period	Sound pressure level dB(A) (re 20 µPa)			
	L_{90}	L_{eq}	L_{10}	L_{max}
Day (07:00-19:00)	45	55	52	57 - 74
Evening (19:00-23:00)	39	52	49	59 - 68
Night (23:00-07:00)	36	48	44	52 - 71

Table 10.6: Summary of averaged sound pressure levels at location R4 (attended)

Period	Sound pressure level dB(A) (re 20 µPa)			
	L_{90}	L_{eq}	L_{10}	L_{max}
Day (07:00-19:00)	44	51	50	59 - 59

Table 10.7: Summary of averaged sound pressure levels at location R5 (attended)

Period	Sound pressure level dB(A) (re 20 µPa)			
	L_{90}	L_{eq}	L_{10}	L_{max}
Day (07:00-19:00)	53	60	57	74 - 74

2019 Baseline survey

A summary of the measurements undertaken in 2019 are presented in Table 10.8. Details of the 2019 survey are presented in Appendix F1. A comparison between the 2020 and the 2019 measurement survey data suggests that the LA90 measured

[159] For the logged measurement, the indicators L_{A90} and L_{A10} are calculated as arithmetic average. The indicator L_{Aeq} is calculated as logarithmic average

at the closest receptors in R1, R2 and R3 pre Covid-19 (2019) is higher during the daytime than that measured in during the 2020 survey. The 2019 survey did not cover the evening and night-time periods, so no comparison has been made.

Table 10.8: Summary of results from 2019 survey

Location of 2019 survey	Daytime (10:00-17:00) sound pressure level dB L_{A90} (re 20 µPa)	Nearest 2020 survey location
Briar Close (Rassau)	42	R1
Llangynidr Rd	54	R2
Chestnut Close	47	R1
Pen-y-Crug	49	R3

To assess a worst-case scenario and set conservative thresholds, the measured levels of 2020, which are likely to be quieter than normal, are used and therefore no further adjustments are applied.

10.5.2 Assessment methodology

Construction noise

The construction of the proposed development has the potential to give rise to significant effects at the closest sensitive receptors. Therefore, a noise assessment in line with the guidance presented in BS5228 Part 1 and Part 2 is undertaken as part of this noise impact assessment.

The BS5228 standard provides information on the prevention and control of construction noise and includes a procedure for predicting construction noise and assesses its potential impacts. The calculation of construction noise levels at selected locations have been based on typical noise levels of the key noise-generating plant, taken from BS5228 and experience of projects of similar scale. Calculations also take account of typical percentage on-time, propagation distance, details of the intervening ground cover, topography and screening.

The assessment has been undertaken at locations which are representative of groups of sensitive receptors. The location of these receptors has been discussed and agreed with BGCBC. The assessment location is chosen to be representative of a worst-case location i.e. most exposed or closest to the likely construction works.

The threshold for determining significant impacts from construction noise has been set based upon the ‘ABC’ methodology set out in BS5228. For residential receptors, the potential significant impact threshold is determined using the existing measured ambient noise level, rounded to the nearest 5dB and evaluated in relation to the thresholds set out in Table 10.9.

Table 10.9: Potential significant effects at dwellings from on-site noise sources

Assessment category and threshold value period	**Threshold value, dB**		
	Category A	Category B	Category C
Night-time (23:00 – 07:00)	45	50	55
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75
Other: Weekday evenings (19:00 – 23:00) Saturdays (13:00 – 23:00) Sundays (07:00 – 23:00)	55	60	65
Category A: threshold value to use when ambient noise levels (rounded to the nearest 5dB) are less than these values. Category B: threshold value to use when ambient noise levels (rounded to the nearest 5dB) are the same as Category A values. Category C: threshold value to use when ambient noise levels (rounded to the nearest 5dB) are higher than Category A values.			

An adverse impact is indicated where the construction site noise (L_{Aeq}) level exceeds the threshold level for the category appropriate to the ambient noise level. If the ambient noise level exceeds the highest threshold values given in Table 10.9 (i.e. the ambient noise level is higher than the Category C values), then an adverse impact is deemed to occur if the construction site noise (L_{Aeq}) level for the period is greater than the ambient noise level.

Having established if there is an adverse impact effect using the ABC method, the final assessment of significance is made using professional judgement. This is evaluated by considering various other factors such as the:

- Change in noise levels (and resulting noise impact on receptors);
- Level of noise exposure once the proposed development is in operation;
- Level and character of the existing noise environment;
- Number and grouping of adversely affected dwellings and shared community facilities;
- Any unique features of the source or receiving environment in the local area;
- Combined exposure to noise and vibration;
- Duration of the adverse or beneficial effect; and
- Effectiveness of mitigation measures that are provided.

Construction vibration

The closest residential receptor is located further than 100m away from the site boundary. Piling works and vibratory compaction are the construction processes that would give rise to the largest levels of vibration, however as these would be within the site boundary which is outside the scoping distance of the assessment,

as likely to be very low. The closest commercial receptors may experience some levels of vibration, however these are unlikely to be significant and/or take place during long periods of time. As such, adverse impacts associated with construction vibration are very unlikely to take place and therefore the assessment is scoped out, in agreement with the scoping opinion provided to the BGCBC.

Construction traffic

The Department of Transport CRTN presents a procedure for the prediction of road traffic noise. The relevant parts of this procedure have been used to predict, for a given road at a reference distance, the change in noise level resulting from the change in road traffic between the baseline and the assessment case with construction traffic.

The change in construction road traffic noise between the baseline and the assessment is determined to be an adverse impact where the change would be greater than 3dB. The overall significance of the effect is assessed using professional judgement by considering not only the criteria above but also other assessment factors.

Operational industrial noise

The proposed development industrial plant items and activities associated with the transportation/movement of materials have been input into a 3D noise prediction model[160] along with details of the proposed building massing, intervening structures, ground attenuation and topography of the proposed site and surroundings.

Information on topography of the site and surroundings is taken from the Lle Geo-Portal for Wales[161]. Details on the Mastermap topographic layer such as building layout, type of ground (reflective or absorptive) are taken from Emapsite (dated 6th June 2019). The proprietary noise modelling software then calculates noise emissions of the plant items in accordance to ISO 9613-2[155]. The noise sources schedule and model assumptions are presented in Appendix F4.

As identified during consultation with BGCBC (Section 10.4), the local authority outlined the expectation that the rating level of the noise emitted from the proposed development should not exceed the existing background level at the residential receptors as shown in Figure 10.1, and that this should be assessed in accordance with BS4142:2014 +A1:2019.

An assessment of the potential impacts arising from operational noise sources has therefore been undertaken in line with BS4142:2014+A1:2019 (Methods for rating and assessing industrial and commercial sound) at the residential receptors closest to the proposed development.

This bases the impact of industrial noise on the difference between the measured background sound level without the sound of the proposed industrial

[160] Proprietary software used is SoundPlan version 8.2. Info available in https://soundplan-uk.com/
[161] LiDAR Composite Dataset, accessed via: http://lle.gov.wales/Catalogue/Item/LidarCompositeDataset/?lang=en

development, and the 'rating level' of the proposed industrial development, at the receiver location.

The 'background sound level' ($L_{A90,T}$) is defined in BS4142 as the typical noise existing in the absence of the 'specific sound level' at the receiver location. The 'specific sound level' ($L_{Aeq,T}$) from the industrial source can be subject to a certain weighting (penalty) where it displays an identifiable character (such as tonality, impulsivity, intermittency or otherwise distinctive character) to provide a 'rating level' ($L_{Ar,T}$). The 'background sound level' is subtracted from the rating level and the difference used to inform the assessment of the effects.

BS4142 advises: "The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs".

BS4142 advises that an initial estimate of the impact of the specific sound be conducted by subtracting the measured background sound level from the rating level and consider the following:

Typically, the greater this difference, the greater the magnitude of the impact;

- A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context, and
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

Importantly for this site which experiences low background levels, especially at night, BS4142 advises that "where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following:

"The absolute level of sound. For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level[162] is high than for an acoustic environment where the residual sound level is low.

Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night".

The significance of effects has been determined based on the methodology presented above and other factors including the acoustic context of the area,

[162] Residual sound level is defined as the ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.

magnitude of exceedance, predicted absolute noise levels, number of receptors affected, time of the day where impact occurs, and professional judgement.

The non-residential receptors have been assessed on a case-by-case basis. Consideration was given to the measured noise levels and also to the predicted absolute noise levels in line with the guidance provided in BS8223 and the WHO guidelines.

Operational road traffic noise

The proposed development has the potential to increase the noise emissions of the nearby road network as a result of an increase in vehicle and HGV movements which serve the facility operating on a 24/7 basis. An approach to assessing the potential noise impacts due to such additional traffic, is based on the principle of the scoping assessment methodology described in DMRB LA 111.

The LA 111 approach to assessing the noise impact is to compare the Basic Noise Level (BNL)[163] for the 'Do-Something' (with proposed development) scenario against noise for the 'Do-Minimum' (without proposed development) scenario. For the purpose of this assessment, the analysis is undertaken to compare the Do-Minimum Opening Year (2026) and the Do-Something Opening Year (2026).

The calculation of the night-time traffic noise levels (L_{night}) has been undertaken using Method 1 of the TRL method[164]. This method uses the hourly traffic derived from the traffic assessment for the night-time to initially predict the $L_{A10,1hr}$ and then convert into an $L_{Aeq,1hr}$. The L_{night} is calculated as the A-weighted equivalent continuous sound pressure level over the 8-hour night period of 23:00 to 07:00.

The magnitude of change is calculated by taking the difference between the BNL of the Do-Minimum scenario and the Do-Something scenario. The resulting BNL is then used to determine the magnitude of change in accordance with LA 111 Table 3.54, which is reproduced in Table 10.10. The initial assessment of likely significant effects has been determined using Table 3.58 of LA 111 which is reproduced in Table 10.11.

Table 10.10: Magnitude of change – short-term

Short-term magnitude	Short-term noise change (dB LA10,18hr or Lnight)
Major	Greater than or equal to 5.0
Moderate	3.0 to 4.9
Minor	1.0 to 2.9
Negligible	Less than 1.0

[163] As defined in LA 111 and CRTN, the Basic Noise Level (BNL) is an indicative noise emission level calculated using the traffic flow, HGV% and average speed at a reference distance of 10m.
[164] Transport Research Laboratory (TRL). Abbott, P.G. TRL PR/SE/611/99 "Calculation of road traffic noise – Extending the range of propagation"

Table 10.11: Initial assessment of operational noise significance

Significance	Short-term magnitude of change
Significant	Major
Significant	Moderate
Not significant	Minor
Not significant	Negligible

Where the magnitude of change in the short-term is negligible, it has been concluded that the noise change will not cause changes to behaviour or response to noise and as such, will not give rise to a likely significant effect. An initial indication of potential significant effects has been assigned when the magnitude of change is either moderate or major.

10.5.3 Limitations and assumptions

Baseline noise surveys have been undertaken at a set of locations along the proposed scheme during a period of unusual road traffic activity caused by travel restrictions across the UK during 2020 as a result of the Covid pandemic. The baseline data used in the assessment is based on this information supplemented by the use of previous measurements made in 2019, in agreement with BGCBC.

The assumptions used in the construction noise assessment have been made in order to determine the potential likely significant effects. These are based on experience from similar projects in the UK and professional judgement. A detailed construction programme is not available, however it is expected that the majority of construction site activities would be undertaken during the daytime only. The assessment is based on the likely worst-case month from any one activity. This is considered a reasonable assumption as overlap in activities on site is likely to be as one activity is completing and another commencing.

The operational modelling of the noise sources associated with the proposed development has been undertaken in collaboration with the client and is based on both manufacturer data and is supplemented by measured data of existing facilities. There is a possibility that there is variation in the noise from similar facilities, however this is likely to be relatively small.

The operation of the proposed development will include road vehicle deliveries during the daytime hours only as identified in the Transport assessment (Chapter 12), based on feedback from the client.

10.6 Baseline environment

10.6.1 Baseline description

The proposed development lies within the eastern extent of the Rassau Industrial Estate, north of the A465 Heads of The Valleys Road. To the west of the proposed development site, there are a number of operational industrial units which include

office buildings, and to the north there is open land (including the Brecon Beacons National Park) and a number of public rights of way (PRoW).

The noise climate around the proposed development site is dominated by road traffic noise arising from the A465 with some contribution from lorry movements and plant items which serve the nearby industrial units.

10.6.2 Sensitive receptors

During a visual survey of the site and its surroundings on the 17th and 18th of September 2020, it was identified that the closest sensitive receptors are residential dwellings located to the south of the proposed development, on the south side of the A465. The residential receptors are all within the community of Rassau and Garnydan. To the north of the site, there are also a number of PRoW.

Figure 10.1 shows the redline boundary of the proposed development site and the measurement locations which are considered to be representative of the noise sensitive receptors as agreed with BGCBC.

A description of the measurement locations is listed as follows:

- Location R1: Representative of the residential dwellings alongside Rowan Way and Maple Way. At this location, an attended measurement location was undertaken at the front of the house, and a logging meter at the back of it. The back of the house is the façade facing the proposed development;
- Location R2: Representative of the residential dwellings alongside Llangynidr Road (B4560);
- Location R3: Representative of the residential dwellings alongside Pen Y Bryn road;
- Location R4: Representative of the PRoW located to the north of the site (adjacent to the Carno reservoir); and
- Location R5: Representative of the industrial buildings on the westernmost extent of the development site within the Rassau Industrial Estate (adjacent to the proposed development site. It has been assumed for the purposes of this assessment that these buildings are primarily industrial however they also include some office space for staff.

Figure 10.1: Noise measurement locations (red) and proposed development site (red line)

10.6.3 Industrial operational noise thresholds

During consultation, BGCBC stated that "the rating level of the noise emitted from proposed development should not exceed the existing background level at any premises used for residential purposes when measured and corrected in accordance with BS4142:2019".

The measurements undertaken at the closest sensitive receptors are therefore used to determine the industrial operational noise thresholds. Appropriate adjustments have been applied to estimate the background sound level at the most exposed façade of the assessed buildings as follows.

A façade correction of 3dB is applied to all residential receptors, as the predicted noise levels are also calculated as façade levels.

At location R1, the unattended measurements are used to derive the noise threshold as this measurement was undertaken at the building façade which faces the proposed development.

The resulting arithmetic average of the façade levels at location R1 (captured with the continuous logger) results in approximately 39dB $L_{A90,T}$ for the night-time, 41dB $L_{A90,T}$ for the evening and 44dB $L_{A90,T}$ for the daytime.

The measured levels at location R3 are further away from the A465 than the assessed receptor location. An adjustment for the ratio of distances of 0.5dB is applied at the measured levels around R3.

Table 10.12 shows the proposed industrial noise thresholds based on the criteria discussed with BGCBC of rating level not exceeding existing typical background.

Table 10.12: Industrial noise targets at closest residential receptors

Receptor Location	Noise level threshold (dB)		
	Daytime (07:00-19:00)	**Evening (19:00-23:00)**	**Night (23:00-07:00)**
R1 Rowan Way	44	41	39
R2 Llangynidr Road	51	41	31
R3 Pen Y Bryn Road	49	43	40

10.6.4 Assessment at residential receptors (BS4142)

The parameters used for the BS4142 assessment are described as follows:

- Specific sound level: It is defined as the predicted noise levels from the facility in $L_{Aeq,T}$ calculated with the noise model. The specific sound level is calculated at the assessment location for the relevant period of time e.g. day, evening or night;
- Rating level: It is defined as the specific sound level plus any adjustments for the characteristic features of the sound. A 3dB adjustment for acoustic

character of the source has been applied to all the sources in line with the recommendations of BS4142[165]; and

- Background sound level: It is defined as the existing background noise levels which were estimated at the assessment location in $L_{A90,T}$.

A diagram showing the proposed development noise sources and the closest receptors is presented in Figure 10.1. Details on the technical specifications of the sources including the sources sound pressure level or sound power level, are also presented in Appendix F4 as the schedule of noise sources.

10.7 Embedded mitigation

The assessment assumes the following or equivalent measures (refer to Appendix F4 for details on assumed mitigation):

- The selection of plant items, in particular generators and compressors within the Utility Building, have been modelled with embedded attenuation in the form of attenuators in the outlet and inlet;
- Acoustic louvres with a minimum of R_w15-17dB[166] have been included for all louvre opening which overlooks the receptors located to the south. In particular, the southern façade of the Furnace Building and on all the roof louvres of the Furnace Buildings should be acoustic louvres;
- The envelope of the proposed building has been modelled with an acoustic sound reduction index of approximately R_w30-32dB;
- No openable windows for ventilation are included on the southern façade of the Furnace Building or the Batch Building;
- Fans and associated ductwork serving the furnace stacks have been enclosed;
- The stack case is assumed to be built out of concrete around the flue exhaust and therefore emissions through the body of the stack itself are negligible. Should the stack case change material, then consideration should be given to noise emissions through it and it should be made sure that noise is minimised; and
- Any outdoor ductwork serving the stack exhaust has been modelled as lined to control noise break-out.

[165] From BS4142:2014+A1:2019 *"where the specific sound feature characteristics that are neither tonal nor impulsive, nor intermittent, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied"*
[166] Sound Reduction Index based on BS 2750/3-1980 (ISO 140/3-1978)

10.8 Assessment of effects

10.8.1 Assessment of construction effects

10.8.1.1 Construction noise

The thresholds of adverse impacts for construction noise have been established in line with the 'ABC' methodology presented in BS5228, which uses the measured noise levels (dB $L_{Aeq,T}$) summarised in Section 5[167]. The estimated thresholds of potential adverse impacts from construction noise are shown in Table 10.13.

Table 10.13: Threshold of potential adverse impacts arising from construction noise

Noise sensitive receptor	**Threshold value in decibels (dB $L_{Aeq,T}$) and ABC category in brackets**		
	Day (07:00-19:00) Saturday (07:00-13:00)	Evening (19:00–23:00)	Night (23:00–07:00)
R1 Rowan Way	65 (A)	55 (A)	50 (B)
R2 Llangynidr Road	75 (C)	65 (C)	50 (B)
R3 Pen Y Bryn Road	65 (A)	55 (A)	55 (C)

Information about likely construction activities has been provided by the Arup design team. In the absence of detailed information, a benchmarking exercise has been undertaken using information of projects of similar scale. For further details, refer to Appendix F2. Noise from the following construction activities has been assessed:

- Activity A - Preliminaries: Includes site clearance, tree felling and vegetation removal;
- Activity B - Earthworks: Includes forming various plateaus for building, demolition of existing road, material handling and constructing haul roads around the perimeter of the site;
- Activity C - Demolition: Demolition of existing road: Includes breakers mounted on excavators;
- Activity D - Piling works: Includes piling foundations of approximately 750mm diameter bored piles, fed by concrete supplied from off site;
- Activity E - Drainage works: Includes excavation and breaking of ground;
- Activity F - Hardstanding: Includes laying of asphalt or concrete roads; and
- Activity G - Erection of structures: Includes cranes and hand tools to erect structures such as sheds, roofs, etc.

[167] The measured $L_{Aeq,T}$ at location R1 results from the average of attended and unattended measurements. The measured levels include a 3dB adjustment to estimate façade noise levels.

Residential receptors

The highest predicted noise levels for the construction activities at the residential receptors are presented in Table 10.14 for daytime ($L_{Aeq,08:00-18:00}$).

Table 10.14: Predicted construction site noise levels

Construction Activity	Predicted dB $L_{A,10h}$ façade level at noise a sensitive receptor		
	R1 - Category A 65dB $L_{Aeq,T}$	R2 – Category C 75dB $L_{Aeq,T}$	R3 – Category A 65dB $L_{Aeq,T}$
Activity A – Preliminaries	60	53	52
Activity B - Earthworks	57	50	49
Activity C – Demolition	46	43	48
Activity D – Piling	54	47	46
Activity E – Drainage	51	44	44
Activity F – Hardstanding	42	34	34
Activity G – Structures	43	35	35

None of the construction activities are predicted to exceed the ABC assessment thresholds for potential significance, as shown in Table 10.14, therefore effects from construction noise are considered to be not significant at these locations.

Non-residential receptors

The PRoW is an outdoor location represented by Location R4. Construction noise levels are predicted to be between 30-50dB $L_{Aeq,T}$. The worst case noise levels are predicted to be generated by earthworks and demolition of the existing road. The measured daytime levels at location R4 are 51dB $L_{Aeq,T}$. As per BS5228, for an open public space, adverse impacts are deemed to occur if the total noise exceeds the ambient noise by 5dB or more for a period of a month of more. As there is no exceedance over the measured levels at the outdoor receptors, no adverse impacts are identified and therefore the effects assessed as not significant.

For the industrial receptors (including office use) represented by location R5, the predicted construction noise levels are between 33-68dB $L_{Aeq,T}$ for all activities. The highest predicted noise level is likely to be generated by the demolition activity. A noise level of 60dB $L_{Aeq,T}$ was measured during the daytime at location R5. The only adverse impacts are identified during demolition of the site road. However, these works are unlikely to take place for longer than one month and therefore the effects are assessed as not significant.

Importantly, the assessment assumes that the construction activities will be conducted in accordance with a Code of Construction Practice (CoCP) and that Best Practicable Means will be employed throughout the construction period. Refer to mitigation section 10.9 for further details.

10.8.1.2 Construction traffic noise (indirect)

Indirect noise impacts from construction traffic have been assessed. Road traffic vehicles will use the existing A465 Heads of the Valleys Road to access the Rassau Industrial Estate. Information on traffic routes, flows, average speed and HGVs for the baseline year 2018 has been provided in the Transport assessment (Chapter 12). Based on this information, the six road links identified in Figure 10.2 have been identified with the highest change to traffic noise as a result of the proposed scheme.

Figure 10.2: Assessed road traffic links

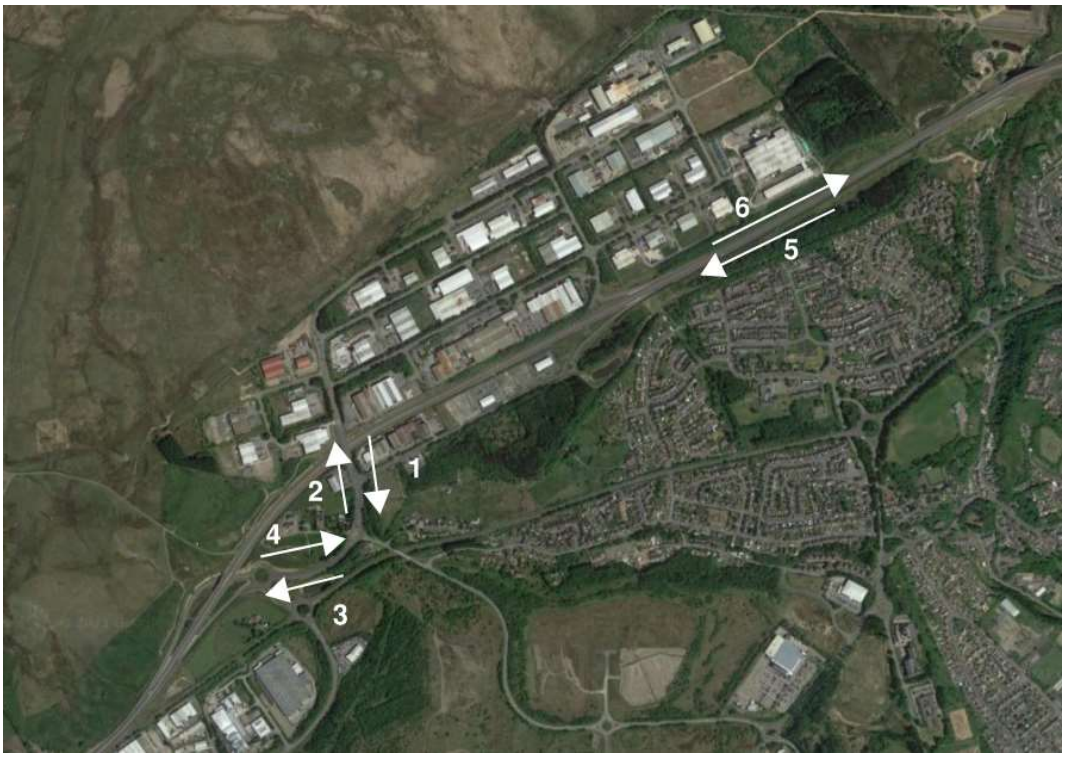


Table 10.15 shows the predicted Basic Noise Level (BNL)[163] calculated from the 18hr Annual Average Weekday Traffic (AAWT) for the baseline 2018 as well as predicted BNLs with the increased number of HGVs due to construction. As the majority of all construction work will take place during the daytime, no evening or night-time HGV movements due to construction traffic are anticipated to take place, and only daytime assessment is presented.

Table 10.15: Summary of predicted construction traffic noise during the daytime

No	Link Name	dB $L_{A10, 18h}$ at reference distance of 10m (i.e. BNL)		Change in noise level, dB(A)	Magnitude of change
		BNL 2018	BNL 2018 + Construction traffic		
1	Alan Davies Way (southbound)	62.0	62.6	0.6	Negligible

No	Link Name	dB $L_{A10, 18h}$ at reference distance of 10m (i.e. BNL)		Change in noise level, dB(A)	Magnitude of change
		BNL 2018	BNL 2018 + Construction traffic		
2	Alan Davies Way (northbound)	60.5	61.2	0.7	Negligible
3	A4046 (southbound)	63.3	63.7	0.4	Negligible
4	A4046 (northbound)	63.0	63.5	0.5	Negligible
5	A465 (westbound)	72.8	73.0	0.2	Negligible
6	A465 (eastbound)	72.5	72.7	0.2	Negligible

During the construction period, the changes in noise level due to an increase of construction vehicles is negligible. Therefore, the indirect construction traffic noise effects are assessed as not significant.

10.8.2 Assessment of operation effects

10.8.2.1 Operational industrial noise

Modelling

A three-dimensional noise model has been built using proprietary software[160] to predict the noise emissions associated with the operation of the proposed development. The following information has been used to construct the model:

Table 10.16: Sources of information

Component	Source
Existing topography	LiDAR topography information on the existing site and surroundings from Lle Geo-Portal for Wales. Digital Terrain Map (DTM) and Digital Surface Map (DSM) have been downloaded for the highest available resolution
Proposed earthworks	Information provided by Engineering Team in CAD file format
Existing buildings	Footprints extracted from E-map site dated June 2019. Height values calculated using the LiDAR information above.
Proposed buildings	Created in Soundplan 8.2 based on information provided by architectural team.
Ground absorption areas	Information extracted from E-map site dated June 2019.
Noise sources	Information provided by the Mechanical and Electric team (M&E), by the furnace manufacturer and by the client.
Stack heights	Provided by the client team

The noise model calculates noise emissions in accordance with the ISO 9613-2 for outdoor noise propagation. As such, the model accounts for the sound power level

and directivity of the noise sources, attenuation due to intervening screening, attenuation due to walls/louvre transmission loss, effect of ground absorption, and propagation of sound energy.

The proposed development includes a number of noise sources, all of which have their own acoustic character and sound power levels. Details of the assessed sources schedule and results in the form of a grid noise map is presented in Appendix F4 alongside any assumptions made in the absence of technical detail at the current stage of project design.

Residential receptors

The predicted rating level arising from the proposed development in operation at the closest sensitive receptors is presented in Table 10.17.

Mitigation measures assumed to be part of the design are described in detail in Section 10.9.

Table 10.17: Results of noise predictions at residential receptors - normal operation

	Floor	Time period	Rating level at assessment location dB $L_{Ar,T}$	Background at assessment location, dB $L_{A90,T}$	Excess of rating level over background sound level
R1	Ground	Day	42.0	44	-3.8
		Evening	37.7	41	-3.3
		Night	36.4	39	-2.6
	First	Day	42.5	44	-1.5
		Evening	40.5	41	-0.5
		Night	39.3	39	+0.3
R2	Ground	Day	38.0	51	-13
		Evening	36.4	41	-4.6
		Night	34.1	31	+3.1
	First	Day	38.8	51	-12.2
		Evening	37.2	41	-3.8
		Night	34.9	31	+3.9
R3	Ground	Day	43.3	49	-3.7
		Evening	40.9	43	-2.1
		Night	39.3	40	-0.7
	First	Day	46.6	49	-2.4
		Evening	42.5	43	-0.5
		Night	40.5	40	+0.5

BS4142 indicates that the lower the rating level is relative to the measured background sound level, the less likely it is that the proposed development will have an adverse impact.

As shown in Table 10.17, the rating level does not exceed the background sound level at any location during the daytime or evening. At locations R1 and R3, however the predicted noise level are slightly in excess of the measured noise level at the first floor by 0.3dB and 0.5dB during the night-time respectively. BGCBC have specified that their preference is for noise levels not to exceed the existing measured background noise levels, however this is a marginal exceedance and therefore has been assessed as not significant.

At location R2 there is an exceedance of 3.9dB at first floor and 3.1dB at ground floor relative to background noise during the night-time. BS4142 notes that there is an indication of an adverse impact when the difference is around +5dB. Importantly, the standard notes that where the measured noise levels are low, absolute noise levels may be as, or more, relevant than the margin by which the rating level exceeds the background, and this is particularly true at night.

The noise level of 34.9dB at location R2 is an external noise level predicted at 1m outside the façade. Occupants would typically be indoors during the night-time, where WHO guidelines[168] indicate that a criterion of 30dB$L_{Aeq,8hr}$ for the night-time is appropriate for bedrooms. An approximation of the internal noise levels within bedrooms can be made by assuming that the majority of noise would travel through windows opened to provide ventilation. As per BS8233[169], a partially open window would provide 15dB attenuation, and the resulting internal noise level would be 20dB[170]. This level is well below the WHO criteria, and therefore, the effects from the identified impacts are assessed as not significant.

The level of uncertainty for this assessment is dependent upon the complexity and number of the sound source emissions and the assessment relies on noise calculation approximations. However, the assessment is considered to be conservative and robust for the purpose of this ES.

Non-residential receptors

The operational assessment of industrial noise on non-residential receptors has been undertaken on the nearest PRoW represented by location R4, and the closest existing industrial site represented by location R5.

The predicted noise levels arising from the proposed development are presented in Table 10.18, alongside the measured $L_{Aeq,T}$ and the exceedance over measured levels.

[168] World Health Organisation - Night noise guidelines for Europe, 2009
[169] British Standard 8233:2014 Guidance of sound insulation and noise reduction for buildings. *Note that the level difference through a window partially open for ventilation can vary significantly depending on the window type and the frequency content of the external noise. If the specific details of window are known, the value for isolation may be adjusted accordingly.*
[170] To estimate internal noise levels, the façade level needs to be converted to free-field level by subtracting 3dB. Then the 15dB adjustment for an openable window is applied.

Table 10.18: Results of noise predictions at non-residential receptors - normal operation (daytime)

Receptor	Predicted noise level, dB $L_{Aeq,T}$	Measured noise level, dB $L_{A90,T}$	exceedance
R4	34.6	51	-16.4
R5	62.7	63	-0.3

As shown in Table 10.18, the predicted noise levels at the PRoW at location R4 are well below the measured noise level of 51dB $L_{Aeq,T}$. The predicted absolute noise level is also well below the criteria for outdoor spaces presented in BS8223 of 50-55dB $L_{Aeq,T}$. Location R4, representing the PRoW and outdoor receptors located to the north of the proposed development, impacts are assessed as not significant.

The predicted noise levels at R5 do not exceed the existing measured noise level of 63dB $L_{Aeq,T}$, which indicates that the impact is unlikely to result in a significant effect. This receptor has been assessed as industrial use, but with some office use, which is the more noise sensitive. Based on the predicted external noise level of 63dB $L_{Aeq,T}$ and assuming a 15dB attenuation for a partially open window (BS8233[171]), the resulting equivalent internal noise level would be 48dB. This predicted internal noise level is within the design range presented in BS8223 for an open plan office of 45-50dB $L_{Aeq,T}$.

It is noted that this calculation is undertaken at the closest industrial building to the proposed development site. Therefore, at location R5 which is representative of industrial receptors near to the proposed development, the impacts are assessed as not significant.

The level of uncertainty for this assessment is dependent upon the complexity and number of the sound source emissions and the assessment relies on noise calculation approximations. However, the assessment is considered to be conservative and robust for the purpose of this ES.

Operational road traffic noise

The road links with the potential to be subject to an increase in noise emissions as a result of the operation of the proposed development, are shown in Figure 10.2 above. The increase in traffic flows upon the local road network is due to the proposed staff vehicle trips, HGV movements for the delivery of raw materials, and HGV movements for the transportation of glass bottles from the site. Details of the traffic flows assumed for this road traffic noise assessment can be found in Appendix F3.

Table 10.19 shows the predicted BNL for the following:

- Do-Minimum Opening Year 2026 (without proposed development); and

[171] British Standard 8233:2014 Guidance of sound insulation and noise reduction for buildings. *Note that the level difference through a window partially open for ventilation can vary significantly depending on the window type and the frequency content of the external noise. If the specific details of window are known, the value for isolation may be adjusted accordingly.*

- Do-Something Opening Year 2026 (with proposed development).

An assessment of the adverse impacts arising due to the increase in noise levels as a result of the operation of the proposed development, is conducted by considering the difference between the Do-Something Opening Year 2026 and the Do-Minimum Opening Year 2026. The proposed development is expected to be fully operational in 2026 when the two furnaces are constructed and therefore the assessment is undertaken in this year (when the traffic increase as a result of the project is the highest).

Table 10.19: Operational road traffic noise impacts during the daytime based on BNL

No	Link Name	dB $L_{A10, 18h}$ at reference distance of 10m (i.e. BNL)		Change in noise level, dB	Magnitude of change
		Do-Minimum Opening Year 2026 BNL	Do-Something Opening Year 2026 BNL		
1	Alan Davies Way (southbound)	62.1	62.6	0.4	Negligible
2	Alan Davies Way (northbound)	60.6	61.2	0.6	Negligible
3	A4046 (southbound)	63.5	63.7	0.2	Negligible
4	A4046 (northbound)	63.2	63.5	0.2	Negligible
5	A465 (westbound)	70.5	70.7	0.1	Negligible
6	A465 (eastbound)	69.7	69.9	0.2	Negligible

As shown in the table, all road links are predicted to have an increase of less than 1dB. As defined in DMRB LA 111, this magnitude of change is a negligible impact assessed as not significant.

The potential impacts during the night-time are assessed using the L_{night} metric which is dependent on the hourly traffic flows between 23:00 and 07:00. Table 10.20 shows the results of the L_{night} prediction. It is noted that during the night-time, the increase in traffic flows is mainly caused only by staff traffic vehicle movements, and not HGVs increase. There may be delivery vehicles starting onsite at 6am, however these are unlikely to exceed 15 vehicle movements and hence are very unlikely to result in a change in noise level greater than 1dB on receptors alongside the road network.

Table 10.20: Operational road traffic noise impacts during the night-time

No	Link Name	dB L_{night} at a reference distance of 10m (i.e. BNL)		Change in noise level, dB	Magnitude of change
		Do-Minimum Opening Year 2026	Do-Something Opening Year 2026		
1	Alan Davies Way (southbound)	56.1	56.4	0.2	Negligible

No	Link Name	dB L_{night} at a reference distance of 10m (i.e. BNL)		Change in noise level, dB	Magnitude of change
		Do-Minimum Opening Year 2026	Do-Something Opening Year 2026		
2	Alan Davies Way (northbound)	55.7	55.6	0.0	Negligible
3	A4046 (southbound)	56.6	56.9	0.3	Negligible
4	A4046 (northbound)	56.5	56.5	0.0	Negligible
5	A465 (westbound)	60.5	60.6	0.1	Negligible
6	A465 (eastbound)	60.2	60.4	0.2	Negligible

As shown in the table, all of the assessed road links result in a negligible change and therefore no adverse impacts during the night-time are identified. Noise effects are therefore assessed as not significant.

It is noted however, that during the first and last hour of the night (23:00-00:00 and 06:00-07:00) there may be an increase in staff vehicle movements caused by the start/finish of the daytime/night-time shift, however the resulting increase in noise level is only minor and is assessed as not significant.

Any HGV vehicles serving the facility (either to deliver raw material or for the transportation of glass bottles away from the site) are expected to work during the daytime only (07:00-23:00). The potential impacts arising from HGV movements within the site, are assessed as part of the on-site operational noise assessment in Section 10.8.2.

10.8.3 Assessment of in-combination effects

There will be a period of approximately 12 to 18 months from the middle of 2024 where the first furnace will be operational, however construction on the second furnace will be ongoing. During this period there is the potential for construction and operational noise to impact the local community.

As construction work will only occur during the daytime, this only has the potential to result in in-combination effects during the daytime. At this time, the loudest construction activities (preliminaries, earthworks and demolition) will already be completed. Operationally, only one furnace will be working and so the daytime noise levels will be lower than reported in Table 10.17. As the noise levels during the daytime for both construction and operation are already below the criteria, the likelihood of in-combination effects is therefore very low.

10.8.4 Potential impacts due to climate change

The climate variable which has the potential to impact this noise and vibration assessment is temperature. This does not directly affect noise or vibration levels, however as a result of higher average temperatures, there is the potential for an increased number of people to open windows during the day and night-time to provide cooling. In opening windows, this increases the noise levels inside the

building which residents will be subject to. Additionally, building services may need to operate more frequently, increasing the noise levels in the outside environment. This assessment is based on meeting external noise criteria, which have been developed to protect health and wellbeing of the occupants in the scenario of both windows open or shut. Noise predictions have also been made based on the building services operating at their maximum design duty at all points where this would be operational.

10.9 Mitigation and enhancement

10.9.1 Mitigation of effects from construction

To minimise the level of noise to which sensitive receptors will be exposed, the construction work will be conducted in accordance with a Code of Construction Practice (CoCP) or a Construction Environmental Management Plan (CEMP).

The CoCP/CEMP will contain established control measures for environmental protection that will be adopted during construction. These measures will be based upon the BS5228 standard. Examples of typical measures include the following:

- Careful selection of plant and construction methods. Only plant conforming to relevant national, EU or international standards, directives and recommendations on noise and vibration emissions should be used;
- Design and use of site enclosures, housing and temporary stockpiles, where practicable and necessary, to provide acoustic screening at the earliest opportunity;
- Where practicable, doors and gates should not be located opposite occupied noise-sensitive buildings. The mechanisms and procedures for opening doors/gates will minimise noise, as far as reasonably practicable;
- Choice of routes and programming for the transport of construction materials, spoil and personnel; and
- Careful programming so that activities which may generate significant noise are planned with regard to local occupants and sensitive receptors.

Other examples of typical mitigation measures include:

- All vehicles and mechanical plant shall be fitted with effective exhaust silencers and shall be maintained in good and efficient working order and operated to minimise noise emissions;
- All compressors and generators shall be ‘sound reduced’ models fitted with properly lined and sealed acoustic covers which shall be kept closed whenever the machines are in use, and all pneumatic percussive tools shall be fitted with mufflers or silencers of the type recommended by the manufacturers;
- All machines in intermittent use shall be shut down in the intervening periods between works or throttled down to a minimum. Lorry engines will be switched off, as soon as practicable, when vehicles are stationary;

- Noise emitting equipment which is required to run continuously shall be housed in a suitable acoustic enclosure;
- Temporary noise barriers will be used to reduce noise levels where appropriate and practicable. Such measures can be particularly appropriate for stationary or near-stationary plant such as pneumatic breakers, piling rigs and compressors. Barriers should be located as close to the plant as possible and, in order to provide adequate attenuation and should have a mass per unit area of at least 7 kg/m2;
- Plant and equipment liable to create noise and/or vibration whilst in operation will, as far as reasonably practicable, be located away from sensitive receptors and away from walls reflecting towards sensitive receptors;
- Materials for night-time working shall be delivered, where practicable, during normal hours of working and be placed as close as possible to the work area for which they are required;
- Where reasonably practicable, fixed items of construction plant shall be electrically powered in preference to combustion engine driven; and,
- Doors on plant and equipment will be kept closed.

Additionally, it should be noted the local authority has powers under the Control of Pollution Act (1974) to control noise from construction sites.

10.9.2 Mitigation of effects from operation

Noise from the operation of the factory (beyond the embedded mitigation design measures described in Section 10.7) will be controlled through Best Available Techniques (BAT) to minimise noise emission. The mitigation of industrial noise can be secured by a suitably worded planning condition and the exact requirements of such condition, can be discharged during detailed design of the development.

10.10 Residual effects

A noise impact assessment has been undertaken for the construction and operation of the proposed Dragon Glass Bottle Manufacturing Facility at the Rassau Industrial Estate.

The assessment of construction noise undertaken in line with the guidelines presented in BS5228, concluded that with the implementation of suitable CoCP or CEMP, the impacts of construction are assessed as not significant. The CoCP/CEMP would implement the list of Best Practicable Means outlined in Section 7 (Mitigation).

The proposed development has the potential to increase the number of vehicles and HGVs within the nearby road network. An assessment of the operational road traffic noise has been undertaken in line with the methods and guidelines presented in CRTN and DMRB LA 111, and the conclusions of the assessment is that the impacts are assessed as not significant.

In order to assess potential adverse impacts arising from the operation of the proposed industrial noise sources, a three-dimensional noise model has been constructed. An assessment in line with BS4142 concluded that there are a few instances where the rating level exceeds the measured background level at the residential receptors. However, these exceedances are well below +5dB over background and as noted in the BS4142 standard, an exceedance of +5dB over measured background is necessary to trigger an adverse impact. Additionally, the predicted noise levels arising from the operation of the facility are relatively low and the predicted internal noise levels result in levels well below the WHO criteria. Based on this rationale, the effects associated with the operation of the facility are assessed as not significant.

The assessment also concluded that at the closest non-residential receptors, the effects are assessed as not significant. This is the case for the PRoW located to the north-west of the proposed development (location R4) where the predicted noise levels are well below the measured background levels. As for the closest commercial receptors, the exceedance over the measured noise levels is marginal and the predicted internal noise levels fall within the recommendations for open plan office set out in BS8223.

The operational noise assessment identified mitigation measures which will minimise noise emissions from the proposed development.

Table 10.21: Residual noise and vibration effects during construction

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Residential receptors	Construction noise	Not significant	None other than CEMP controls	Not significant
	Construction traffic	Not significant	Mitigation not required	Not significant
Non-residential receptors	Construction noise	Not significant	None other than CEMP controls	Not significant
	Construction traffic	Not significant	Mitigation not required	Not significant

Table 10.22: Residual noise and vibration effects during construction

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Residential receptors	Operational noise	Not significant	None other than embedded mitigation	Not significant

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
	Operational traffic	Not significant	Mitigation not required	Not significant
Non-residential receptors	Operational noise	Not significant	None other than embedded mitigation	Not significant
	Operational traffic	Not significant	Mitigation not required	Not significant

11 Socio-economics

This chapter presents the socio-economic assessment of the construction and operation of the proposed development.

It includes consideration of the potential direct and indirect effects that could arise with a focus on employment and training opportunities and supply chain impacts.

11.1 Legislation, policy context and guidance

11.1.1 Legislation

Welsh Government, Well-being of Future Generations (Wales) Act 2015

The Well-being of Future Generations (Wales) Act 2015 is about improving the economic, social, environmental and cultural well-being of Wales. The process of improvement would have to include actions that are in accordance with the sustainable development principles. Any action a public body takes in carrying out sustainable development must include set and published well-being objectives that are designed to achieve each of the well-being goals and public bodies need to consider the impact that their decisions could have on people living in Wales in the future.

11.1.2 Policy Context

National planning policy

Future Wales: The National Plan 2040

Future Wales is the national development framework for Wales and aims to address key national priorities through the planning system over the next 20 years. These include developing and sustaining a vibrant economy, achieving decarbonisation and climate-resilience, developing strong ecosystems and improving health and well-being of our communities. The three main National Growth areas of the Plan are employment, housing and infrastructure.

Policies in the plan that are relevant include aspirations to supporting councils and public bodies that are using their land and resources to make places more sustainable (policy 3), supporting and protecting rural communities and the rural economy by bringing money and work to rural areas (policies 4 and 5) and protecting and enhancing natural capital, biodiversity and green infrastructure as well as renewable energy initiatives (Policies 9, 16,17 and 18).

Welsh Government, Prosperity for All: Economic Action Plan

National planning policy is also set out in the Prosperity for All: Economic Action Plan. The Action Plan states significant support for businesses that can demonstrate a growth potential, measured by the contribution to employment, productivity and multiplier effects, fair work, promotion of health and progress in

reducing their carbon footprint. In addition, the Action Plan includes preference to focus on a limited amount of foundation sectors: tourism, food, retail and care. These sectors will be supported through improved skills development schemes, new business models and infrastructure.

Welsh Government, Programme for Government: 2021 t0 2026

The latest Programme for Government was launched in June 2021 and includes a number of commitments for a stronger, greener, fairer Wales. In relation to this assessment, the commitments of particular relevance include:

- Build an economy based on the principles of far work, sustainability and the industries and services of the future. This commitment seeks to address damage caused by decades of austerity, Brexit and the impact of coronavirus thorough provide decent jobs, relevant skills and training opportunities. In particular the commitment seeks to create 125,000 apprenticeships.

Local planning policy and strategies

Cardiff Capital Region, Industrial and Economic Plan

The Industrial and Economic Plan aims to boost productivity and accelerate economic and inclusive growth in the Cardiff Capital Region in the long term. The Plan makes propositions to create good and sustainable jobs by backing businesses and through targeted investments in skills, infrastructure, innovation and priority industries.

Blaenau Gwent County Borough Council (BGCBC), Adopted Local Development Plan, 2006-2021 and emerging Local Development Plan 2018-2033

The main vision and objectives of the BGCBC LDP are to create a network of sustainable vibrant valley communities, to create opportunities for sustainable economic growth, to promote learning and skills and to create healthy, safe and vibrant communities by protecting and enhancing the unique natural and built environment.

Strategic policy 7 also states that new developments have to be sustainable by maximising the use of land, promoting the re-use and restoration of derelict land and buildings, focusing on infrastructure away from areas vulnerable to flooding, reducing energy consumption and increasing the supply of renewable energy.

In addition, policy 8 states that by 2021, 50 hectares of employment land and a range of premises must have been delivered which meet the needs of local businesses and offers employment opportunities for local people.

Ebbw Vale Enterprise Zone, Strategic Plan 2018-2021

The Ebbw Vale Enterprise Zone is one of 8 eight across Wales and focuses primarily on the advanced materials and manufacturing sector. The Enterprise Zone comprises of four areas totalling 40 hectares of developable land. The main objectives of the Enterprise Zone are job creation and business growth. It strives

for the creation of a vibrant, world class technology hotspot for manufacturing companies that will provide valued employment. The Zone can support the development of up to 450,000 sqm of new industrial and commercial floor space that could generate around £20 million of private sector investment, potentially providing around 1,000 jobs on top of employment during the construction phase[172].

11.1.3 Guidance and standards

In line with established industry best practice, the assessment of employment effects has drawn on the following published documents:

- The Green Book, HM Treasury (2020);
- Homes and Communities Agency (HCA), Employment Densities Guide, 3rd edition (2015);
- HCA, Additionality Guide, 4th edition (2014); and
- HCA, Calculating Cost Per Job: Best Practice Note, 3rd edition (2015).

11.2 Methodology

11.2.1 Methodology for establishing baseline conditions

The baseline uses publicly available data sources including the 2011 Census, as well as the Index of Multiple Deprivation (2019), the Annual Population Survey (2020), the Annual Survey of Hours and Earnings (2020), and the most recent Annual Population Projections produced by the Office for National Statistics (ONS). Business and employment data are drawn from the Inter-Departmental Business Register, and Business Register and Employment Statistics, and data on growth and productivity from ONS Gross Value Added (GVA) statistics.

The baseline also provides details of the current provision of employment land within the study area, and the key economic issues and challenges in Blaenau Gwent and the wider Cardiff Capital / south-east Wales region. This information is drawn from local sources, including data and reports published by BGCBC and by Cardiff Capital Region.

11.2.2 Assessment methodology

The assessment considers the potential direct and indirect effects of the proposed development for current and future residents and businesses within the study area, including potential cumulative effects arising from the proposed development in combination with other planned developments. Effects are considered both during the construction phase and once the proposed development is operational.

As proposed through the scoping report submitted to the LPA at the scoping stage, the socio-economic assessment focusses on employment and supply chain

[172] See page 5, Deliverables and Outcomes - https://gov.wales/sites/default/files/publications/2019-03/ebbw-vale-enterprise-zone-strategic-plan-2018-2021_0.pdf

opportunities, and on training and apprenticeships. Other topics including the impact on Public Rights of Way, tourism, agricultural land, amenity effects for local residents and businesses, and traffic disruption for local businesses were scoped out. Further information is provided in the Environmental Impact Assessment Scoping Report which is available from the LPA on request.

The chapter includes an estimate of construction employment which utilises current estimates in relation to forecast project capital cost. Operational employment has been estimated using information provided by the client regarding anticipated employment generation. The assessment provides an estimate of the gross number of new jobs potentially supported by the proposed development.

The assessments of construction and operational employment use industry standard approaches and guidance including The Green Book and take account of leakage[173] and displacement[174] factors. Appropriate multipliers have been developed and applied to gross employment numbers to capture supply chain effects such as induced spend and additional income within the local economy.

Significance criteria

Given the lack of published/accepted guidance in relation to the assessment of socio-economic effects, the significance criteria below have been developed on the basis of best practice and have been tested through a number of previous, similar projects. Where necessary and relevant, professional judgement has been applied in arriving at significance conclusions.

Significance of an effect is defined as a function of:

- Resource value (international, state or local level importance)/receptor sensitivity;
- Magnitude of effect (either adverse or beneficial); and
- Temporal scale (temporary or permanent).

Appropriate sensitivity and magnitude criteria have been developed, based on professional judgement and industry best practice. These reflect the focus of the socio-economic assessment on determining whether effects would change patterns of activity; social or economic. Table 11.1 provides the definitions of sensitivity used in the assessment.

[173] Leakage – the number or proportion of outputs that benefit those outside of the target area or group. These are deducted from the gross direct effects of any intervention but should not be ignored.
[174] Displacement – the number or proportion of intervention outputs (e.g. jobs) accounted for by reduced outputs elsewhere in the target area.

Table 11.1: Definitions of sensitivity

Level of sensitivity	Definition of sensitivity examples
High	Businesses, individuals, groups of individuals, or other receptors possessing very significant economic, social or community value, that are expected to incur a material loss or gain as a result of potential changes in the environment.
Medium	Businesses, individuals, groups of individuals, or other receptors possessing significant economic, social or community value, that are expected to incur limited material loss or gain as a result of potential changes in the environment.
Low	Businesses, individuals, groups of individuals, or other receptors possessing some local economic, social or community value, that are not expected to incur a material loss or gain as a result of potential changes in the environment.

The magnitude of the effect on the baseline can then be assessed considering the scale, extent of change, nature and duration of effect. Table 11.2 provides the definitions of magnitude used in the assessment.

Table 11.2: Definition of magnitude

Level of magnitude	Definition of magnitude
High	An adverse or beneficial effect that would be likely to result in total or major changes to baseline conditions for a large number of businesses, individuals, groups of individuals, or other receptors.
Medium	An adverse or beneficial effect that would be very likely to result in partial changes to baseline conditions for a moderate number of businesses, individuals, groups of individuals, or other receptors.
Low	An adverse or beneficial effect that would be likely to result in minor changes to baseline conditions for a small number of businesses, individuals, groups of individuals, or other receptors.
Negligible	An adverse or beneficial effect that would be likely to result in little or no change to baseline conditions for businesses, individuals, groups of individuals, or other receptors.

Using these definitions, a combined assessment of sensitivity and magnitude can then be undertaken to determine how significant an effect is, as demonstrated in Table 11.3 Where the table presents two potential conclusions, professional judgement will be applied.

Table 11.3: Significance matrix

		SENSITIVITY		
		Low	Medium	High
MAGNITUDE	High	Moderate	Major or Medium	Major
	Medium	Minor or Moderate	Moderate	Major or Moderate
	Low	Minor	Minor or moderate	Moderate
	Negligible	Negligible	Negligible	Negligible

Where effects are classified as being of moderate and/or major significance (either beneficial or detrimental), the effect is considered significant in EIA terms.

11.2.3 Limitations and assumptions

The assessment has been completed on the basis of information known at the point of assessment and has considered site analysis, desk-based work and information gathered through consultation with the client team.

In the absence of published guidance and advice in relation to socio-economic assessment, the assessment utilises a methodology which has been established, tested and accepted through a number of similar scheme, and relies in part of the professional judgement of the author in drawing conclusions.

The following assumptions should be noted with respect to this socio-economic assessment:

- Construction and operational employment data has been estimated based on information provided by the client team, and based on their experience in building and operating similar facilities elsewhere;
- Multipliers have been selected from The Green Book (2020) on the basis of the anticipated effects given the nature and the geographic location of the Proposed Development. These are considered appropriate and described further in Section 12.6.
- Any timescales referred to within the assessment are based on the indicative construction programme at the time of writing. This has the potential to change, however, this is considered unlikely to affect the overall assessment conclusions in relation to construction employment.

11.2.4 Study area

As defined at the scoping stage of the proposed development, the socio-economic study area comprises the wards of Rassau and Beaufort and the wider Blaenau Gwent local authority area, where it is anticipated that the majority of socio-economic effects will be experienced. The assessment also considers potential effects on the wider Cardiff Capital Region where relevant.

11.2.5 Consultation undertaken

An EIA Scoping Report was prepared and submitted to Blaenau Gwent County Borough Council (BGCBC) on 20th May 2021 and included a proposed approach and scope for this socio-economic assessment.

A Scoping Opinion was received from BGCBC on 24th June 2021 and can be viewed on BGCBC's planning portal, Application reference C/2021/0128.

The Scoping Opinion and specialist consultee responses received did not provide any specific comments on the proposed approach and scope of this socio-economic assessment and therefore the assessment has been completed based on the scoped defined, focussing on the likely economic effects of the proposed development only.

No further consultation has been undertaken with any statutory consultees in preparing this assessment.

11.3 Baseline environment

The baseline presents data for the study area comprising the wards of Rassau and Beaufort and the wider Blaenau Gwent local authority area, where it is anticipated that the majority of socio-economic effects will be experienced. Data for Wales is provided as a comparator where appropriate.

Rassau and Beaufort are located in the northern part of Blaenau Gwent, a local authority in the South East Wales region, 20 miles north of Newport and 20 miles east from Cardiff. Blaenau Gwent covers an area of 10,900 hectares (BG Local Development Plan, 2012).

11.3.1 Population and demographics

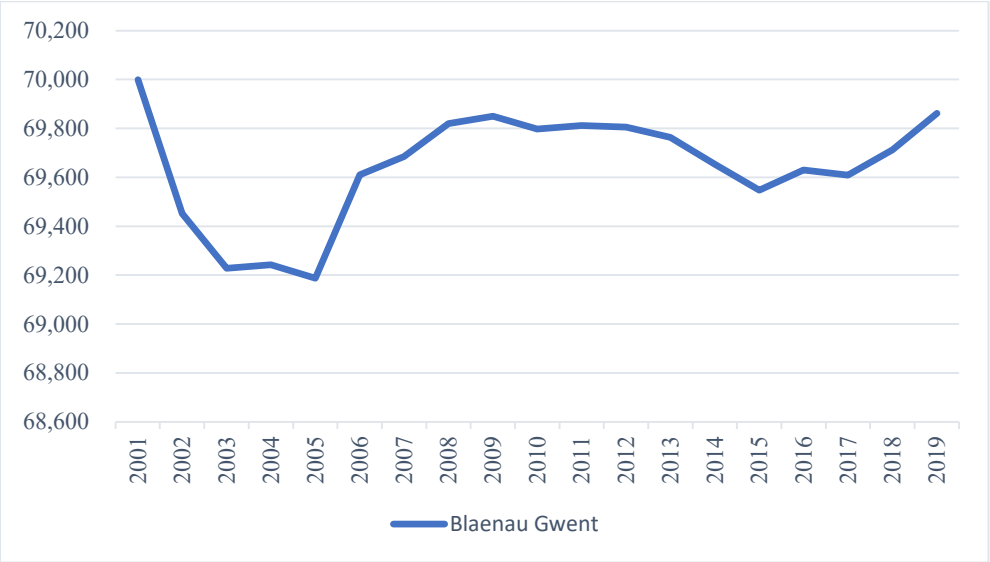
In 2019, Rassau and Beaufort had a population of 3,196 and 3,848 respectively. Overall, the population of Blaenau Gwent is 69,862 and the local authority has one of the highest population densities in Wales. The towns with the biggest populations are Ebbw Vale, Tredegar, Brynmawr, Blaina and Abertillery and most of the population in the local authority is concentrated in 23% of the area (BG Local Development Plan,2012).

Figure 11.1: Blaenau Gwent Settlement Context

Source: BG Local Development Plan (2012)

Since 2001, population in Blaenau Gwent has not changed significantly. From 70,000 in 2001 the population decreased to 69,812 in 2011 and has been largely unchanged since.

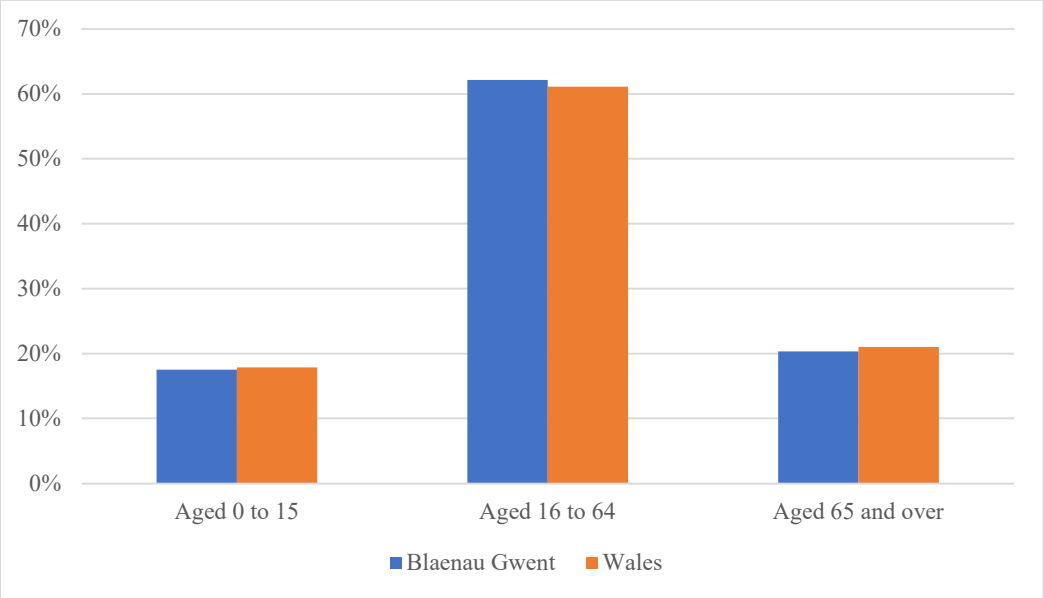
Figure 11.2: Population Growth over the last 20 years



Source: StatsWales

Figure 11.3 below illustrates the age profile of Blaenau Gwent. The local authority has a large proportion of residents of working age with 43,433 residents or 62% aged between 16 and 64. Children up to 15 years of age comprise 18% of the total population and residents aged 65 and over comprise 20% of the total population. The age profile of Blaenau Gwent is very similar to that of Wales as indicated below.

Figure 11.3: Age Profile



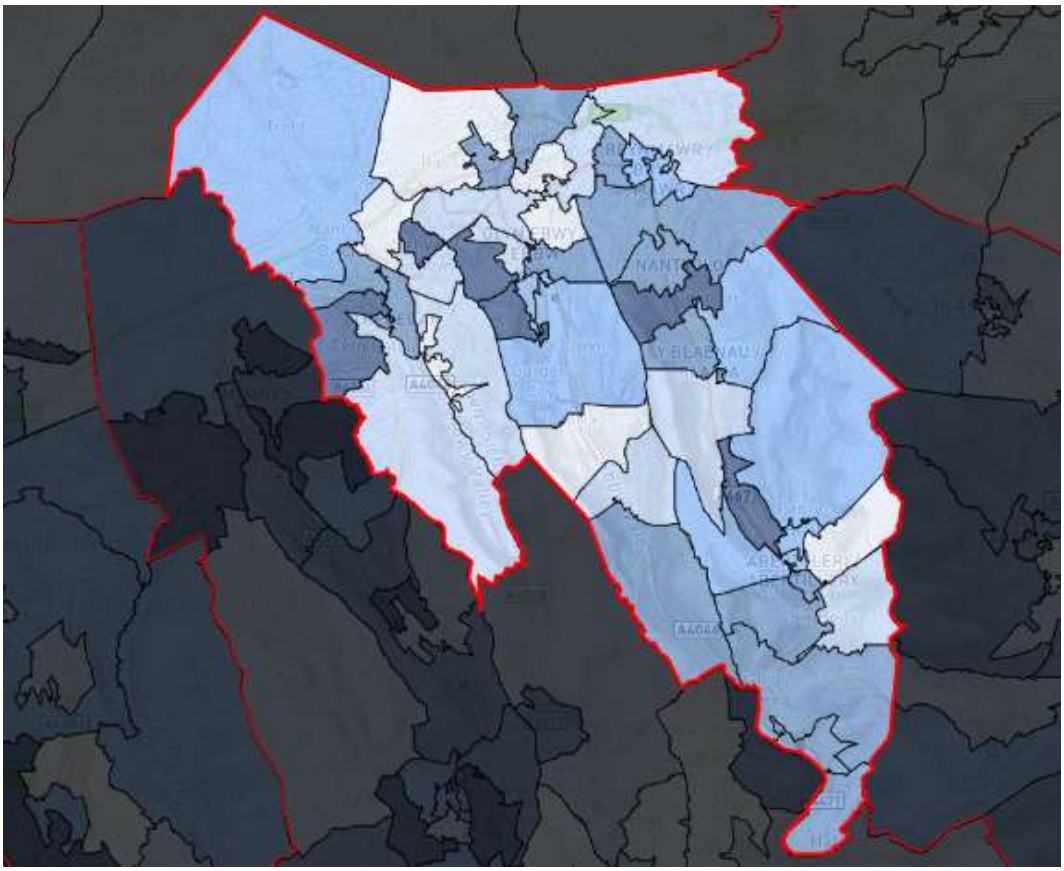
Source: StatsWales

The Blaenau Gwent local authority contains 47 Lower Super output Areas (LSOAs). Within the 10% of the most deprived LSOAs in Wales, 6 are located in Blaenau Gwent. This accounts for 12.8% of those located in the Blaenau Gwent

Local Authority and just 0.3% of those located in Wales overall. In the map below, the areas shown in dark blue are the most deprived. Areas in white or light blue are the least deprived.

The type of deprivation that is most prominent in Blaenau Gwent is community safety (27% of LSOAs in the local authority), employment deprivation (24%) and health deprivation (19%). On the other hand, there is no deprivation related to access to services and the physical environment in Blaenau Gwent.

Figure 11.4: Blaenau Gwent Multiple Deprivation (Overall)



Source: Welsh index of multiple deprivation

11.3.2 Economic growth and productivity

The Cardiff Capital Region generates 51% of the total GVA in Wales. According to the CCR Employment and Skills Plan (2019-22), Cardiff's GVA is higher than the UK average but other local authorities such as Blaenau Gwent, the Vale of Glamorgan and Caerphilly have the lowest GVA per head in the region.

In 2018, regional GVA in Blaenau Gwent in chained volume measures (CVM) index and considering all industries was 110,4 (2016=100) and in current prices it was £915m. This compares to £65,453m in current prices for Wales and £1,910,247m for the United Kingdom during the same year. This shows that GVA is a small proportion of the Wales total and it is considered that manufacturing diversification could help build resilience and improve the overall structure of the local economy.

Table 11.4: GVA per industry

Industry	Blaenau Gwent GVA (CVM index)	Blaenau Gwent GVA in current prices (£million)	Wales GVA in current prices (£million)
Production Sector	111.1	272	14,776
Services Sector	103.5	611	46,399
Manufacturing	115.9	219	11,248
Construction	85.6	33	4,279
Wholesale and retail trade, repair of motor vehicles	97.8	97	6,292
Transportation and storage	113.4	15	1,883
Accommodation and food service activities	102.3	20	2,254
Information and communication	353.3	7	2,131
Financial and insurance activities	127.6	6	3,052
Real estate activities	112.9	156	7,808
Professional, scientific, and technical activities	106.2	13	2,375
Administrative and support service activities	145.6	23	2,473
Public administration and defence	132.4	78	4,924
Education	105.8	61	4,047
Human health and social work activities	103.2	100	7,092
Arts, entertainment and recreation	83.1	11	810
Other service activities	175.3	23	1,155

Source: ONS 2018

11.3.3 Employment and economic activity

According to the BGCBC LDP (2012), the origins of Blaenau Gwent lay in a broad range of important local natural resources for making iron and steel. Consequently, the three valleys of Sirhowy, Ebbw Fach and Ebbw Fawr attracted heavy industries. For instance, up until 2002 the steel industry was a major employer in the local authority area. The manufacturing sector grew around these heavy industries and today makes up a central part of the economy.

Table 11.5 below shows economic activity rates among the working-age population of Blaenau Gwent, Wales and the United Kingdom using data from 2020. In total, 74% of working age residents of Blaenau Gwent are considered economically active. This compares to 75.7% for Wales and 78.9% for the United Kingdom. The unemployment rate in Blaenau Gwent is at 4.3%, slightly higher

than the Welsh unemployment rate (3.7%) but below the unemployment rate in the United Kingdom overall (4.5%).

According to the Cardiff Capital Region Investment Prospectus (2021) Blaenau Gwent and Merthyr are the local authorities with the highest unemployment rates in the region.

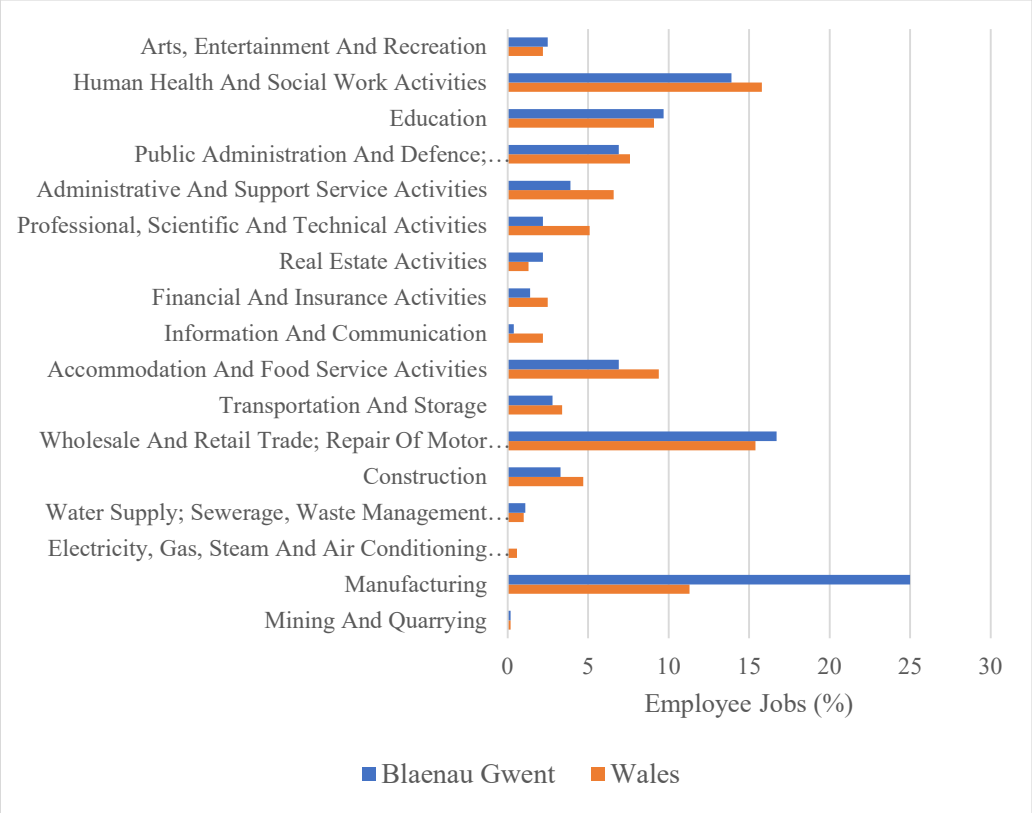
Table 11.5: Employment and economic activity

	Blaenau Gwent	Wales	United Kingdom
Economically active	74%	75.7%	78.9%
Employed	63.7%	63%	65.1%
Unemployed	4.3%	3.7%	4.5%
Economically inactive	26%	24.3%	21.1%

Source: ONS (Census 2011), ONS 2020

The largest sector for employment in Blaenau Gwent is the manufacturing sector which provides 25% of the region's jobs. Wholesale and retail trade accounts for 16.7% of employee jobs and human health and social work activities account for 13.9% of employee jobs. The smallest industry sectors in Blaenau Gwent are electricity, gas, steam and air conditioning supply, mining and quarrying and information and communication, each accounting for less than 1%.

Figure 11.5: Employee jobs by industry (%)

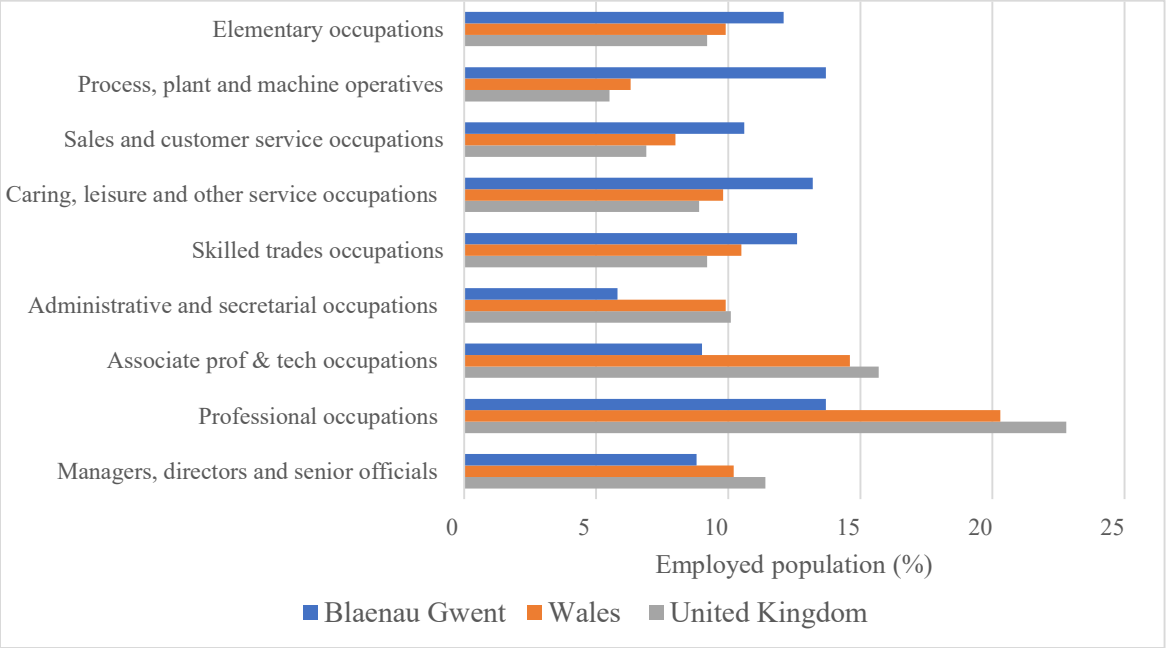


Source: ONS business register and employment survey

11.3.4 Workforce skills and qualifications

Blaenau Gwent has the highest percentage of employees in plant and machine operations (13.7%), professional occupations (13.7%), and caring, leisure and other service occupations and process (13.2%). Comparably, the highest percentage of employees in both Wales and the United Kingdom are in professional occupations (20.8% and 22.8% respectively) and associate professions and technical occupations (14.6% and 15.7% respectively) Administrative and secretarial occupations comprise the lowest percentage of occupations in Blaenau Gwent (5.8%) followed by managers directors and senior officials occupations (8.8%).

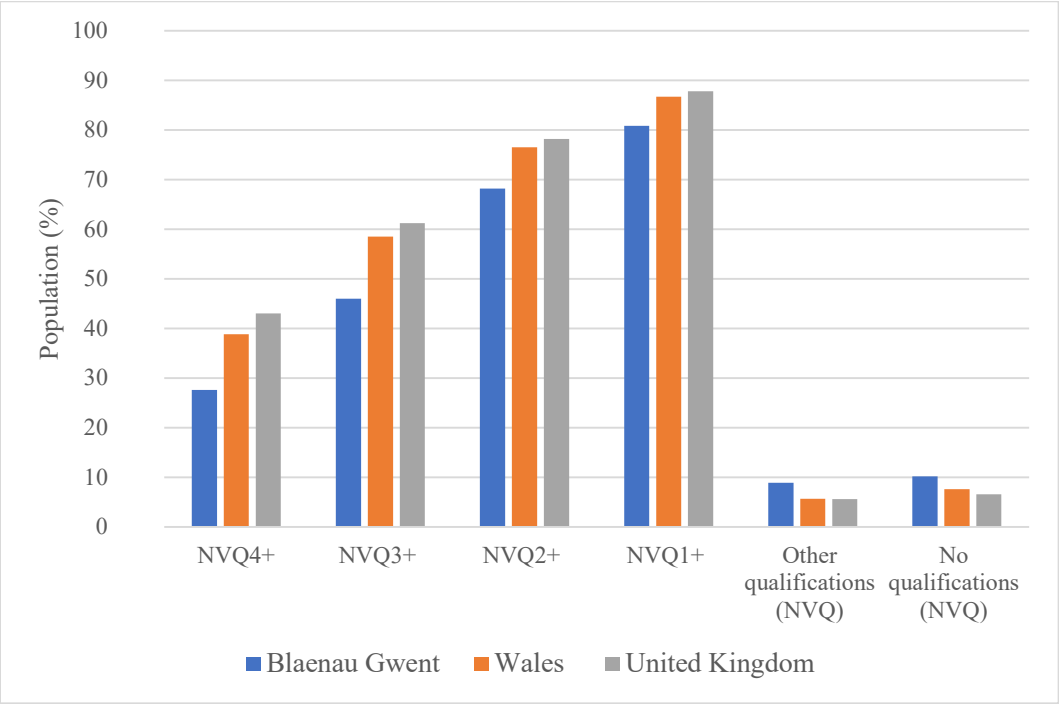
Figure 11.6: Employment by occupation



Source: ONS annual population survey

In Blaenau Gwent in 2020, 27.6% of the workforce had NVQ4 qualifications and above, 46% had NVQ3 and above and 68.2% NVQ1 and above. 10.2% of the population had no qualifications. According to the CCR Investment Prospectus (2021), within the Cardiff Capital Region, Blaenau Gwent, Caerphilly and Merthyr Tydfil were the only local authorities with less than 30 % of their population having level 4 qualifications. Cardiff, the Vale of Glamorgan, and Monmouthshire had over 46% of their population with level 4 qualifications.

Table 11.6: Qualifications



Source: ONS annual population survey

11.3.5 Business demographics and industrial structure

According to 2020 data, Blaenau Gwent has 1225 active enterprises, 190 business births and 155 business deaths. 87% of Blaenau Gwent's enterprises are micro enterprises with up to 9 employees, 9.8% are small enterprises with 10 to 49 employees and 2% are medium enterprises with 50 to 249 employees. There are only 5 large enterprises (0.4%), with over 250 employees.

Table 11.7: Size of enterprises

Enterprises	**Blaenau Gwent**		**Wales**	
	Number	**%**	**Number**	**%**
Micro (0-9)	1,075	87.8	94,600	89.4
Small (10 to 49)	120	9.8	9,460	8.9
Medium (50 to 249)	25	2	1,470	1.4
Large (250+)	5	0.5	325	0.3
Total	1,225		105,855	

Source: ONS 2020

In terms of earnings, the median weekly gross pay in Blaenau Gwent is lower than the Wales and UK medians, as shown in the table below.

Table 11.8: Earnings and hours worked

	Blaenau Gwent	Wales	United Kingdom
Median weekly pay (gross)	454.2	541.7	585.2
Hours worked (weekly total)	38	37.5	37.5

Source: ONS annual survey of hours and earnings

11.3.6 Economic Challenges

According to the LDP (2012) and key Cardiff Capital Region documents, the following provides a summary of the main economic challenges in Blaenau Gwent as well as potential actions to address them:

- Economic diversification: increase employment opportunities and secure higher income jobs for the future in industries such as services, knowledge-based industries, advanced manufacturing and sustainable technologies
- New roles for town centres: address the high vacancy rates and low presence of national retailers that characterises the local authority's main towns.
- Stabilising population: reverse net out migration by providing land for housing and jobs to retain people
- Meeting housing needs and improving housing: ensure affordability and mix of house types and tenure of new housing developments
- Improving education attainment and skills: continue to increase education attainment of local population, broaden the apprenticeship offer and improve education infrastructure
- Address the gap in gross median earnings between men and women
- Improving accessibility: develop a transport network which improves links to internal and external services, jobs and markets
- Creating a network of hubs: provide a network of towns and villages that can offer a sustainable level of services
- Supporting sustainable transport: increase active travel modes and public transport in order to reduce carbon emissions and encourage more healthy lifestyles
- Promoting health and well-being for all: consider aspects such as safety, health and freedom from disturbance in order to improve quality of life in the area

- Creating a place which supports its green environment: protect and enhance the areas natural assets and its wildlife in order to increase social and economic well-being
- Create places with a distinctive sense of identity: build on the area's distinctive location, history and townscape
- Sustainable use of natural resources: promote a responsible use of the area's physical resources in order to address problems related to pollution, land contamination and dereliction that can have long term negative effects to the health and well-being of its residents
- Sustainable design and development: build on the potential to generate energy by sustainable means and reduce consumption of energy of existing buildings
- Spreading the benefits of regeneration: take advantage of opportunities for transformation and regeneration that can have a positive impact on the local economy and environment

11.3.7 Summary

In summary, the baseline review has shown the following key socio-economic characteristics and trends:

- Blaenau Gwent has recorded small changes in population growth over the last 20 years. The local authority as a whole has a similar age structure than Wales. Blaenau Gwent has some deprived LSOAs especially in relation to community safety, employment and health deprivation
- While the Cardiff Capital Region generates half of the total GVA in Wales, GVA in Blaenau Gwent is among lowest in the region
- Blaenau Gwent specialises in manufacturing, wholesale and retail trade and human health and work activities
- Blaenau Gwent has generally lower rates of economically active populations that Wales and the UK overall
- Within the Cardiff Capital Region, Blaenau Gwent has among the lowest percentages of population with level 4 qualifications
- The number of businesses in Blaenau Gwent is 1,225, the majority of which employ fewer than 9 people.

11.4 Embedded mitigation

The assessment of socio-economic effects relies on measures that will be developed and embedded within the CEMP and Construction Traffic Management Plan (CTMP) and submitted as part of the application. This includes, for example, traffic management and noise mitigation measures.

11.5 Assessment of effects

11.5.1 Assessment of construction effects

Gross direct construction Employment

The construction of the proposed development will create employment opportunities over a period of approximately four years. Construction employment has been estimated based on the capital cost of the development, excluding finance and land purchase costs etc.

The cost of the works is estimated at approximately £200m. HCA guidance on calculating cost per job[175] provides labour coefficients that express the number of workers required over one year to deliver £1m of construction investment for different types of development. The recommended labour coefficient for private industrial developments is 10.0.

Applying this coefficient to the cost of the works gives an estimated of 2,000 construction worker years that would be required to construct the proposed development. Using the standard industry benchmark that 10 years of construction employment is equivalent to one full-time equivalent (FTE) construction job, this gives an estimate of 200 gross FTE jobs that would be supported directly by the construction of the proposed development.

Net additional construction employment

Net additional employment, taking into account the effects of leakage and displacement, has been calculated using the methodology set out in The Green Book.

Leakage refers to the proportion of jobs or other benefits that would be expected to occur outside the target area – in this case Blaenau Gwent – and can be affected by factors including local labour market conditions and ease of access to neighbouring areas. Research by the Construction Industry Training Board (CITB) found that the average distance travelled by a construction worker is 22 miles[176]. A 22-mile radius from the site would take in much of South East Wales and South Powys. However, the site's location on A465 means that east-west connectivity and accessibility is easier than north-south accessibility.

Many of the areas in the wider region and along the A465 are considered to offer some capacity within the labour market and therefore there is a good chance that construction employment could be taken up by people living within Blaenau Gwent or the areas surrounding the site. A low leakage rate of 10% has therefore

[175] HCA (2015), Calculating Cost Per Job: Best Practice Note, 3rd edition. Available online at: http://www.nwueu.ac.uk/NWUEU/LatestUpdates/PDF/CPJ%20BPN%20%202015%203rd%20Edition%20-%20Final.pdf

[176] Construction Industry Training Board (CITB) (2015), Workforce Mobility and Skills in the UK Construction Sector, 2015. Available online at: https://www.citb.co.uk/documents/research/workforce%20mobilty%202015/uk%20mobility%20report%202015.pdf

been applied, giving a total of 180 net FTE jobs that would be retained within the Cardiff Capital and South Powys areas.

Displacement refers to the proportion of jobs or other benefits that would be accounted for by reduced market share in other parts of the target area and can be influenced by factors including the degree of competition within the local business environment. As above, it is considered that there is likely to be capacity within the wider region and therefore a low displacement rate of 25% has therefore been applied, giving an estimate of 135FTE jobs that would be retained within the Cardiff Capital and South Powys areas.

Supply chain impacts

The jobs created directly by the construction of the proposed development would be expected to have knock-on effects within the local economy, as a result of expenditure in the supply chain (indirect effects) and as a result of additional income associated with local expenditure by direct and indirect employees (induced effects). A composite multiplier can be applied to capture these indirect and induced effects. The scale of these effects is influenced by the extent of the local supply chain, and the proportion of additional income likely to be spent within the area.

The 2020 update of the HM Treasury (HMT) Green Book[177] provides new employment multipliers for 'tradable' sectors, derived from research by the What Works Centre for Local Economic Growth. What Works specifies in its findings that construction is considered a 'non-tradable' sector. Therefore, the HMT Green Book employment multipliers cannot be applied to construction net jobs. Furthermore, the guidance does not specify what should be used instead for non-tradable net direct jobs, and therefore, in the absence of such guidance a zero multiplier has been applied.

Summary and conclusion

Table 11.9 provides a summary of the estimated direct, indirect and induced employment that could be generated by the construction of the proposed development and retained within the wider Cardiff Capital and South Powys areas. In total, it is estimated that total employment associated with construction that would be retained within these authorities would be approximately 135 FTE jobs.

Table 11.9: Summary of construction employment

	Estimated employment
Capital cost of construction	£200m
Construction worker years	2,000
Gross FTE direct employment	200
Net additional direct employment	135

177 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/938046/The_Green_Book_2020.pdf

	Estimated employment
Indirect and induced employment	0
Total additional direct, indirect and induced employment	135

It is considered that the sensitivity of the local labour market is medium, and the magnitude of the impact is also likely to be medium. This results in a moderate beneficial significance of effect for the Blaenau Gwent area and wider Cardiff Capital and South Powys authorities, which is significant.

Training and apprenticeships

As well as direct and indirect employment, the construction of the proposed development is also likely to provide opportunities for training and skills development, including apprenticeships. As reported through the baseline, Blaenau Gwent has a relatively low skilled population with among the lowest percentages of the population having achieved level 4 qualifications within the Cardiff Capital Region. Apprenticeships in the construction industry could therefore be important in providing opportunities for young people to stay in the area and develop their skills within the local economy.

The project developer is committed to engaging with a range of local partners including colleges, the local authority and job centre plus / Careers Wales to develop opportunities around apprenticeships and work placements, including during construction. It is anticipated that the contractor who is yet to be appointed would also have their own objectives in terms of apprenticeships and training.

It is likely that the construction of the proposed development will create further opportunities for CiNER Glass Ltd and its contractors to continue to work with local partners and training providers to deliver apprenticeships and training placements. At this stage, it is considered that the sensitivity of the local labour market is medium, and the magnitude of the effect, based on overall construction employment numbers, is likely to be low. This results in a minor beneficial significance of effect, which is not significant.

11.5.2 Assessment of operation effects

Gross operational employment

Gross operational employment associated with the proposed development has been estimated using data provided by CiNER Glass Ltd regarding anticipated roles and employment generation for the various elements of the site once in operation.

Table 11.10 shows estimated gross operational employment. In total, it is estimated that gross operational employment would be 671 FTE jobs. This includes circa 598 onsite, direct jobs, and further 73 off-site or sub-contracted jobs such as hauliers, security and cleaning contracts. It is therefore assumed that the majority of off-site employment would be made up of third-party contractors, principally hauliers, who would service the storage areas of the site.

Table 11.10: Estimated gross direct operational employment

Gross operational employment	Employment
On site, direct jobs	598
Off-site / sub-contractors (hauliers etc.)	73
Total	671

Net additional direct employment

Table 11.11 provides an estimate of the net additional direct employment generated by the proposed development that would be retained within the local labour market, following the methodology set out in the HCA Additionality Guide. Again, the assessment has considered effects within the Cardiff Capital Region.

For the purposes of this assessment, it has been assumed that gross operational onsite jobs can be considered 'direct' employment, while third-party off-site jobs are already in existence so would not be new to the local economy. The assessment of net employment is therefore based on the number of gross operational onsite, direct jobs only.

Table 11.11: Estimated net additional employment

	Employment
Estimated gross operational direct employment	598
Minus leakage (10%)	-60
Minus displacement (25%)	-135
Estimated net additional employment	404

The assessment has applied the same assumptions regarding leakage and displacement as the construction phase assessment. Low leakage and displacement rates of 10% and 25% respectively have therefore been applied, which results in circa 404 net additional FTE jobs that would be retained within the local labour market.

Supply chain impacts and indirect employment

The new 2020 HMT Green Book guidance central case employment multipliers for tradable direct employment have been used in order to consider potential indirect and induced employment as a result of the proposed development. This reflects that jobs created are largely manufacturing jobs and it is therefore assumed these are tradable. This results in an estimate of additional FTE employment that would be retained within the Cardiff Capital Region of circa 928. This includes indirect and induced employment of circa 525.

Table 11.12: Indirect and induced employment

	Employment
Net additional direct employment (a)	404
Total net additional non-tradable jobs created (with multiplier of 0.9) (b)	363
Total net additional tradable jobs created (with multiplier of 0.4) (c)	161
Indirect and induced employment (b+c)	525

Summary and conclusion

Table 11.3 provides a summary of the estimated net additional FTE employment that could be generated by the proposed development. In total, it is estimated that total net additional direct, indirect and induced employment associated with the development that would be retained within the Cardiff Capital Region would be in the range of 928 FTE jobs.

Table 11.13: Summary of operational employment

	Employment
Gross direct employment	598
Net additional direct employment	404
Indirect and induced employment	525
Total net additional direct, indirect and induced employment	928

It is considered that the sensitivity of the local labour market is medium, and the magnitude of the effect is likely to be medium. This results in a moderate beneficial significance of effect, which is significant.

Training and apprenticeships

As well as direct and indirect employment, the proposed development is also likely to provide opportunities for training and skills development, including apprenticeships, once in operation. Given the baseline data, it is considered that such apprenticeships and training opportunities could provide opportunities for young people to stay in the area and develop their skills within the local economy.

CiNER Glass Ltd is committed to engaging with a range of local partners including colleges, the local authority and job centre plus / Careers Wales to develop opportunities around apprenticeships and work placements.

At this stage, it is considered that the sensitivity of the local labour market is medium, and the magnitude of the effect, based on overall employment numbers, is likely to be low to medium. This results in a minor beneficial significance of effect, which is not significant.

11.5.3 Potential impacts due to climate change

The ES considers effects related to climate change as per the requirements of the 2017 EIA Regulations. The combined effects relating to the socio-economic impact of the proposed development and potential climate change on receptors indicate that there will be no significant additional impacts on the future baseline and no additional mitigation measures will be required.

11.6 Mitigation and enhancement

11.6.1 Mitigation of effects from construction

No significant adverse socio-economic effects have been reported during the construction stage of the proposed development. However, it is anticipated that management plans proposed through other chapters of the ES would bring benefits for those living and working in the areas surrounding the site in terms of managing wider potential effects (e.g. construction traffic and wider construction effects such as dust).

In order to bring the greatest benefit to the local communities in the area surround the proposed development, and the wider regional economy, CiNER Glass Ltd are committed to engage with a range of local partners to explore training and apprenticeship opportunities. Should consent be granted, they would also work with their appointed contractor to access relevant job fairs and promote opportunities during the construction stage for employees and supply chain partners.

11.6.2 Mitigation of effects from operation

No significant adverse socio-economic effects have been reported during the operational phase of the proposed development and therefore no specific mitigation measures are proposed or necessary.

CiNER Glass Ltd have committed to engage with local partners within the education and training sector to access apprenticeships, training and employment opportunities.

11.7 Residual effects

Table 11.14 and Table 11.15 provide a summary of the residual effects arising from the proposed development. Following the implementation of measures to ensure greatest benefit of the project, all impacts are reported as beneficial.

Table 11.14: Residual Socio-economic effects during construction

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Construction employment and supply chain opportunities	Construction employment	Moderate Beneficial	n/a	Moderate Beneficial
Construction training and apprenticeships	Creation of training and apprenticeship opportunities	Minor Beneficial	Commitment to engage with relevant parties and requirement on contractor.	Minor Beneficial

Table 11.15 Residual Socio-economic effects during operation

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Operational employment and supply chain opportunities	Operational employment	Moderate Beneficial	n/a	Moderate Beneficial
Operational training and apprenticeships	Creation of training and apprenticeship opportunities	Minor Beneficial	Commitment to engage with relevant parties.	Minor Beneficial

12 Transport

12.1 Introduction

This chapter reports the findings of an assessment of the potential significant effects on Traffic and Transport as a result of the proposed development, considering both the construction and operation phases.

The chapter considers and assesses the effects and extent of the environmental impacts arising from the proposed development on safety, capacity and the operation of the transport network within the vicinity of the site, including walking, cycling and public transport.

The assessment draws closely on the findings of a Transport Statement (TS) prepared by Arup (DRAGON-ARUP-ENVZ-XX-RP-YT-00001), which has been submitted to further support the planning application. A Framework Travel Plan (FTP) is also included within the document and can be found in Section 6 of the TS.

12.2 Legislation, policy context and guidance

This section summarises the key transport policies at a national, regional and local level that are relevant to this proposal, including:

Legislation

- The Well-being of Future Generations (Wales) Act 2015
- Active Travel (Wales) Act 2013

National Planning Policy

- Planning Policy Wales: Edition 11 (2021)
- Future Wales: The National Plan 2040 Wales
- Wales Transport Strategy: One Wales – Connecting the Nation (April 2008)
- Technical Advice Note 18: Transport (March 2007)

Regional Planning Policy

- South East Wales Valleys Local Transport Plan (2015)
- Our Valleys, Our Future – Delivery Plan (2019-2021)
- Ebbw Vale Enterprise Zone Strategic Plan 2018-2021

Local Planning Policy

- Blaenau Gwent County Borough Council (BGCBC) LDP2021

12.2.1 Legislation

The Well-being of Future Generations (Wales) Act 2015

The Well-being of Future Generations (Wales) Act (2015) requires public bodies in Wales to consider the long-term impacts of decision making and improve working with local communities to prevent persistent problems in Wales such as poverty, health inequalities and climate change. Seven well-being goals have been identified within the Act to ensure public bodies are working towards the same goals, and include the following:

- A Prosperous Wales that has an innovative, productive and low carbon society which recognises the limits of the global environment and therefore uses resources efficiently and proportionately;
- A resilient Wales that maintains and enhances a biodiverse natural environment which has the capacity to adapt to change;
- A healthier Wales in which people's physical and mental well-being is maximised and in which choices and behaviours that benefit future health are understood;
- A more equal Wales where people are able to achieve their full potential regardless of their background or circumstances;
- A Wales of cohesive communities which are attractive, viable, safe and well-connected;
- A Wales of vibrant culture and Welsh language; and
- A globally responsible Wales which, when doing anything to improve the economic, social, environmental and cultural well-being of Wales, takes account of whether doing such a thing may make a positive contribution to global well-being.

Active Travel (Wales) Act 2013

The Active Travel (Wales) Act 2013 aims to make walking and cycling the most attractive travel option for most shorter journeys. The Act requires local authorities in Wales to produce active travel maps and deliver year on year improvements in active travel routes and facilities. Furthermore, the Act requires highways authorities in Wales to enhance pedestrian and cycle routes and facilities as part of all new road schemes.

12.2.2 Policy Context

National planning policy

Planning Policy Wales: Edition 11

PPW11 sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs). The primary objective of PPW11 is to ensure that the planning system contributes towards the

delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales.

Chapter 2 (People and Places: Achieving Well-being through Placemaking) indicates all development decisions should contribute towards the making of Sustainable Places and improved well-being. Five key principles are presented in PPW which should be embraced to ensue planning facilitates the right development in the right place. These are listed below alongside how the development is considered to positively contribute to these goals:

- Growing our economy in a sustainable manner;
- Making best use of resources – using resources efficiently, development should be resilient to climate change and contribute towards decarbonising society;
- Facilitating accessible and healthy environments;
- Creating and sustaining communities;
- Maximising environmental protection and limiting environmental impact;

Chapter 3 (Strategic and Spatial Choices) identifies five key aspects of good design. It states good design is inclusive design, placing people at the heart of the design process. It must reduce inequality of access to essential services, education and employment and design measures with design measures improving accessibility by walking, cycling and public transport.

It is also noted that good design should avoid the creation of car-based developments by maximising opportunities for people to make sustainable and healthy travel choices for their daily journeys. To maximise accessibility by sustainable non-car modes, infrastructure proposed within the site should be integrated with existing infrastructure such as the strategic cycling network.

Chapter 4 (Active and Social Places) discusses the well-connected cohesive communities, components of placemaking, covering transport, housing retail and commercial development, community facilities and recreational spaces. With regards to transport, it states people should have access to jobs and services through more efficient and sustainable journeys, by walking, cycling and public transport.

To encourage the use of Ultra Low Emission Vehicles (ULEVs), PPW11 states the planning system should support the provision of ULEV charging points as part of new developments. Where car parking is provided for new non-residential development, planning authorities should seek a minimum of 10% of car parking spaces to have ULEV charging points. PPW11 also notes that it may be appropriate for some to be ‘passive’, with the necessary underlying infrastructure provided to enable installation and activation in the future.

Chapter 5 (Productive and Enterprising Places) considers the economic theme of place-making. It states the provision of sustainable transport infrastructure is essential in order to build prosperity, tackle the climate emergency, reduce airborne pollution and to improve the social, economic, environmental and cultural well-being of Wales.

Future Wales: The National Plan 2040 Wales

Future Wales is a new development plan which provides a national spatial strategy setting out the priorities for Wales over the next 20 years through the planning system, including 'sustaining and developing a vibrant economy, achieving decarbonisation and climate-resilience, developing strong ecosystems and improving the health and well-being of our communities'.

Policy 12 outlines a number of measures that the Welsh Government will prioritise investment. These are listed below and seek to improve regional connectivity across Wales:

- Active Travel – Prioritising walking and cycling for all local travel. We will support the implementation of the Active Travel Act to create comprehensive networks of local walking and cycling routes that connect places that people need to get to for everyday purposes.
- Bus – Improve the legislative framework for how local bus services are planned and delivered. We will invest in the development of integrated regional and local bus networks to increase modal share of bus travel and improve access by bus to a wider range of trip destinations.
- Metros – Develop the South East Metro, South West Metro and North Wales Metro. We will create new integrated transport systems that provide faster, more frequent and joined-up services using trains, buses and light rail.
- Ultra-Low Emission Vehicles – Support the roll-out of suitable fuelling infrastructure to facilitate the adoption of ultra-low emission vehicles, particularly in rural areas.

Wales Transport Strategy: One Wales – Connecting the Nation (April 2008)

In informing the strategic priorities of the National Transport Plan (NTP), the Wales Transport Strategy identifies a range of outcomes that should be achieved over the longer term. These include the need for improved connectivity and reliability across networks. The following key principles are identified as critical to the future transport policy agenda:

- achieving a more effective and efficient transport system;
- achieving greater use of the more sustainable and healthy forms of travel;
- minimising demands on the transport system; and
- reducing the impact of transport on greenhouse gas emissions.

Among the range of intended strategy outcomes is improved access to healthcare, education, shopping and leisure facilities and the encouragement of healthy lifestyles.

Technical Advice Note 18: Transport (March 2007)

The Advice Note elaborates on the relationship between land use planning and transport infrastructure by outlining a range of key principles that should be

adopted in ensuring that economic development can create a basis for sustainable travel patterns. These include the following:

- Ensuring new development is located where there is, or will be, good access by public transport, walking and cycling, thereby minimising the need for travel and fostering social inclusion;
- Managing parking provision;
- Ensuring that new development and major alterations to existing developments include appropriate provision for pedestrians (including those with special access and mobility requirements), cycling, public transport, and traffic management and parking/servicing;
- Encouraging the location of development near other related uses to encourage multi-purpose trips;
- Promoting cycling and walking;
- Supporting the provision of high quality, inclusive public transport; and,
- Promoting the location of warehousing and manufacturing developments to; and facilitate the use of rail and sea transport for freight.

Regional planning policy

South East Wales Valleys Local Transport Plan (2015)

The South East Wales Valleys Local Transport Plan[178] (LTP) was published in 2015 and focuses on transport improvements that lie within the remit of five local authorities comprising Blaenau Gwent, Merthyr Tydfil, Torfaen, Caerphilly and Rhondda Cynon Taf.

The LTP sets down the vision and objectives for transport in the South East Wales Valleys area and provides a short and long-term programme of interventions to work towards achieving these goals. The short-term programme sets down those schemes that are priorities for the five years to 2020. The longer-term programme identifies aspirations up to 2030.

Some of the broad objectives of the plan are as follows:

- Safety and Security - To reduce the number and severity of road traffic casualties and improve actual and perceived level of personal security when travelling.
- Connectivity and Accessibility - To improve access for all to employment opportunities, services, healthcare, education, tourism and leisure facilities, including by sustainable transport throughout the SE Wales Valleys and the rest of Wales, UK and Europe.

[178] South East Wales Valleys Local Transport Plan January 2016 (http://www.rctcbc.gov.uk/EN/Resident/ParkingRoadsandTravel/Travel/Relateddocuments/SouthEastWalesValleysLocalTransportPlanJanuary2015.pdf

- Quality and Efficiency - To improve interchange within and between modes of transport, improve reliability of the transport system and reduce traffic growth, traffic congestion and to make better use of the existing road system.
- Environment - Reduce significantly carbon emissions from transport; and,
- Land Use and Regeneration - To ensure developments in the South East Wales Valleys are accessible by sustainable transport.

Our Valleys, Our Future – Delivery Plan (2019-2021)

In July 2016, the Ministerial Taskforce for the South Wales Valleys was set up by the First Minister. The taskforce is made up of independent experts and is key to shaping the work of the Welsh Government, particularly in changing and setting government policy in relation to the Valleys.

Within the Delivery Plan for the period between 2019-2021, the taskforce has agreed to focus on seven priority areas, each driven by a subgroup of relevant experts that are responsible for taking forward the work. These are as follows:

- Strategic hubs;
- Foundational Economy;
- Entrepreneurship and business support;
- Housing;
- Valleys taskforce innovation fund;
- Transport; and,
- Valleys Regional Park.

The plan identifies Ebbw Vale as a strategic hub which is defined as an area of focused public sector investment, which aim to attract private sector investment, creating jobs and opportunities for the local area. Seven areas across the South Wales Valleys have been identified as strategic hubs – these are areas which are most accessible within 45 minutes to people living within Valley communities by public transport.

Ebbw Vale Enterprise Zone Strategic Plan 2018-2021

The plan outlines the achievements of the Ebbw Vale Enterprise Zone since its inception and makes some recommendations for future direction. It refers to the Ebbw Vale Enterprise Zone and specifies that it comprises of four areas totalling approximately 40 hectares of developable land, as follows:

- The Works/ Festival Park;
- Tredegar Business Park;
- Rhyd-y-Blew/ Bryn Serth; and,
- Rassau Industrial Estate.

The overall vision for the Ebbw Vale Enterprise Zone is the creation of a vibrant, world class high technology hotspot for Welsh based manufacturing companies of

all sizes spanning many key sub sectors including food and manufacturing, providing employment that is challenging, rewarding and valued.

Local planning policy

Blaenau Gwent County Borough Council (BGCBC) Local Development Plan 2021

The BGCBC LDP was adopted in 2012 and has a plan period of 2006 - 2021. It comprises a Written Statement and Proposals Map. The LDP sets out land use policies and proposals to control development in the county borough up to 2021 and provides the basis by which planning applications will be determined. The plan gives a clear indication of where development will be encouraged and where it will be resisted. It sets out a number of Strategic Policies (SP) and Development Management Policies (DM).

The Written Statement outlines 14 'challenges for the future' which need to be addressed through the LDP. The following challenges specifically relate to the proposed development:

Challenge 1: Economic Diversification which outlines that a key challenge is to secure jobs for the future, this means increasing the proportion of jobs in sectors with good growth prospects, such as service, knowledge-based business, advanced manufacturing, tourism and sustainable technologies. The challenge is to provide land, services and environments that will draw investment.

Challenge 8: Supporting sustainable transport; creating an environment and transport network in which it becomes a more attractive choice to walk, cycle or travel by public transport.

Challenge 10: Creating a place which supports the green environment; protects and enhances the natural assets both to support the regeneration of Blaenau Gwent and as features in their own right.

Challenge 13: Sustainable design and development; help through the development process, to achieve the potential for reducing greenhouse gases and impacts of climate change.

The policies within the LDP of relevance to this chapter include:

- Policy SP6 - Ensuring Accessibility

The policy states that the Council will work with various bodies and authorities to increase connectivity through improving rail, bus and road links and promoting Ebbw Vale as a regional public transport hub which integrated cycling, walking, bus and rail networks.

- Policy DM1 - New Development

Under point 3 - Accessibility, the policy states that development proposals will be permitted provided that:

2. The proposal has regard for the safe, effective and efficient use of the transportation network;
3. The proposal ensures that developments are designed to an appropriate standard that prioritises the interests of pedestrians, cyclists and public transport before that of the private car;
4. The proposal secures appropriate provision for people with special access and mobility requirements
5. Parking, appropriate servicing and operational space has been provided; and
6. Where a Transport Assessment and Travel Plan is required by national planning policy, they must demonstrate that there will be no adverse impact on trip generation and travel demand.

- Policy EMP1 – Employment allocations

The site itself is allocated for employment use under Business Parks as policy number EMP1.4 and EMP1.5, as per Table 12.1 below.

Table 12.1: BGCBC LDP Employment Allocations

Policy Number	Site Name	Hub	Indicative Developable Area (Ha)
EMP1.4	Rassau Platform A	Ebbw Vale	3.4
EMP1.5	Rassau Platform B	Ebbw Vale	3.7

12.2.3 Guidance and standards

Supplementary Planning Guidance for Access, Car Parking and Design

In addition to the adopted LDP, Supplementary Guidance provides clear direction on planning and development issues. The parking standards seek to ensure a consistent approach to the provision of parking, submissions to travel plans and sustainability considerations that will inform all those involved in the design/construction of a given development. Parking standards are determined by land uses in zones, as follows:

- Zone 1 - Town Centre or City Centre Fringe; and
- Zone 2 - Suburban or near urban; and
- Zone 3 - Deep Rural.

BGCBC have designated the site within the suburban or near urban zone (Zone 2). The car parking standards which apply to the development proposals are summarised in Table 12.2 below.

Table 12.2: BGCBC Adopted Parking Standards

Type of Development	Operational (10% of GFA)	Non-operational
Industry Warehouses	10% of Gross Floor Area (GFA)	1 space per 140m2
Industry	10% of GFA	1 space per 120m2

Appendix 2 of the document also states that for car parks associated with new employment premises, the number of disabled car parking spaces should comprise 5% of the total car park capacity.

Appendix 3 of the document also outlines the requirements for cycle parking for both long-stay and short-stay. These are outlined below.

Table 12.3: BGCBC Cycle Parking Standards

Land Use	Long-Stay	Short-Stay
Industry	1 stand per 500 m2	1 stand per 1000 m2
Industrial Warehouses & Storage Centres	1 stand per 500 m2	No requirement

It should be noted, however, that given the scale of the proposed development site in terms of GFA and the proposed number of staff likely to be employed, it is not considered appropriate to apply the car and cycle parking standards to this development as it would result in a significant overprovision.

A bespoke calculation has therefore been undertaken to estimate the likely demand for car and cycle parking at the facility. This considers the maximum number of staff likely to be present on-site at any given time (including overlap between shifts) and the likely mode share. This is set out in detail within Section 4 of the TS.

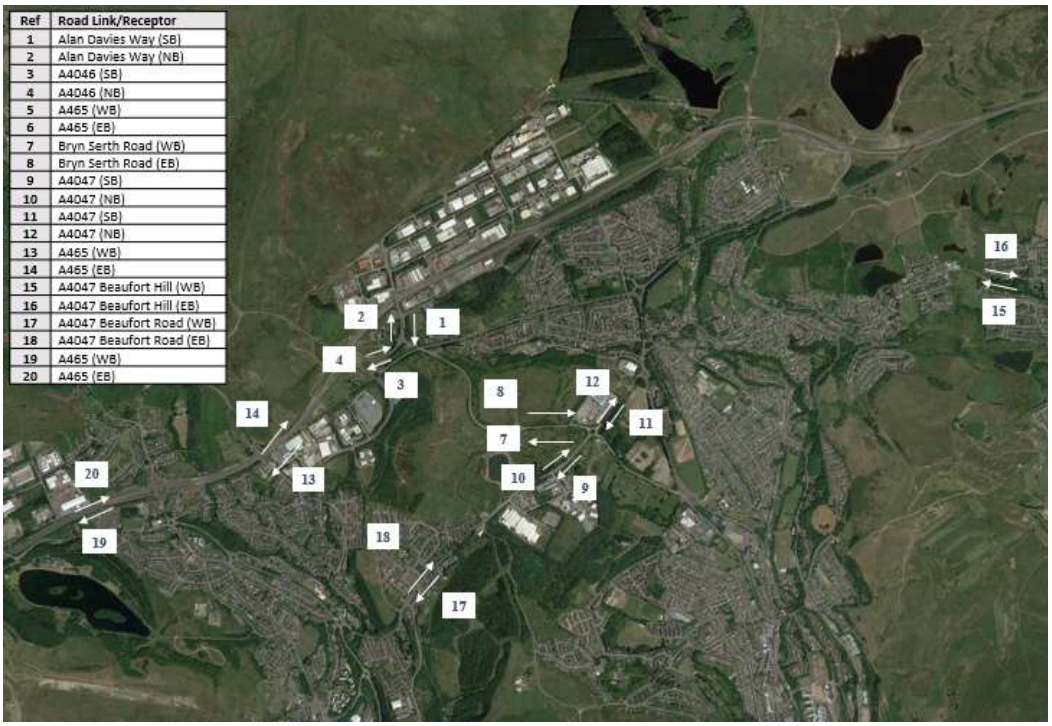
Guidelines for the Environmental Assessment of Road Traffic" - Institute of Environmental Assessment (IEA), 1993

The methodology presented in this section has been prepared in accordance with The Guideline for the Environmental Assessment of Road Traffic produced by the Institute of Environmental Assessment (IEA) (now Institute of Environmental Management and Assessment (IEMA)) in 1993, hereafter known as the IEMA guidelines. This is discussed further in Section 12.5.

12.3 Study area

The study area for the Transport chapter of the ES broadly reflects that of the TS and encompasses all highways, walking and cycling routes that surround the site. Some links within the wider area have also been included in the assessment, despite impact along the majority of these being low. The study area is shown in Figure 12.1 below:

Figure 12.1: Study Area (Copyright: Google Maps)



12.4 Consultation

An EIA Scoping Report was prepared and submitted to BGCBC on 20th May 2021. The EIA Scoping Report sets out the proposed scope for the assessment of traffic and transport and can be found on BGCBC's planning portal.

A Scoping Opinion was received from BGCBC on the 24th June 2021. This can be viewed on BGCBC's planning portal (application reference C/2021/0128) and has been summarised with responses to explain where the Scoping Opinion comments have been incorporated in the assessment. Table 12.4 below provides responses to relevant comments raised in this correspondence.

Table 12.4: Local authority response to scope of transport assessment

Scoping opinion comment	Applicant response
The Team Manager of the Built Environment at BGCBC responded stating that 'the scoping report parameters and proposed assessment methodology regarding traffic and transport are acceptable to the highway authority'	As per the scoping response, it is considered that the methodology used for the assessment of traffic and transport impacts of the proposed development is acceptable.

Prior to submission of the EIA Scoping Report, the proposed scope of works was discussed and agreed with Officers of BGCBC via Teams calls and email correspondence for the submission alongside Planning, which is also included in Appendix A2 of the TS. A summary of the agreed scope is summarised below in Table 12.5.

Table 12.5: Consultation

Organisation	Consultation Response
BGCBC Highways Department	Consultation with the highway officer at BGCBC has been undertaken (May 2020) and the following has been confirmed: • a Transport Statement is considered sufficient alongside submission of the planning application • Consideration is required within reporting regarding the impact of the proposed development on the following junctions: Bryn Serth Road/A4047/Waun-y-Pound Rd roundabout; and Bryn Serth Road / Rassau Ind Est roundabout. • A Framework Travel Plan is considered acceptable for submission for planning, with a full Travel Plan required prior to occupation. Further discussions were held with BGCBC regarding the submission and information/data held by BGCBC that could be used as part of the transport work. The date and subject of the email correspondence are listed below: • 7 September 2020 – Transport Statement question and information on committed developments; • 22 September 2020 – Transport Statement/development flow data; • 30 September 2020 - Proposed Heavy Goods Vehicle (HGV) movements/delivery restrictions/TEMPro growth factors; and • 5 October 2020 - Proposed access arrangements.

12.5 Methodology

The methodology presented in this section has been prepared in accordance with the guidance provided in The Guideline for the Environmental Assessment of Road Traffic produced by the Institute of Environmental Assessment (IEA) (now Institute of Environmental Management and Assessment (IEMA) in 1993, hereafter known as the IEMA guidelines.

The methodology used for this assessment is based upon a comparison of predicted traffic flows along affected roads. The impact of traffic is dependent upon a wide range of factors, including:

- Volume of traffic;
- Traffic speeds and operational characteristics; and,
- Traffic composition e.g. percentage of Heavy Goods Vehicles (HGVs).

The methodology of this EIA transport assessment can be summarised as follows:

- Describe the assessment methodology;
- Review baseline traffic flow information;
- Detail the embedded mitigation;

- Assess the construction and operational effects of the project on the local transport network;
- Identify suitable and safe mitigation measures; and,
- Assess any residual effects.

The methodology used for this assessment is based upon a comparison of predicted traffic flows along affected roads using the IEMA guidelines on the environmental impacts of road traffic. This assessment is structured around the consideration of potential environmental effects relating to traffic and transport, which includes the following:

- Noise and vibration (see Chapter 11);
- Visual impacts (see Chapter 14);
- Severance;
- Driver delay;
- Pedestrian delay;
- Pedestrian amenity;
- Accidents and safety;
- Hazardous loads (not considered relevant to this scheme);
- Air pollution (see Chapter 6); and,
- Dust and dirt (see Chapter 6).

A set of criteria have been defined and used as a means of determining the sensitivity of receptors which are likely to be affected by any changes in the composition of traffic, in particular the volume and movement patterns of HGVs. These criteria have been based on the IEMA guidelines and are detailed in paragraph 12.5.3 of this Chapter.

12.5.1 Methodology for establishing baseline conditions

To understand and quantify the future impacts of the proposed development, an assessment of existing local highway characteristics and trends has been undertaken, including:

- 2018 peak period traffic survey data obtained from a Transport Assessment (TA) submitted as part of a planning application for a New Industrial Unit at Rhyd-y-Blew, Ebbw Vale. The data was supplied by BGCBC;
- Liaison with BGCBC on committed developments; and,
- Desktop studies to gather local highway accident records and the nature of the highways likely to be affected sourced from publicly available information.

Department for Transport (DfT) traffic counts have also been used as well as local Automatic Traffic Counts (ATCs) with factors developed to apply to the peak flows obtained from BGCBC to generate representative 24-hour Annual Average

Daily Traffic (AADT) flows. AADT flows are defined as the average daily flow on a specific road or link over the course of one year.

12.5.2 Assessment methodology

In accordance with Section 3.1 of the Institute of IEMA guidelines, the impact of traffic is dependent upon a wide range of factors, including:

- Volume of traffic;
- Traffic speeds and operational characteristics; and,
- Traffic composition (e.g. percentage of heavy goods vehicles).

In determining the impact of, and crucially, the significance of the above factors, the IEMA guidelines suggest that the following two basic rules are used to define the extent of the assessment:

Rule 1: Include highway links where 24-hour Average Annual Daily Traffic (AADT) flows increase as a result of development by more than 30%; and

Rule 2: Include any other specifically sensitive areas where AADT flows are expected to increase by 10% or more as a result of development.

IEMA guidelines also recommend a link should be assessed where there is a significant increase in HGV flows. As noted in paragraph 4.39 of the IEMA guidelines, a significant change would be where the HGV component of traffic flow is halved or doubled. Therefore, a link will also be assessed if the HGV component of traffic flow increases by 100%.

In accordance with Section 3.15 of the IEMA guidelines, the above rules have been used as the basis of defining the extent of the assessment area. The resulting extent of the network has been informed by the supporting TA.

With regards to the period of assessment, section 3.8 of the IEMA guidelines notes the following

“While it may be valuable to know the environmental impact of a development at the peak hour traffic levels, it is likely that the greatest environmental impacts may occur at other times. For instance, where a development attracts a constant volume of traffic throughout the day”.

The assessment for both the construction and operational phase of the development has been based upon a 24-hour period to gain a full and detailed understanding of the likely traffic and transportation impacts. This includes the potential effects resulting from possible weekend and overnight operations associated with the proposed development site.

The years of assessment are as follows:

- Base: 2018 surveyed traffic flows;
- Construction ‘Do Minimum’ Baseline: 2022 with Committed Development. These flows form the base comparison for the future year analysis with construction traffic;

- Do Something Construction: 2022 with Committed Development and Construction Traffic (peak construction period);
- Operational 'Do Minimum' Baseline: 2026 with Committed Development. These flows form the base comparison for the future year analysis with operational traffic; and,
- Do Something Operational: 2026 with Committed and Proposed Development.

The committed developments included in all future year assessments include the Rhyd y Blew Industrial Unit development. In terms of any other traffic growth, TEMPro has been used which includes allowances for background traffic growth as well as committed developments. To avoid the potential for double-counting of traffic flows and from making any manual adjustments to TEMPro, no additional committed development traffic has been added to the baseline traffic conditions (with the exception of the Rhyd y Blew site). This approach was agreed with the highway officer at BGCBC on 30th September 2020.

12.5.3 Methodology for determining construction effects

The construction phase of the proposed development is anticipated to result in an increase in the total number of vehicles and HGV movement on some links within the study area. For the purposes of the assessment, it has been assumed that all HGVs will route to the site from the A465 as illustrated in Figure 12.2.

Figure 12.2: Proposed Construction HGV Routing (Copyright: Google Maps)

The selected route for construction HGV traffic is considered the most appropriate being mindful of road widths, weight restrictions and the minor impact that larger vehicles would have on the A465, given that there are already many HGVs travelling along this route.

However, the routing of HGVs will be agreed with BGCBC as part of a Construction Traffic Management Plan (CTMP) following the appointment of the

relevant contractor(s). An Outline CTMP has been prepared in support of this application and included in Section 5.6 of the TS. It is proposed for a CTMP to be secured under a planning condition.

The estimated increase in construction traffic is set out in 12.8.1 and detailed in Section 5.6 of the TS. A review of the construction programme was undertaken to identify any overlap in construction phases and to identify the phases of construction that would generate the highest number of vehicular movements.

12.5.4 Methodology for determining operational effects

Once operational, the proposed development is forecast to result in additional vehicle movements on the local highway network. To review the potential impact of the operational phase, reference has been made to the trip making assumptions presented in Chapter 5 of the TS.

The methodology for calculating the anticipated distribution of vehicle trips associated with the proposed development has been based on 2011 Census Data, whilst a different distribution has been assumed for future staff and for the HGVs associated with the operation of the future site. Background traffic growth factors have been derived from TEMPro and adjusted to account for the committed and proposed development. The modal share for the site has been calculated by reference to 2011 Census Travel to Work Data for the Blaenau Gwent 001 Middle Super Output Area (MSOA).

The assessment of operational traffic flows was undertaken on a link basis, rather than a junction basis. It is based on the estimated year when the site is likely to be fully operational i.e. 2026, calculating the percentage increase in traffic arising from the proposed development on the 'Do Minimum' traffic flows. This informs the impact that the proposed development will have on traffic flows and whether this increase in traffic flow will result in significant effects.

12.5.5 Significance Criteria

Significance of Receptors

In accordance with the EIA Regulations, the potential significant environmental effects of the project have been identified and their significance determined. Evaluation of their significance has been based upon specific criteria for each type of receptor and impact. This process considers the following:

- Impact likelihood, extent and magnitude;
- Impact nature (whether beneficial or adverse, direct or indirect, primary or secondary, permanent or temporary);
- Importance and sensitivity of the environmental receptor;
- The number of receptors that are impacted;
- Impact duration (whether short, medium or long term); and,
- Whether it is a stand-alone or cumulative impact.

Unless specified otherwise, the following terms have been used to assess the overall significance of effects:

- High beneficial or adverse – where the proposed development is likely to cause a significant improvement or deterioration to the baseline environment;
- Medium beneficial or adverse – where the proposed development is likely to cause a noticeable improvement or deterioration to the baseline environment;
- Small beneficial or adverse – where the proposed development is likely to cause a barely perceptible improvement or deterioration to the baseline environment; and,
- Negligible – no discernible improvement or deterioration to the baseline environment.

The significance of an effect on a receptor is defined in accordance with the magnitude of the impact and the sensitivity of the receptor. The sensitivity of a receptor can be defined by the degree by which it responds to change in its environment. In this assessment, it predominately relates to the effect of an increase in traffic flow.

Paragraph 2.5 of the IEMA guidance indicates the followings user groups are susceptible to being impacted by changes in traffic conditions:

- People at home;
- People in workplaces;
- Sensitive groups including children, older people and disabled;
- Sensitive locations, e.g. hospital, churches, schools, historical buildings;
- People walking;
- People cycling;
- Open spaces, recreational sites, shopping areas;
- Sites of ecological/nature conservation value; and,
- Sites of tourist/visitor attraction.

Table 12.6 below presents the receptor sensitivity based on paragraph 2.5 of the IEMA guidelines and adapted using professional judgements.

Table 12.6: Receptor Sensitivity Terminology

Receptor Sensitivity	Receptor Type
High	Receptors of greatest sensitivity to traffic flow: schools, colleges, playground, accident blackspots, retirement homes, urban/residential roads without footways that are used by pedestrians. (Para. 2.5, IEMA Guidelines, 1993)
Medium	Traffic flow sensitive receptors including doctor surgeries, hospitals, shopping areas with roadside frontage, roads with narrow footways, un-segregated cycleways, community centres, parks, recreation facilities. Receptors include hospitals and health care centres, shops, cemeteries and parks.

Receptor Sensitivity	Receptor Type
Small	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 distant from affected roads and junctions. Receptors include very small settlements and roads with no significant settlements including new strategic trunk roads or motorways.

Potential Receptors

For the purpose of this ES, receptors are defined as physical (i.e. roads) or user groups that would be affected by the project impacts. The sensitivity of a receptor is defined by the degree of which it responds to change in its environment. In this assessment, it has been related to the effect of an increase in traffic flow.

Assessment Criteria

Magnitude is determined by predicting the scale of any potential change in the baseline conditions. Where possible, magnitude has been quantified; however, where this has not been possible, a fully defined qualitative assessment has been undertaken.

To assess the magnitude of impact arising from an increase in HGV movements, the following impacts have been considered:

- Severance – the IEMA Guidance states that, "severance is the perceived division that can occur within a community when it becomes separated by a major traffic artery". Further, "changes in traffic of 30%, 60% and 90% are regarded as producing 'slight', 'moderate' and 'substantial' (or minor, moderate and major) changes in severance respectively". However, the Guidelines acknowledge that "the measurement and prediction of severance is extremely difficult";
- Driver delay – the IEMA Guidelines note that these delays are only likely to be "significant (or major) when the traffic in the network surrounding the development is already at, or close to, the capacity of the system.";
- Pedestrian and cycle delay – The IEMA guidelines note that:
- "… increases in traffic levels are likely to lead to greater increases in [pedestrian] delay. Delays will also depend upon the general level of pedestrian activity, visibility and general physical conditions of the site… More recent work (HFA 1990) has suggested a lower threshold of 10 seconds delay and upper threshold of 40 seconds delay which, for a link with no crossing facilities, equates to the lower threshold of a two-way flow of about 1,400 vehicles per hour."
- A lower threshold of a two-way traffic flow of about 1,400 vehicles per hour has been used to determine whether there is a significant impact on pedestrian delay, providing there are no existing or proposed crossing facilities.

- Pedestrian and cyclist amenity – the IEMA guidelines suggest that a tentative threshold for judging the significance of changes in pedestrian amenity would be where the traffic flow (or its HGV Component) is halved or doubled;
- Fear and intimidation – The suggested threshold presented in the IEMA guidelines proposes a small impact if the average HGV flow is around 1,000-2,000 vehicles and negligible if the HGV flow is below 1,000 (18-hour AAWT). It advises, however, that such thresholds should be used as an approximation and other factors will need to be taken into consideration. For example, areas where high-speed sections of road are present, the location of access junctions, or areas exposed to higher than average levels of school children; and
- Accidents and safety – professional judgement has been used to assess the implications of local circumstances, or factors which may elevate or lessen risks of accidents.

There are other potential impacts that could arise from the increase in traffic from the proposed development; such effects are discussed in: Chapter 8: Ecology, Chapter 14: Landscape and Visual Impact Assessment, Chapter 11: Noise and Vibration and Chapter 6: Air Quality.

Magnitude of Impact

Table 12.7 outlines the criteria by which potential impacts have been assessed. The IEMA guidelines have been used for developing the assessment criteria to determine the magnitude of impact caused by either a general increase in traffic flow or HGVs.

Table 12.7: Assessment criteria to determine magnitude of impact

Impact	**Assessment Criteria**			
	Negligible	**Minor**	**Moderate**	**Major**
Severance – results from the creation of new barriers such as roads combined with increased traffic flows along existing routes. Magnitude is based on IEMA Guidelines	Change in traffic flow of up to 30%	Change in traffic flow of 30% to 60%	Change in traffic flow of 60% to 90%	Change in traffic flow of over 90%
Driver Delay – often caused by the impact of the works on the local road network, along with increase in overall traffic flow along existing routes.	To be assessed on case-by-case basis using professional judgement and the results of the junction modelling assessments.			
Pedestrian and cycle delay - results from increase in	To be assessed on a case-by-case basis, with consideration given to the sensitivity and vulnerability of the receptor. It can occur on a road			

Impact	Assessment Criteria			
	Negligible	**Minor**	**Moderate**	**Major**
traffic flow, speed or composition along existing routes.	without crossings when the two-way flow exceeds 1,400 vehicles per hour.			
Pedestrian and cyclist amenity - relates to the relative pleasantness of a journey and can be affected by increase in traffic.	To be assessed on case-by-case basis using professional judgement with consideration given to changes to traffic flow. Generally, where the traffic flow or HGV component is halved or doubled, the effect is deemed to be significant.			
Fear and intimidation - a pedestrian's level of fear and intimidation is linked to the volume of traffic on the local road network.	To be assessed on case by case basis using professional judgement with consideration given to the increase in HGV flow, footway widths and road speeds. HGV flow below 1,000 vehicles (18-hour AAWT) is typically anticipated to have a negligible effect.			
Accidents and Safety - the impact of the proposed development through an increase in vehicles could influence the accidents and safety of the surrounding road network.	To be assessed on case by case basis using professional judgement with consideration given to accident assessment included within the TS.			

As a guide to inform the assessment, but not as a substitute for professional judgement, an overall impact of significance matrix used for determining the significance of traffic related effects is set out in Table 12.8 and has been developed by combining receptor sensitivity and the magnitude of the impact.

Table 12.8: Significance of effects matrix

	Magnitude of Impact			
Receptor Sensitivity	High	Medium	Small	Negligible
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Small	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

Effects are considered as having a major, moderate, minor or negligible significance. Potential effects that are determined to be moderate and major are classed as 'significant' effects for the purposes of an EIA. Where an effect has

been anticipated to be of negligible to minor, these are classed as 'not significant' effects.

Effects Scoped Out

As stated in the IEMA guidelines, increases in traffic flow below 10% are generally considered to be insignificant given that daily variations in background traffic flow on any given road link can fluctuate by the same amount. As per the guidelines, changes in traffic flow levels below 10% is therefore assumed to have no discernible environmental impact.

12.5.6 Limitations and assumptions

Limitations

Traffic Growth

To generate traffic flows for the future assessment year when the site would likely to be operational, background traffic growth factors have been derived from the DfT's Trip End Model Presentation Program (TEMPro) version 7.2b.

The geographical area has been set at the Blaenau Gwent local authority area. Origin/Destination growth rates for Car Driver trips have been obtained for the AM and PM peak hours and the adjusted local growth figure for BGCBC has been calculated.

It is noted that the Covid-19 pandemic may also have had an impact on traffic flow during the course of this study, due to the change in work patterns primarily caused by the advice for people to work from home. This has not been accounted for within the assessment, however, this is considered to be robust given that the majority of areas have seen a decrease in traffic volumes since the start of the pandemic. The use of Automatic Traffic Counts (ATCs) would therefore likely under represent traffic flows, particularly when comparing against pre-pandemic volumes. Flows are also likely to return to (or close to) pre-pandemic volumes as more people return to workplaces.

Assumptions

Throughout the assessment process, professional judgement and industry best practice has been applied. Where there is a gap in available data, reasonable assumptions have been applied which are set out below.

Construction

Construction of the facility is due to start in 2022. A staged approach for the construction and operation of the facility would be undertaken allowing the first glass making furnace to be operational by the end of 2023. Construction of the second furnace would be undertaken alongside the operational aspects of the first furnace. The facility would be fully operational by 2026 whereupon both glass making furnaces will be in operation. The operation is anticipated to be long-term with a 40-50-year life creating long term employment and supply chain

opportunities. At this stage, it is proposed that all construction activity would take place during the following hours:

- Monday to Friday 08:00-18:00; and
- Saturday 12:00-18:00.

To assess the traffic and transport impacts associated with the construction of the proposed development, assumptions have been made about the following:

- Construction programme;
- Construction vehicle trip generation;
- Construction routes; and
- Construction access.

Construction Trip Generation

For the purposes of the construction assessment, a robust timetable has been produced for the proposed development to calculate the level of construction activity. The programme used for calculations is shown in Table 12.9 below.

Table 12.9: Simplified construction programme

Simplified Construction Programme		
Scheme Delivery	**Working Days**	**Working Months**
Earthworks & Enabling	130	6
Sub Structure	87	4
Super Structure	260	12
Fit-out	130	6
Total	**607**	**28**

The trip generation calculation to estimate the number of construction vehicle movements is based on survey data obtained from a range of sites, varying from small (12,999m2), medium (42,000m2) and large (68,000m2) developments in terms of area. It is also expected that approximately 14% of the total number of trips would be made by HGVs, with the remainder being made by Light Goods Vehicles or Medium Goods Vehicles as shown below in Table 12.10.

Table 12.10: Percentage by type of construction vehicle

Vehicle	Percentage
Light Goods Vehicle	20
Medium Goods Vehicle	66
Heavy Goods Vehicle	14

The resultant number of vehicle trips estimated for each of the four construction phases is summarised in Table 12.11.

Table 12.11: Estimated construction vehicle movements

Phase	Vehicles	Average Vehicles/Month	Peak Daily Movements	Peak Day HGVs (14%)
Earthworks & Excavation	10,638	1,773	53	7
Construction - Substructure	6,653	1,663	75	11
Construction - Superstructure	12,419	1,035	43	6
Fit-Out	8,615	1,436	53	7
Total	**38,325**	-	-	-

It is likely that there will be an overlap in construction activity between Phase 1 (Earthworks and Excavation) and Phase 2 (Construction - Substructure). Based on the peak day movements outlined in the table above, the maximum number of daily trips expected to be generated would therefore be 128 trips (256 two-way), with 18 (36 two-way) of those likely to be HGVs.

In addition to the above, it is expected that during peak periods of construction activity there may be up to 450 workers on site. The movements of site workers arriving by private or public transport have therefore also been estimated. For robustness, it has been assumed for the purpose of this assessment that 70% of workers would arrive by private single occupancy transport, while 15% would utilise multi-occupancy transport/car sharing and the remaining 15% are assumed to travel by either car sharing as passengers, public transport, on foot or by bike.

The actual trip generation is expected to be lower than this and the appointed contractor could introduce measures such as dedicated worker minibuses to minimise the impact on the strategic and local highway network. This would be confirmed within the full CTMP.

The resultant number of daily construction worker trips are outlined below in Table 12.12.

Table 12.12: Estimated construction worker movements

Mode	Mode Share	No. Vehicular Trips
Private Car – Single Occupancy	70%	315
Car – Multi Occupancy	15%	68
Car Passenger, public transport, on Foot, Cycle, Taxi	15%	0
Total	**100%**	**383**

Based on the above information in both Table 12.11 and Table 12.12, it is forecast that the total number of daily vehicular trips generated by both construction vehicles (128 one-way trips) and construction workers (383 one-way trips) would be 511 (1,022 two-way trips).

This is below what is expected during the operational aspect of the development which is modelled in Section 5.4 of the TS, due to worker travel, delivery of

materials and trips associated with the distribution of glass bottles. Additional measures are also likely to be introduced that will minimise impact of construction vehicles on the highway network, including encouraging workers to travel to site by multi-occupancy transport methods.

Construction Access

Construction access will be achieved from within the Industrial Estate via Alan Davies Way to the west of the proposed development site which could be utilised for site construction activities including surveys, clearance, import of materials, workforce travel and export of materials. All construction vehicles will enter and exit the site in forward gear.

Traffic management interventions (potentially including banksmen and/or traffic signals) may be required to control vehicle movement within the Industrial Estate and such interventions will be agreed as part of the CTMP.

Operational

The methodology for projecting travel demand for the operational phase of the site has been informed by discussion with CiNER and their experience of operating similar facilities in other locations in order to determine and agree the overarching assumptions. A robust approach has been taken in forecasting development related vehicular trips to determine a worst-case scenario in terms of both staff trips and delivery vehicles. The key assumptions made include the following:

- There will be 671 staff employed at the site;
- The distribution of staff across the day has been confirmed to be as follows, across four shift patterns:

Shift	Shift Start	Shift End	Estimated Staff Number
1	00:00	08:00	132
2	08:00	16:00	270
3	08:00	18:00	116
4	16:00	00:00	153

- Staff are assumed to arrive within the hour before their shift start time, and depart within the hour after their shift ending;
- The modal share for the site has been calculated by reference to 2011 Census Travel to Work Data for the Blaenau Gwent 001. This suggests a car mode share of 74%, which has been applied to staff numbers;
- It has been confirmed that there will be 190 two-way (380 total) daily HGV trips associated with the delivery of raw materials to the site, including sand and soda ash to produce glass and for transportation of glass bottles off site following production; and
- Incoming deliveries will take place between 08:00 and 17:00, with outgoing deliveries between 06:00 and 22:00. Deliveries are also likely to be higher in

the first half of the day as the client has confirmed their intention to deliver to their clients before 09:30.

The information above has been considered when producing the bespoke trip calculations for the proposed site.

Operational Trip Generation

The tables below present the total number of trips expected to be generated by the proposed development site for the AM period (07:00-10:00), PM period (16:00-19:00), and across the day. These time periods have been used as they are likely to be the busiest in terms of other traffic along the network. These figures consider the assumptions outlined previously.

A full hourly distribution of vehicular trips likely to be associated with the proposed development site is included within the Transport Statement submitted as part of the planning application documents. The tables are broken down into three categories, as follows:

- The number of vehicular trips likely made by future staff;
- The number of HGV trips (for delivery of raw materials and glass bottle transportation); and,
- The total number of trips associated with the proposed development site (i.e. both staff and HGVs).

Table 12.13 presents the vehicular trip generation for future staff of the proposed development site.

Table 12.13: Daily Staff Vehicle Trips

	Time	Arrivals	Departures	Total*
AM Peak Period	07:00-08:00	276	0	276
	08:00-09:00	0	98	98
	09:00-10:00	2	0	2
PM Peak Period	16:00-17:00	0	190	190
	17:00-18:00	0	0	0
	18:00-19:00	0	86	86
	Total (24 Hour)	**490**	**490**	**981**

*Number subject to rounding

Table 12.14 presents the vehicular trip generation for HGVs associated with the delivery of materials and glass transportation to/from the site daily.

Table 12.14: Daily HGV Trips

	Time	Arrivals	Departures	Total*
AM Peak Period	07:00-08:00	18	18	36
	08:00-09:00	61	55	116
	09:00-10:00	10	10	19

PM Peak Period	16:00-17:00	10	10	19
	17:00-18:00	3	10	13
	18:00-19:00	3	3	6
	Total (24 Hour)	**190**	**190**	**380**

*Number subject to rounding

Table 12.15 presents the total vehicular trip generation including both staff and HGVs.

Table 12.15: Total Proposed Development Trips

	Time	Arrivals	Departures	Total*
AM Peak Period	07:00-08:00	294	18	312
	08:00-09:00	61	153	214
	09:00-10:00	12	10	21
PM Peak Period	16:00-17:00	10	199	209
	17:00-18:00	3	10	13
	18:00-19:00	3	89	92
	Total (24 Hour)	**680**	**680**	**1,361**

*Number subject to rounding

Table 12.15 shows that the proposed development is expected to generate around 680 one-way daily trips (1,361 two-way). The table also shows that generally these are fairly well distributed across the day and as a result, there is likely to be an additional 214 two-way trips in the typical AM peak hour (08:00–09:00) and up to 13 two-way additional vehicular trips in the typical PM peak hour (17:00–18:00).

12.5.7 Consultation undertaken

The scope of the assessment has been discussed with Officers of BGCBC via Teams calls and email correspondence. A summary of the agreed scope is summarised below in Table 12.16.

Table 12.16: Consultation

Organisation	Consultation Response
BGCBC Highways Department	Consultation with the highway officer at BGCBC has been undertaken (May 2020) and the following has been confirmed: • a Transport Statement is considered sufficient alongside submission of the planning application • Consideration is required within reporting regarding the impact of the proposed development on the following junctions: Bryn Serth Road/A4047/Waun-y-Pound Rd roundabout; and Bryn Serth Road / Rassau Ind Est roundabout.

Organisation	Consultation Response
	• A Framework Travel Plan is considered acceptable for submission for planning, with a full Travel Plan required to prior to occupation. Further discussions were held with BGCBC regarding the submission and information/data held by BGCBC that could be used as part of the transport work. The date and subject of the email correspondence are listed below: • 7 September 2020 – Transport Statement question and information on committed developments; • 22 September 2020 – Transport Statement/development flow data; • 30 September 2020 - Proposed Heavy Goods Vehicle (HGV) movements/delivery restrictions/TEMPro growth factors; and • 5 October 2020 - Proposed access arrangements.

12.6 Baseline environment

The site is allocated within the Ebbw Vale Enterprise Zone and occupies a strategic location adjacent to the A465 Heads of the Valleys Road in the head of the South Wales Valleys, approximately 700m to the north of Rassau village and 3km north of Ebbw Vale Town Centre.

The Rassau Industrial Estate, built in the late 1970s – early 1980s, currently comprises of purpose-built light industrial/manufacturing units with ancillary office accommodation. Rassau Industrial Estate covers approximately 17 acres (7.1 ha) and currently accommodates larger buildings predominantly for B1, B2 and B8 uses.

The proposed site is currently undeveloped and is located on the eastern extent of the industrial estate, consisting of existing grass land, scrub, broadleaved and coniferous woodland. An unadopted asphalt access road extends from the western boundary of the site which transitions into an unbound gravel track providing access to the eastern site extents.

Walking and Cycling

Pedestrian access to the site from the west is achieved via Alan Davies Way (which also provides vehicular access to the Rassau Industrial Estate) via a 2.5m wide pedestrian footway on the eastern side of the carriageway. Within the Estate itself, the footway extends on the southern side all the way to the extent of the proposed development site.

To the south of Alan Davies Way, the footway extends around onto the northern side of the A4281 where it becomes a shared footway/cycleway into Rassau itself.

An alternative more direct connection into the Industrial Estate from Rassau is provided via an underpass below the A465 carriageway which connects between Stonebridge Road in Rassau and Rassau Industrial Estate itself. This convenient access on foot or bicycle and is likely to be the most attractive Active Travel route into the Estate for most Active Travel journeys.

The site is well situated in relation to the local cycle network. A shared footway/cycleway is provided on the northern side of the A4281 carriageway into Rassau from the south of Alan Davies Way.

Within Rassau Industrial Estate there is provision for cyclists within the carriageway in the form of road markings in the form of white dashed lines, denoting an advisory cycle lane in each direction of travel.

The site is located close to National Cycle Network Route 46, a signposted route comprising a mixture of traffic-free (yellow solid lines) and on-road sections (blue solid lines). This long-distance east-west route connects between Bromsgrove (England) and Neath and passes through several residential areas in Ebbw Vale as well as providing connections to other areas of the south Wales valleys including nearby Brynmawr and the Sirhowy Valley.

In Rassau, NCN Route 466 spurs south from route 46 and provides a signposted route (much of which is traffic-free) through the Ebbw Valley to Aberbeeg.

Public Transport

The X4 is a longer distance Merthyr Tydfil to Abergavenny bus service that passes close to the site. As summarised below in Table 12.17, it operates at a frequency of one bus approximately every 30 minutes. Although it doesn't directly serve bus stops within Rassau, it can be accessed via bus stops located within Beaufort which is approximately 20-minutes' walk from the site.

The E4 service which previously operated near the site in Rassau was replaced by a new Fflecsi Demand Responsive Transport service by Transport for Wales in June 2021. Further information regarding the new Fflecsi service is outlined in more detail later in this section.

Table 12.17: Other Local Bus Services

Service	Route	Operator	Mon-Fri	Saturday	Sunday
X4	Merthyr Tydfil - Abergavenny	Stagecoach South Wales	Every 30 mins First: 06:18 Last: 20:51	Every 30 mins First: 06:18 Last: 20:51	No Service
	Abergavenny – Merthyr Tydfil	Stagecoach South Wales	Every 30 mins First: 06:42 Last: 19:12	Every 30 mins First: 06:42 Last: 19:12	No Service

The site is situated approximately five kilometres northwest of the closest railway station, Ebbw Vale Town. Table 12.18 summarises the current level of service from Ebbw Vale Town. Services from Ebbw Vale town call at Ebbw Vale

Parkway, Llanhilleth, Newbridge, Crosskeys, Risca & Pontymister, Rogerstone, Pye Corner and Cardiff Central.

Table 12.18: Ebbw Vale Town Rail Station Service Summary

Route	Typical Daytime Frequency/Duration	Journey Time	Sunday Service	Operator
Ebbw Vale Town to Cardiff Central	Hourly First Service: 06:35 Last Service: 22:40	57 mins	Every 2-3 hours First Service: 08:52 Last Service: 22:42	Transport for Wales
Cardiff Central to Ebbw Vale Town	Hourly First Service: 06:16 Last Service: 21:34	60 mins	Every 2-3 hours First Service: 07:44 Last Service: 21:33	Transport for Wales

Improvements to the Ebbw Vale railway line infrastructure and services are also proposed as part of the South Wales Metro programme which is a major programme of investment to improve the public transport across the Cardiff Capital Region. The proposed improvements include:

- Improvements to the rail infrastructure between Ebbw Vale and Newport in the Gaer area of Newport to enable introduction of an additional hourly direct service to Newport (currently it is not possible to reach Newport without interchange at Cardiff). As well as a new connection this additional service would provide additional passenger capacity to address crowding issues, particularly during the morning peak; and
- Introduction of four trains per hour on the Ebbw Vale line by 2024.

Although the station is situated approximately five kilometres from the proposed development site by combining rail travel with bicycle or staff shuttle rail services this could form an attractive option for travel to the site particularly from more distant locations.

Transport for Wales 'Fflecsi' Service

Fflecsi is a new pilot service which has been set up by Transport for Wales in partnership with local bus operators. The service picks passengers up and drops off in the service area, with drop off locations not strictly defined by bus stop locations.

Passengers are picked up on request, with the routing of the bus changing so that all passengers can get to where they need to go. The concept aims to replace a number of scheduled bus services and is designed to target people making essential local journeys.

TfW have already set up a number of pilot schemes within a number of locations across Wales including Cardiff North, Rhondda, Newport and areas in North Wales. In Cardiff North for example, tickets cost £2 for a single journey and £3 for a return and payments are taken on-board via card or smartphone.

A new Fflecsi service was introduced for the Ebbw Vale area in June 2021, replacing the E2 and E4 services within the Ebbw Vale area and providing

connections with the X4 and rail services at Ebbw Vale Town rail station. The service area includes Rassau Industrial Estate and will provide future staff with opportunities to utilise the service.

Local Highway Network

Alan Davies Way provides access to the Rassau Industrial Estate from the A4046/Beaufort Wells roundabout and via an overbridge crossing the A465 (Heads of the Valleys Road). On approach to the Industrial Estate Alan Davies Way is a dual carriageway with two traffic lanes in each direction and a central reservation with a typical width of 16.5m. The road leads to a three-arm roundabout.

To the north of the roundabout and towards the industrial estate, Alan Davies Way reduces to a single lane in each direction with a width of approximately 7m and a footway on the southern side. The road continues east for approximately 1.2km to the western extent of the proposed development site. The road is subject to a 30-mph speed limit in both directions.

The site assumes a prominent position in relation to the wider strategic highway network located immediately north of the A465 (Heads of the Valleys Road) dual carriageway. Westbound access to the A465 is from the southwest of the site via the A4046/A4281 roundabout and slip road. Eastbound traffic can access the A465 via a slip road which runs from the southern extent of the Estate.

The A465 provides a strategically important route between the Midlands and South Wales including to areas such as Brynmawr, Ebbw Vale, Tredegar, Rhymney and Merthyr Tydfil.

Road Traffic Collision Analysis

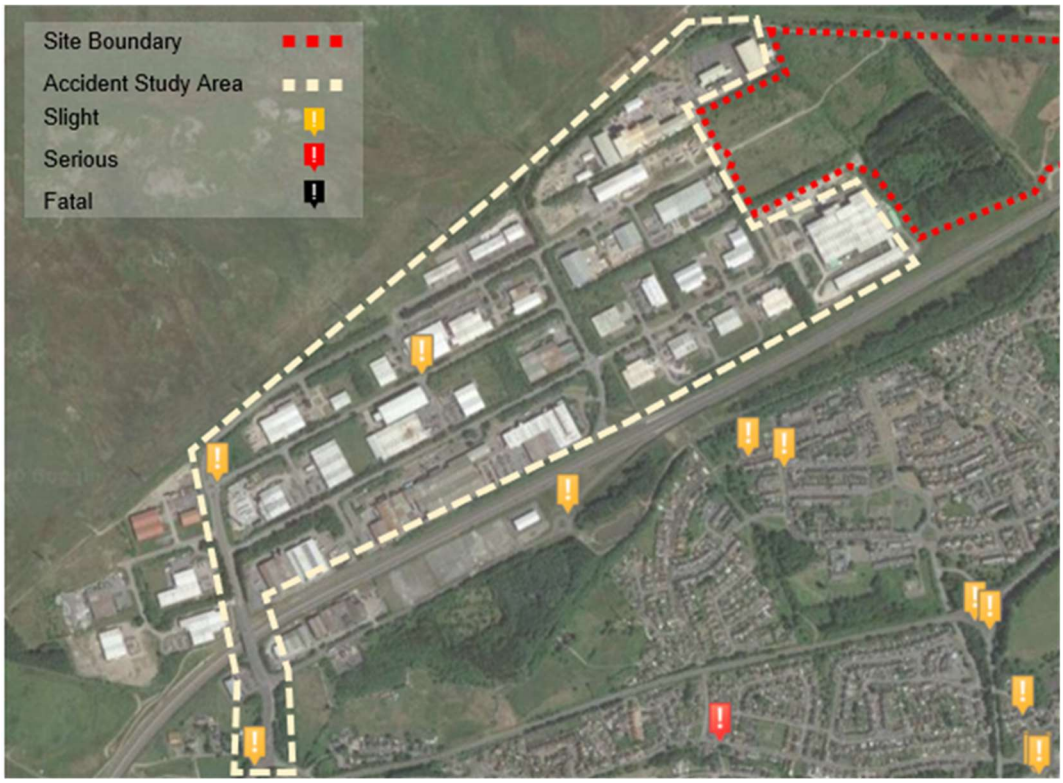
Road Traffic Collision (RTC) data for the most recent available five-year period (1st January 2015 – 31st December 2019) has been obtained from the Crashmap[179] website. RTC data is recorded by South Wales Police when they attend the scene of a collision and medical assistance is required by one or more parties, therefore damage only collisions are omitted. RTCs are categorised according to their severity:

- Slight – medical attention was required but no hospital stay was necessary;
- Serious – medical attention involving a hospital stay was required; and,
- Fatal.

The RTC data relevant to the study area is shown below in Figure 12.3.

[179] Crashmap https://www.crashmap.co.uk/Search

Figure 12.3: Road Traffic Collision Plan (Source: Crashmap)



Analysis of the data confirms that three slight collisions were recorded over the five-year period in the study area. The first incident occurred in 2016 at the roundabout which provides access on the northwest corner of the Industrial Estate and involved two vehicles.

The second incident occurred at the A4046/Beaufort Wells roundabout on the approach along the southern arm of the roundabout. The incident occurred in 2015 and involved two vehicles.

The third incident occurred within the Industrial Estate itself in 2017 and involved two vehicles.

The occurrence of three collisions at different locations classified as slight in severity over a five-year time period is not considered to indicate any key areas for concern within proximity of the site.

Receptor Sensitivity Classification

Using the receptor sensitivity criteria presented in Table 12.6 a sensitivity classification has been carried out on the links at baseline condition. ‘Sensitive’ links are those deemed to have a High or Very High sensitivity classification and are highlighted in Table 12.19.

All receptors that have been identified along the road links have been taken into account to determine the sensitivity of receptor classification.

Table 12.19: Sensitivity Classification of Receptors

Ref	Road Link/Receptor	Location	Receptor Sensitivity	Justification
1	Alan Davies Way (SB)	West of the site, access to Industrial Estate	Low	No residential frontage, provides access to Rassau Industrial Estate.
2	Alan Davies Way (NB)	West of the site, access to Industrial Estate	Low	No residential frontage, provides access to Rassau Industrial Estate.
3	A4046 (SB)	South of the Bryn Serth Road/Rassau Industrial Estate roundabout	Low	Dual carriageway
4	A4046 (NB)	South of the Bryn Serth Road/Rassau Industrial Estate roundabout	Low	Dual carriageway
5	A465 (WB)	Directly south of the site	Low	Strategic road network
6	A465 (EB)	Directly south of the site	Low	Strategic road network
7	Bryn Serth Road (WB)	West of the Bryn Serth Road/ A4047/Waun y Pound Rd roundabout	Medium	Has a footway on the northern side of carriageway but no residential frontage
8	Bryn Serth Road (EB)	West of the Bryn Serth Road/ A4047/Waun y Pound Rd roundabout	Medium	Has a footway on the northern side of carriageway but no residential frontage
9	A4047 (SB)	South of the Bryn Serth Road/ A4047/Waun y Pound Rd roundabout	Low	Has a footway on the eastern side of carriageway but no residential frontage. Unlikely that a large proportion of traffic would utilise route

Ref	Road Link/Receptor	Location	Receptor Sensitivity	Justification
10	A4047 (NB)	South of the Bryn Serth Road/ A4047/Waun y Pound Rd roundabout	Low	Has a footway on the eastern side of carriageway but no residential frontage. Unlikely that a large proportion of traffic would utilise route
11	A4047 (SB)	South of the Bryn Serth Road/ A4047/Waun y Pound Rd roundabout	Medium	Has a footway on the both sides of carriageway but no residential frontage. Potential impact for those looking to access Morrisons
12	A4047 (NB)	South of the Bryn Serth Road/ A4047/Waun y Pound Rd roundabout	Medium	Has a footway on the both sides of carriageway but no residential frontage. Potential impact for those looking to access Morrisons
13	A465 (WB)	West of Crown Business Park	Low	Strategic road network
14	A465 (EB)	West of Crown Business Park	Low	Strategic road network
15	A4047 Beaufort Hill (WB)	King Street, east of Murco garage	Low	Has residential frontage, however, unlikely that a large proportion of traffic would utilise route
16	A4047 Beaufort Hill (EB)	King Street, east of Murco garage	Low	Has residential frontage, however, unlikely that a large proportion of traffic would utilise route
17	A4047 Beaufort Road (WB)	Sirhowy	Low	Has residential frontage, however, unlikely that a large proportion of traffic would utilise route
18	A4047 Beaufort Road (EB)	Sirhowy	Low	Has residential frontage, however, unlikely that a large proportion of traffic would utilise route

Ref	Road Link/Receptor	Location	Receptor Sensitivity	Justification
19	A465 (WB)	Southwest of Nantybwch	Low	Strategic road network
20	A465 (EB)	Southwest of Nantybwch	Low	Strategic road network

12.7 Embedded mitigation

In line with Local and National Policy, the proposed development seeks to maximise the proportion of journeys made to and from the site by sustainable modes of transport. It is proposed to achieve this with a range of physical interventions and soft influencing measures.

Improvements are proposed to the existing footway fronting the site, including resurfacing and will measure approximately 2m in width, extending into the site on the southern side of the new vehicular access road to the northwest corner of the site. Footways will also be provided within the development site, approximately two metres in width alongside the internal road network to enable pedestrian movements around the site safely on defined routes.

Dropped kerbs and tactile paving will also be provided at appropriate locations to enable safe crossing opportunities for pedestrians, including to the south of the site where a new crossing is proposed. However, for large parts of the day, there will be limited traffic along the internal road network therefore conflict between pedestrians, cyclists and vehicles is likely to be low.

Cycle parking and associated facilities will also be provided including cloakroom facilities, showers and lockers which will aim to encourage a number of staff to travel to the site by bike. As outlined within the TS accompanying the planning application, a bespoke calculation has been undertaken to estimate the likely demand for cycle parking at the facility. This considers the maximum number of staff likely to be present on-site at any given time (including overlap between shifts) and the likely mode share of cycling for travel to the site. Adjustments have been made to the existing mode share to account for the introduction of Travel Plan measures intended to increase the use of cycling in comparison to the existing situation.

The calculation of cycle parking requirements is set out below within Table 12.20.

Table 12.20: Cycle Parking Minimum Requirements

Item	Value
Provision based on BGCBC standard (long-stay and short-stay)	364
Maximum no. staff on-site at any given time	514

Item	Value
Existing cycle mode share for journey to work in surrounding area	1%
Targeted increase in cycle mode share through Travel Plan measures	+7%
Revised Cycle Modal Share	8%
Resultant Proposed Cycle Parking Provision	**514 × 8% =41 spaces**

Based on the above, it is proposed to provide 21 covered Sheffield style stands as part of the development, providing storage for up to 42 cycles. This is deemed appropriate for the level of staff likely to be employed at the site and given that not all of these will be on-site at the same time due to the likely shift patterns.

This is also considered sufficient given that this provides enough space for cycling (based on 2011 Census Data) to increase eightfold (from 1% to 8% total mode share) in comparison to that typical for journeys to work in the surrounding area.

It should also be noted that further expansion of cycling facilities could also be introduced should it be warranted by demand.

A new Demand Responsive Transport (DRT) Fflecsi[180] service has recently been introduced in the Ebbw Vale area. The service area includes Rassau Industrial Estate and Ebbw Vale railway station and will provide future staff with opportunities for multi-occupancy journeys, further reducing reliance on the private car.

In addition to the physical infrastructure outlined previously, a Travel Plan is proposed for the development which provides CiNER with the opportunity to actively commit towards creating a development that encourages modal shift towards sustainable transport. A Framework Travel Plan (FTP) has been prepared in support of this application and can be found in Section 6 of the TS.

12.8 Assessment of effects

12.8.1 Assessment of construction effects

The construction phase of the proposed development is anticipated to result in an increase in the total number of vehicles and HGVs on the local highway network. The estimated increase in construction traffic is set out in Section 5.6 of the TS.

The designated route for traffic associated with construction deliveries will utilise the A465, ensuring that construction vehicles associated with the site will use the strategic road network from the east or west and subsequently Alan Davies Way prior to accessing the Rassau Industrial Estate.

It is considered that the selected route for construction traffic is the most appropriate being mindful of road widths, weight restrictions and the minor

[180] https://www.fflecsi.wales/locations/blaenau-gwent/

impact that larger vehicles would have on the A465, given that there are already many HGVs travelling along this route.

The specific construction access location will be agreed in subsequent design stages but will be provided within the Industrial Estate to the west of the site.

It is intended that all contractor parking will be accommodated onsite, and off highway, close to the site compound. The following predicted impacts may occur during construction:

- Traffic management resulting in potential driver delay;
- Increased traffic movements on access roads to the proposed development including the Industrial Estate during phases of construction leading to possible disruption and delays of local traffic;
- Community effects from construction traffic including severance and amenity effects; and,
- Potential damage to public roads.

The annual number of HGV movements resulting from the construction of the proposed development is estimated to peak during the overlap between Phase 1 (Earthworks and Excavation) and Phase 2 (Construction - Substructure) of construction. Based on the peak day movements outlined in Table 12.11, the maximum number of daily trips expected to be generated would therefore be 128 trips (256 two-way), and 18 (36 two-way) of those are likely to comprise HGVs.

Construction vehicle movements has been considered against the 2022 Do Minimum scenario which includes traffic associated with committed developments. Table 12.21 presents the percentage impact of construction traffic on those links within the study area.

The impacts associated with the construction of the proposed development is based on the period when construction traffic is anticipated to peak i.e. during Phase 1 and Phase 2 of construction. Whilst construction will be for a several years, this assessment is based on a temporary period with traffic impacts likely to reduce beyond this period.

Table 12.21: Traffic impact assessment – construction (24-hour AADT)

Ref	Road Link/Receptor	Receptor Sensitivity	Traffic Impact (Total Vehicles)	Traffic Impact (HGV Component)
1	Alan Davies Way (SB)	Low	8%	11%
2	Alan Davies Way (NB)	Low	12%	16%
3	A4046 (SB)	Low	4%	9%

Ref	Road Link/Receptor	Receptor Sensitivity	Traffic Impact (Total Vehicles)	Traffic Impact (HGV Component)
4	A4046 (NB)	Low	5%	9%
5	A465 (WB)	Low	2%	1%
6	A465 (EB)	Low	3%	1%
7	Bryn Serth Road (WB)	Medium	3%	0%
8	Bryn Serth Road (EB)	Medium	3%	0%
9	A4047 (SB)	Low	0%	0%
10	A4047 (NB)	Low	0%	0%
11	A4047 (SB)	Medium	1%	0%
12	A4047 (NB)	Medium	1%	0%
13	A465 (WB)	Low	1%	1%
14	A465 (EB)	Low	1%	1%
15	A4047 Beaufort Hill (WB)	Low	<1%	<1%
16	A4047 Beaufort Hill (EB)	Low	<1%	<1%
17	A4047 Beaufort Road (WB)	Low	<1%	<1%
18	A4047 Beaufort Road (EB)	Low	<1%	<1%
19	A465 (WB)	Low	1%	1%
20	A465 (EB)	Low	1%	1%

Based on the traffic impact assessment, the impacts of construction traffic on all links are deemed 'not significant' as per the IEMA guidelines. However, there is an increase greater than 10% along Alan Davies Way both in terms of total vehicles and HGVs.

Severance

Severance is defined as the perceived division that can occur within a community when it becomes separated by a major traffic artery. It can be quantified by the percentage change in traffic. An increase in traffic of 30% or less is deemed to have a negligible impact with regards to severance.

In the period when construction traffic is estimated to peak, the proposed development is anticipated to result in a daily average of 511 vehicles arriving and departing the site.

Based on information provided within Table 12.21, the percentage increase in traffic on all links within the study area for the construction phase are below 30% and therefore considered to be negligible.

The largest increase during the construction phase is likely to be along Alan Davies Way which is predicted to be between 8% and 12%. However, it is predicted that any environmental effects associated with severance would be minimal.

Driver delay

With predicted traffic growth and operational traffic, the Bryn Serth Road/Rassau Industrial Estate roundabout was assessed and is shown to operate well within capacity and without any noticeable queues. The predicted construction traffic is below what is expected during the operational aspect of the development and which is modelled in Section 5.5 of the TS.

The magnitude of impact of construction traffic on all road links are therefore deemed 'not significant' as per the IEMA guidelines. Therefore, the predicted adverse environmental effects associated would be negligible regarding driver delay.

Pedestrian and cycle delay

Pedestrian and cycle delay are predicted to occur where the two-way traffic flow exceeds 1,400 vehicles an hour, providing there are no controlled pedestrian crossings. With the exception of the strategic road network (A465), which is not used by pedestrians or cyclists, no link is likely to exceed this threshold in the peak hour, and therefore has a negligible impact on all receptors.

Pedestrian amenity

The IEMA guidelines suggest that a tentative threshold for judging the significance of changes in pedestrian amenity would be where the traffic flow (or its HGV component) is halved or doubled. In addition, the guidelines indicate that pavement width and separation from traffic are also key factors.

Traffic flow is estimated to increase by a maximum of 12% on any given link and the HGV component is expected to increase by a maximum of 16%, both of which are predicted along Alan Davies Way which is facilitated by a footway on the eastern side and a signalised crossing point to the north of the Bryn Serth Road/Rassau Industrial Estate roundabout.

Therefore, in this scenario there is anticipated to be a negligible effect associated with pedestrian and cycle amenity which is not significant particularly because the majority of the study area comprises the strategic road network, given the site's location in relation to the A465.

Fear and intimidation

An increase in HGV movements can have an adverse effect on pedestrian fear and intimidation. The suggested threshold presented in the IEMA guidelines proposes a small impact if the average HGV flow is around 1,000-2,000 vehicles and negligible if the HGV flow is below 1,000. The guidance also recommends other factors are considered such as road speed and footway width/separation.

The HGV flow on all links is predicted to be below 1,000 HGVs. Therefore, on all links it is predicted that any environmental effects associated with fear and intimidation would be negligible.

Accidents and safety

Analysis of Crashmap data has been undertaken within the study area. No correlations were identified between highway layout, design or condition that were considered contributory factors in the pattern of collisions. However, the cause of accidents is unknown, therefore it is considered that any increases in traffic resulting from the proposed development are anticipated to have a negligible effect with regards to accidents and safety.

Summary

The temporary increase in the HGV component of traffic flow in the busiest phase of construction is deemed to have a negligible effect on severance, pedestrian and cycle delay, fear and intimidation, driver delay and accident and safety.

It is proposed that a Construction Traffic Management Plan (CTMP) be secured with a planning condition to ensure that all reasonable steps are taken to minimise and mitigate the predicted adverse effects of the construction process.

The identified access routes make use of roads with negligible receptor sensitivity. It is proposed that construction traffic is monitored as part of the CTMP to review compliance.

12.8.2 Assessment of operation effects

Table 12.22 presents the traffic impact of the proposed development on the local highway network. This percentage impact assessment has been used to define the study area for the assessment of transport effects associated with the operational phase.

Table 12.22: Traffic impact assessment – operation (24-hour AADT)

Ref	Road Link/Receptor	Receptor Sensitivity	Traffic Impact (Total Vehicles)	Traffic Impact (HGV Component)
1	Alan Davies Way (SB)	Low	11%	117%
2	Alan Davies Way (NB)	Low	16%	163%
3	A4046 (SB)	Low	6%	87%
4	A4046 (NB)	Low	6%	89%
5	A465 (WB)	Low	4%	12%
6	A465 (EB)	Low	4%	13%
7	Bryn Serth Road (WB)	Medium	4%	0%
8	Bryn Serth Road (EB)	Medium	3%	0%
9	A4047 (SB)	Low	1%	0%
10	A4047 (NB)	Low	1%	0%
11	A4047 (SB)	Medium	1%	0%
12	A4047 (NB)	Medium	1%	0%
13	A465 (WB)	Low	2%	15%
14	A465 (EB)	Low	2%	15%
15	A4047 Beaufort Hill (WB)	Low	0%	<1%
16	A4047 Beaufort Hill (EB)	Low	0%	<1%

Ref	Road Link/Receptor	Receptor Sensitivity	Traffic Impact (Total Vehicles)	Traffic Impact (HGV Component)
17	A4047 Beaufort Road (WB)	Low	0%	<1%
18	A4047 Beaufort Road (EB)	Low	0%	<1%
19	A465 (WB)	Low	2%	15%
20	A465 (EB)	Low	2%	14%

Severance

Severance is defined as the perceived division that can occur within a community when it becomes separated by a major traffic artery. It can be quantified by the percentage change in traffic. An increase in traffic of 30% or less is deemed to have a negligible impact with regards to severance.

The proposed operational development is anticipated to result in a total of 1,361 trips which are fairly well distributed across the day and as a result, there is likely to be an additional 214 trips in the typical AM peak hour (08:00–09:00) and up to 13 additional vehicular trips in the typical PM peak hour (17:00–18:00), as outlined within Section 5.3 of the TS.

Based on information provided within Table 12.22, the percentage increase in traffic on all links within the study area for the construction phase are considered to be negligible.

Alan Davies Way has a low environmental sensitivity classification given the number and type of receptors along the link. HGVs are likely to increase by up to 163%, however, total traffic is only expected to increase the link flow by between 11% and 16%, which is classified as a minor impact. The ‘actual’ increase in HGVs is therefore unlikely to have a significant adverse impact on severance on Alan Davies Way.

Overall, it is predicted that any environmental effects associated with severance would be negligible.

Driver delay

With predicted traffic growth and operational traffic, the Bryn Serth Road/Rassau Industrial Estate roundabout was assessed and is shown to operate well within capacity and without any noticeable queues, as set out within Section 5.5 of the TS.

The magnitude of impact of construction traffic on all road links are therefore deemed ‘not significant’ as per the IEMA guidelines. Therefore, the predicted

adverse environmental effects associated would be negligible regarding driver delay.

Pedestrian and cycle delay

Pedestrian and cycle delay are predicted to occur where the two-way traffic flow exceeds 1,400 vehicles an hour, providing there are no controlled pedestrian crossings. Except for the strategic road network which already carries large volumes of traffic (including HGVs) due to its nature, and is not used by pedestrians or cyclists, no link is likely to exceed this threshold in the peak hour, and therefore has a negligible effect on all receptors.

Pedestrian and cyclist amenity

The IEMA guidelines suggest that a tentative threshold for judging the significance of changes in pedestrian amenity would be where the traffic flow (or its HGV component) is halved or doubled. In addition, the guidelines indicate that pavement width and separation from traffic are also key factors.

As per Table 12.22, there is likely to be an impact in terms of HGVs along Alan Davies Way in both directions once the site is operational of between 117% and 163%. However, given the purpose of Alan Davies Way and its nature in providing access to Rassau Industrial Estate, it is unlikely that large volumes of pedestrians/cyclist would utilise Alan Davies Way. This is particularly relevant given that future workers residing in Rassau and Beaufort are more likely to utilise the underpass beneath the A465 to the south of the site.

Based on the assessment criteria this would have a high impact, however, given the sensitivity of the receptor there is anticipated to be a moderate adverse effect with regards to pedestrian and cyclist amenity.

Fear and intimidation

An increase in HGV movements can have an adverse effect on pedestrian fear and intimidation. The suggested threshold presented in the IEMA guidelines proposes a small impact if the average HGV flow is around 1,000-2,000 vehicles and negligible if the HGV flow is below 1,000. The guidance also recommends other factors are considered such as road speed and footway width/separation.

The HGV flow on all links is predicted to be below 1,000 HGVs. Therefore, on all links it is predicted that any environmental effects associated with fear and intimidation would be negligible.

Accidents and safety

Analysis of Crashmap accident data has been undertaken within the study area. No correlations were identified between highway layout, design or condition that were considered contributory factors in the pattern of collisions. However, the cause of accident is unknown, therefore it is considered that any increases in traffic resulting from the proposed development are anticipated to have a negligible effect with regards to accidents and safety.

Summary

The review of potential effects on the study area established that there are unlikely to be any significant adverse effects resulting from the operation of the proposed development. It is considered that no further detailed assessment is required, and no mitigation measures are deemed necessary to alleviate specific environmental effects, however it is proposed that soft measures are adopted for the site in the form of Travel Plans to mitigate and minimise the vehicular traffic to align with the Well-being of Future Generations (Wales) Act and advised by the Technical Advice Note.

Therefore, from this assessment no residual environmental effects with respect of traffic and access are considered likely, however, interventions such as the Travel Plan should be considered to increase the proportion of journeys made to the site by sustainable modes of transport.

12.8.3 Potential impacts due to climate change

This section considers how climate change could impact on traffic and transport. The potential impacts that have been identified are outlined below:

- Long periods of hotter, drier weather and/or droughts have the potential to change people's travel patterns including use of public transport and walking and cycling. This impact could be perceived as positive or negative with warmer conditions potentially increasing the attractiveness of active travel modes; and
- The increase in frequency of extreme weather events (e.g. drought, flooding, heat waves) could also impact on travel behaviours, whilst increased rainfall could cause flooding and result in road closures impacting on development associated traffic including HGVs. This would also have an adverse effect on footpaths and footways, and hence reducing the attractiveness of walking and cycling as a preferred travel mode.

12.8.4 Mitigation of effects from construction

The assessment of effects arising from construction is based on when construction traffic is predicted to peak. The impact of construction traffic is anticipated to have some environmental effect with regards to pedestrian and cycle amenity.

To manage impacts arising from the construction of the proposed development, a CTMP will be prepared to ensure that all reasonable steps are taken to minimise and mitigate any possible adverse effects of the construction process.

An Outline CTMP has been prepared and is included as Section 5.6 of the TS. The scope of the CTMP will be agreed in discussion with BGCBC. It is anticipated that the CTMP will be secured with a planning condition.

It is anticipated that the CTMP will include details of the following:

- Designated construction traffic routes to avoid disruption on local roads;

- Introduction of temporary pedestrian and cyclist crossings, if considered necessary;
- Temporary traffic control measures, where required, such as temporary traffic signals and banksperson;
- HGV movements will be restricted as far as reasonably possible to avoid traffic flow periods 08:00-09:00 and 16:30-18:00;
- Temporary and permanent site accesses, alongside an access management strategy to avoid potential traffic congestion in the peak hours;
- Speed limits shall be put into place on site for all vehicular movements;
- Sufficient parking and circulation will be provided within the site to avoid impacts on the neighbouring highways of nuisance car parking;
- Where appropriate, all vehicles carrying loose material shall be covered;
- A wheel wash facility shall be used for vehicles egressing the site;
- Where necessary, use of road sweepers shall be incorporated to ensure highways remain clear of dust and mud;
- Road edges and pathways shall be swept by hand and damped down as necessary;
- Stockpiles to be dampened down, enclosed or covered as appropriate, be sealed or sprayed with chemical bonding agents as required, and located away from any sensitive receptors wherever possible; and,
- Neighbouring communities and businesses will be consulted and kept informed of the traffic management proposals.

Monitoring of the traffic associated with the proposed development during the construction period will also be undertaken as part of the CTMP. It is anticipated that monitoring of traffic in the operational phase will be undertaken as part of the implementation of the full Travel Plans.

12.8.5 Mitigation of effects from operation

In addition to the physical measures proposed as part of the scheme, it is proposed that soft measures are adopted for the site in the form of Travel Plans. When the proposed development becomes operational, a Travel Plan will be implemented to mitigate and minimise the vehicular traffic impacts of the proposed development.

The aim of the Travel Plan associated with the proposed development will be to reduce car usage and increase the use of public transport, walking and cycling by staff. It is anticipated that this will be achieved through the identification of specific proposals and mechanisms to be implemented that will maximise the accessibility of the site by means other than the private car.

A Framework Travel Plan has been prepared in support of the application and can be found in Section 6 of the Transport Statement. A full Travel Plan is anticipated to be secured with planning conditions. A financial contribution towards the

funding of a Travel Plan Co-ordinator and the monitoring of the Travel Plan may also be secured as part of the Section 106 agreement.

Improvements are proposed to the existing footway fronting the site, including resurfacing and will be approximately 2m in width, extending into the site on the southern side of the new vehicular access road to the northwest corner of the site. Footways will also be provided within the development site, with clear wayfinding signage.

Cycle parking will also be provided within the site which will be covered, lit and facilitated by CCTV to cater for long stay parking requirements along with associated facilities including a cloakroom, showers and lockers.

As set out within the TS, the development will provide a car park within the site boundary, the size of which has been determined through the production of a car park accumulation exercise to ascertain the number of spaces that would be required, considering the client's information regarding staff numbers (including overlap between shift patterns) and modal share.

A total of 389 on-site car parking spaces are proposed comprising 325 standard spaces, 6 additional visitor spaces, 19 disabled parking spaces (5% of the total number, as per the BGCBC adopted Parking Standards) and 39 (10% of the total number) Ultra Low Emission Vehicle (ULEV) charging spaces to encourage the uptake of electric vehicles as encouraged by PPW Edition 11.

12.9 Residual effects

Residual effects are the predicted effects of a project on the environment after the proposed practicable mitigation measures have been adopted. In other words, the predicted actual effects of the project.

Residual effects from construction

The construction period is anticipated to result in a change in vehicular composition proportions on the local road network and these would be temporary for the duration of the works.

Subject to the successful implementation of the CTMP, it is considered that any residual effects associated with the construction traffic will be of a temporary nature and the magnitude will be 'minor' as per Section 12.8.1. It is therefore considered that the residual effects of the construction phase will not be significant.

Construction will have a short-term impact (approximately three years) on the surrounding highway network, with some localised impacts having little significant effect. CTMP measures are proposed for all effects not considered to be negligible.

Residual effects from operation

The operational impact of the proposed development is not anticipated to have a significant adverse effect with regards to transport. The significance of effect for

all receptors is either ‘minor’ or ‘negligible. Subject to the successful implementation and monitoring of the Travel Plan, it is considered that residual effects associated with the operational phase could be further mitigated.

Several beneficial effects are identified, most of which are of minor significance, but do represent an improvement to the local pedestrian and cycle infrastructure. A significant beneficial effect has been identified in relation to the accessibility to public transport for the local communities.

Table 12.23: Residual Operational Traffic Impacts

Potential Effect	Receptor	Prior to mitigation			Mitigation Measure	Following mitigation	
		Sensitivity of Receptor	Magnitude of effect	Overall Sig. of Impact		Magnitude	Significance
Pedestrian and Cyclist Amenity	Alan Davies Way (NB)	Low	High	Moderate adverse	The timings and number of HGV deliveries will be fairly well distributed across the day, as will traffic associated with staff arriving and departing. The associated Travel Plan that will be produced will also seek to encourage sustainable modes of transport to/from the site but will not limit in terms of HGV movements. Those walking to/from the site, particularly from Rassau and Beaufort are highly unlikely to utilise Alan Davies Way. Instead, pedestrians are likely to make use of the A465 underpass and are therefore unlikely to be impacted by any increase in traffic along Alan Davies Way.	Medium	Minor adverse (not significant)
Pedestrian and Cyclist Amenity	Alan Davies Way (SB)	Low	High	Moderate adverse	The timings and number of HGV deliveries will be fairly well distributed across the day, as will traffic associated with staff arriving and departing. The associated Travel Plan that will be produced will also seek to encourage sustainable modes of transport to/from the site but will not limit in terms of HGV movements. Those walking to/from the site, particularly from Rassau and Beaufort are highly unlikely to utilise Alan Davies Way. Instead, pedestrians are likely to make use of the A465 underpass and are therefore unlikely to be impacted by any increase in traffic along Alan Davies Way.	Medium	Minor adverse (not significant)

13 Visual

13.1 Introduction

This chapter provides an assessment of the likely visual effects arising from the proposed Dragon Glass Bottle Manufacturing Facility (the 'proposed development'), located on the eastern extent of the Rassau Industrial Estate, in Ebbw Vale Enterprise Zone, Blaenau Gwent. It identifies visual receptors (people) that may be significantly affected and considers the likely changes to their views and visual amenity as a result of the proposed development.

It sets out the relevant legislation, policy and guidance, along with the methodology used to undertake the assessment in accordance with the Guidelines for Landscape and Visual Impact Assessment (third edition) (GLVIA3)[181].

The development will consist of a three-part operation for the production of glass bottles; the handling of raw material, the manufacturing of the glass containers and the product-inspection and packaging process. Of particular note for this assessment are the two furnaces, associate filters and chimney stacks, batch building and silos for storage and mixing raw materials, the cullet buildings, production lines, utilities buildings and automated warehouse.

13.2 Legislation, policy context and guidance

The following sets out the relevant legislation, policy and guidance which has been considered in the Visual Impact Assessment (VIA).

The UK is no longer a member of the European Union. EU legislation as it applied to the UK on 31st December 2020 is now a part of UK domestic legislation, under the control of the UK's Parliaments and Assemblies.

The European Union (Withdrawal) Act 2018 introduced "retained EU law" which provides that EU-derived domestic legislation continues to have effect after Exit day.

13.2.1 Legislation

Well-being of Future Generations (Wales) Act 2015[182]

The Well-being and Future Generations (Wales) Act defines "sustainable development" as 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.

It also establishes that authorities need to consider:

[181] Landscape Institute and Institute of Environmental Management and Assessment, 2013. Guidelines for Landscape and Visual Impact Assessment, Third Edition.
[182] Well-being of Future Generations (Wales) Act 2015 (legislation.gov.uk)

"*the importance of balancing short term needs with the need to safeguard the ability to meet long term needs, especially where things done to meet short term needs may have detrimental long term effect.*"

The Act can apply in considering how views and visual amenity (as part of the environment) are experienced by people, contributes to their well-being and whether certain views should be protected for future generations.

13.2.2 Policy Context

European Landscape Convention

The following paragraphs are quoted from Institute of Environmental Management and Assessment (IEMA) and the Landscape Institute's Guidance on Landscape and Visual Impact Assessment (GLVIA), 3rd Edition (2013). The status of this convention is not affected by Brexit as it is a convention of the Council of Europe.

"*The UK has signed and ratified the European Landscape Convention (ELC) since 2002, when the last edition of this guidance was published. The recognition that government has thus given to landscape matters raises the profile of this important area and emphasises the role that landscape can play as an integrating framework for many areas of policy. The ELC is designed to achieve improved approaches to the planning, management and protection of landscapes throughout Europe and to put people at the heart of this process.*"

The ELC 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.*"

Key to how people perceive the landscape is through sight and the visual enjoyment of the landscape.

National planning policy

Planning Policy Wales (PPW) Edition 11[183]

PPW11 gives consideration to 'People and Place' in achieving well-being through placemaking.

- Paragraph 2.3 states that the "*planning system should create sustainable places which are attractive, sociable, accessible, active, secure, welcoming, healthy and friendly.*"
- Paragraph 2.4 goes on to state that the "*intrinsic value of a place to people or communities is particularly important, which may be due to aesthetic, cultural, spiritual or historical reasons*"

[183] Planning Policy Wales, Edition 11, February 2021. Accessed online on 07/06/2021. https://gov.wales/sites/default/files/publications/2021-02/planning-policy-wales-edition-11_0.pdf

- The character of a place is important, paragraph 3.9 sets out that the "*special characteristics of an area should be central to the design of a development. The layout, form, scale and visual appearance of a proposed development and its relationship to its surroundings are important planning considerations.*"

This assessment considers how the proposed development may impact views and the visual amenity of people, based on the perceived attractiveness or aesthetic value of available views to the development in relation to the visual appearance of the development.

Future Wales: The National Plan 2040[184]

Future Wales sets out the national development framework, a direction for development in Wales to 2040. It considered how development should be delivered sustainably to meet the Well-being and Future Generations (Wales) Act 2015.

The Plan comments that development, "*irrespective of location or scale, the design and micro-siting of proposals must seek to minimise the landscape and visual impact, particularly those in close proximity to homes and tourism receptors.*"

This chapter assesses the visual impact of the development for different receptor groups in a 5km study area around the development site.

Technical Advice Notes (TAN) TAN 5 - Nature Conservation and Planning185 and TAN 12 Design186

TAN 5 provides guidance in relation to protection and enhancement of the natural environment and TAN12 Design provides design guidance in relation to enhancing local character.

TAN 12 describes how best to deliver 'Good Design', including how to consider 'character' and a place's relationship with distinctive views (in and out of the site), skylines and vistas or in relation to 'legibility' and how an area can be impacted by landmarks such as "*key buildings or landscape features, junctions, views and vistas, barriers and boundaries*".

The role the development could play in creating a 'landmark' feature of high architectural quality has been considered when assessing its likely impact on receptors.

LANDMAP – Visual and Sensory: LANDMAP[187]

LANDMAP is used to inform planning, policy, strategies, evidence, and advice for Environmental Impact Assessment and Landscape and Visual Impact Assessments; National Park and Area of Outstanding Natural Beauty (AONB)

[184] Future Wales – The National Plan 2040. Accessed online on 07/06/2021. Update to Future Wales - The National Plan 2040 (gov.wales)
[185] https://gov.wales/sites/default/files/publications/2018-09/tan5-nature-conservation.pdf
[186] https://gov.wales/sites/default/files/publications/2018-09/tan12-design.pdf
[187] https://naturalresources.wales/evidence-and-data/maps/browse-map-of-data-about-the-natural-environment/

statutory management plans, special qualities; Landscape monitoring; and Local Landscape Character Areas and National Landscape Character Areas (LCAs).

LANDMAP Aspect Areas for Visual and Sensory themes have been considered, particularly in relation to the proposed development's relationship with the Brecon Beacons National Park.

Local planning policy

Blaenau Gwent County Borough Council, Local Development Plan up to 2021, Adopted November 2012[188]

Vision and objectives of the Plan set out that:

"*the valuable landscape of Blaenau Gwent has been protected, enhanced and managed and together with other elements of the natural heritage, helped foster sustainable tourism and promoted community pride*."

- Policy SP10 Protection and enhancement of the natural environment sets out to protect Blaenau Gwent's unique, natural environment and designated landscape by protecting those attributes and features which make a significant contribution to the character, quality and amenity of the landscape;
- Policy DM1 New Development Part 2. Amenity – the policy states that the development would be compatible with other uses in the locality; there would be no unacceptable adverse visual impact on townscape or landscape; there would be no unacceptable impact upon the amenities of neighbouring occupiers.
- Policy DM2 Design and Placemaking requires the development should be appropriate to the local context in terms of type, form, scale and mix; is of good design which reinforces local character and distinctiveness of the area or positively contribute to the area's transformation; and landscaping and planting, where appropriate, achieves a suitable visual setting for the scheme and integrates it into the wider context.

This assessment considered how the development will contribute to the character of the area based on its design, form, scale and its effects on visual amenity.

Brecon Beacons National Park Local Development Plan[189], December 2013

Statutory Purposes of the National Park are:

- *"to conserve and enhance the natural beauty, wildlife and cultural heritage of the National Park*
- *to promote opportunities for public enjoyment and understanding of the special qualities of the National Park"*

[188] https://www.blaenau-gwent.gov.uk/en/resident/planning/local-development-plan/adopted-ldp-allocations/
[189] Breacon Beacons National Park, Local Development Plan, December 2013. Microsoft Word - Brecon text print.doc (beacons-npa.gov.uk)

One relevant Special Qualities of the Brecon Beacon National Park's (BBNP) is:

"*The Park's sweeping grandeur and outstanding natural beauty observed across a variety of harmoniously connected landscapes, including marvellous gorges and waterfalls, classic karst geology with caves and sink holes, contrasting glacial landforms such as cliffs and broad valleys carved from old red sandstone and prominent hilltops with extensive views in all directions.*"

- Policy SQ1 Special Qualities sets out "*to conserve and enhance the special qualities of the Brecon Beacons National Park*"
- Policy SQ4 Landscape sets out "t*o ensure that all future development will protect and enhance the beautiful and varied character of the Landscape*."
- Policy 12 Light Pollution considers the appropriateness of development proposals in relation to lighting so as to avoid significant adverse effects on the character of the area; local residents; and the visibility of the night.

The BBNP special qualities have been considered as part of the assessment, particularly views into and out from the National Park, as set out in section 13.6 Visual Baseline for the Brecon Beacons National Park and section 13.8 assessment of effects – Tourism Receptors.

The proposed development is located outside of the BBNP but would be situated within close proximity to the National Park's boundary at approximately 400m and can be considered within the setting to the National Park. The development would not directly affect the Park's landscape but would be seen in views out from the National Park.

The applicant agreed through consultation with the BBNPA that a landscape assessment was not needed as it was considered that the proposed development would not give rise to significant landscape effects on the surrounding area, including the National Park. Therefore, a full assessment of the likely effects on the National Park's Special Qualities was not undertaken.

Special Qualities such as 'tranquillity' are normally considered as part of a landscape character assessment. However, comments relating to the Special Qualities have been addressed within the Planning Statement and ES Chapter 5 Air Quality, ES Chapter 8 Health, ES Chapter 10 Noise and ES Chapter 13 Visual.

13.2.3 Guidance and standards

The following sources of guidance have been considered in the Visual Impact Assessment:

- The Landscape Institute and Institute of Environmental Management and Assessment, 'Guidelines for Landscape and Visual Impact Assessment' (GLVIA3), Third. Oxon: Routledge, 2013;

- Landscape Institute, 'Technical Guidance Note: Visual Representation of Development Proposals' TGN 06/19, 2019[190];
- Using LANDMAP in Landscape and Visual Impact Assessment GN46, Natural Resources Wales[191]; and
- Heads of the Valleys Smaller Scale Wind Turbine Development – Landscape Sensitivity and Capacity Study, 2015[192].

13.3 Study area

Baseline data has been collected for a study area of 5km, buffered from the site boundary (see Figure 13.1 in ES Volume III).

The size of the study area was based on an initial review of the baseline data, field work and professional judgement made on the nature of the proposed development site and its surroundings. However, relevant information from a wider area has been included, where considered relevant.

Representative viewpoints within this 5km study area have been included in this assessment.

The extent of the study area was consulted on and agreed with BGCBC and Brecon Beacons National Park Authority (BBNPA) to be sufficient at 5km to capture all relevant and likely significant effects.

13.4 Consultation

Consultation with BGCBC and BBNPA was undertaken via email and phone calls with landscape officers from both authorities.

Table 13.1: Record of consultation correspondence

Correspondence date and details	Actions taken to address comments
Microsoft Teams dial in Progress Meeting between Arup and BGCBC on 12 May 2020 on the scope of non-EIA studies to support the proposed Planning Application.	BGCBC agreed that a full landscape and visual impact assessment will not be necessary to accompany the planning application and that a visual appraisal was appropriate.
Exchange of emails dated 27 May 2020 between Arup and BBNPA. BBNPA landscape officer shared photographs taken from possible viewpoint locations within the study area within the National Park.	Not all the locations in the National Park were visited, only those with the greatest visibility of the proposed development have been appraised for likely changes to the view as a result of the proposed development.

[190] Landscape Institute, TGN-06-19-Visual_Representation (windows.net)
[191] Natural Resources Wales / Using LANDMAP in Landscape and Visual Impact Assessments GN46
[192] Blaenau Gwent County Borough Council Supplementary Planning Guidance. Heads of the Valleys
Smaller Scale Wind Turbine Development
Landscape Sensitivity and Capacity Study Final Report, Gillespies, April 2015.
https://www.blaenau-gwent.gov.uk/mwg-internal/de5fs23hu73ds/progress?id=pjlUHmRAZOi9IShFytoOmkXkIL5PMxnH9EnQmVGVswM,&dl

Correspondence date and details	Actions taken to address comments
Exchange of emails dated 4 and 7 August 2020 between Arup and BGCBC planning officer and landscape officer and telephone call 2 September 2020 between Arup and BGCBC to discuss the scope of the visual appraisal, viewpoint locations and likely mitigation proposals. Follow up emails dated 3-4 September 2020 to confirm points discussed on the call between both parties on the 2 September 2020.	Suggested viewpoint locations within Blaenau Gwent were visited. Locations with the greatest visibility of the proposed development have been appraised for likely changes to the view as a result of the proposed development. Some locations were micro-sited onsite to locations with greater visibility. Commentary is provided on the extent of mitigation that can be achieved given the size and scale of the development.
Exchange of emails dated 1 September 2020 between Arup and BBNPA and telephone call 2 September 2020 between Arup and BBNPA to discuss the scope of the visual appraisal, viewpoint locations, likely extent of vapour and timings of discharge, proposed lighting, extent of views out from and into the Park, BBNP Dark Skies (GIS data provided by BBNPA) likely mitigation proposals and combination effects of the proposed development with the existing wind turbine. Follow up emails dated 3-4 September 2020 to confirm points discussed on the call between both parties on the 2nd September 2020.	Suggested viewpoint locations within the 5km study area within the National Park were visited. Locations with the greatest visibility of the proposed development have been appraised for likely changes to the view as a result of the proposed development. Some locations were adjusted (micro-sited) onsite to locations with greater visibility. The extent of views into and out from the Park are appraised. The discharge of vapour from the chimneys has been scoped out of the appraisal because the specific weather conditions needed for the formation of a vapour plume will only occur for approximately 0.1% of the year, as determined by initial air quality assessments. Commentary is provided on the extent of mitigation that can be achieved given the size and scale of the development. Refer to DAS and landscape plans for further details. In-combination effects with the existing Infinite Renewables wind turbine adjacent to the site have been considered throughout the assessment.
Video conference call on 22 April 2021 between Arup and BGCBC to discuss the scope of the Environmental Statement, focusing on whether an assessment of likely landscape effects would be required or if it could be scoped out. Context of the discussion: The proposed site has been allocated within the Ebbw Vale Enterprise Zone and occupies a strategic location within the South Wales Valleys. It is situated on the eastern edge the Rassau Industrial site, in the wider context of the Heads of the Valleys road and the developed Ebbw Vale. The Brecon Beacons National Park boundary is located approximately 400m to the north of the site. Key features of the scheme relevant to a landscape and visual assessment would be its form, scale, massing, height, materials, and	It was agreed that the main concern of BGCBC were related to likely visual effects of the proposals and how the facility would be seen from different locations around the site and how it will appear within its context. Critical to this would be the final design, cladding and appearance of the facility. For these reasons it was agreed that visual effects of the proposed development should be assessed within the Environmental Statement. Regarding landscape effects, despite being situated near the boundary to the Brecon Beacons National Park both parties agreed that given the site's location on the edge of the existing industrial estate, as part of an allocated Enterprise Zone and in the wider context of built development that the landscape effects would be contained within the site and the immediate surrounding area. Therefore, it was agreed that landscape effects

Correspondence date and details	Actions taken to address comments
finish, and how these would be seen within the landscape.	could be scoped out of the Environmental Statement.

In addition, Welsh Ministers were requested to undertake a screening direction on the proposed development, determining that the project should be considered EIA development due to the potential for significant environmental effects. The screening direction considered that the proposed development was unlikely to significantly affect sites or areas of landscape importance.

The screening direction states that:

"*..views of the proposed development from the high ground within the National Park to the north/north west are likely, and potentially from the east/north east. However, views from the National Park are likely to be limited in number and the development would be seen in the context of the existing industrial estate buildings, electricity pylons and wind turbines. Given the site context and existing surrounding uses, and taking into account the advice from NRW, regarding landscape change, the impact of the proposed development in terms of physical change is considered unlikely to have a significant effect*."

An EIA Scoping Report was prepared and submitted to BGCBC on 20th May 2021. The EIA Scoping Report sets out the proposed scope for the assessment of visual impact and can be found on BGCBC's planning portal.

A Scoping Opinion was received from BGCBC on the 24th June 2021. This can be viewed on BGCBC's planning portal, Application reference C/2021/0128 and has been summarised with responses to explain where the Scoping Opinion comments have been incorporated in the assessment. Table 13.2 below provides responses to relevant comments raised in this correspondence.

Table 13.2 Local authority response on scope of visual assessment

Scoping opinion comment	Applicant response
BGCBC Landscape Officer: "The EIA scoping report provides details of the on-going iterative process associated with the proposal for the Dragon Glass Bottle Manufacturing facility. The report clearly identifies the areas of greatest sensitivity regarding Landscape and Visual Impact. The development site is located at the Eastern extent of Blaenau Gwent's primary employment areas with some overspill into the adjacent land areas and as such the report logically concluded that direct landscape impacts are scoped out. The more significant landscape visual impacts on the locality (within 5km) of the development area are to be subjected to a robust Landscape Visual Impact Assessment in accordance with the Landscape Institutes (GLVIA3) guidance for landscape visual	A robust and detailed visual impact assessment has been carried out to determine the likely impact to key receptor groups within the 5km study area. The LDP policies mentioned by the landscape officer are considered as part of the baseline review of relevant planning policies.

Scoping opinion comment	Applicant response
impact. This methodology is defined in the report and considered appropriate."	
Rights of Way: "There are no PRoW affected directly by the proposal but the wider network of public paths are considered to be sensitive receptors to the proposal and as such a number of PRoW that have potential for greater significant impacts are identified for inclusion in the LVIA."	A number of PRoW have been considered as part of the visual impact assessment in relation to how people (users of the PRoW) will experience visual change as a result of the proposed development.
Brecon Beacons National Park Authority: "Whilst the proposed development is entirely outside the National Park and is accessed from the A465; the scoping report recognises that the Environmental Statement will need to detail: The visual impact of the development from receptors in the National Park. I agree with these scoping conclusions…"	Visual Impacts have been assessed from a number of location within the National Park. The assessment considers the potential visual effects for visitors to the National Park and users on the B4560.
Natural Resources Wales: "The proposal is likely to add to the industrial character of some views from the edges of the National Park and to have some adverse effects, including cumulatively, by adding to the clutter of vertical structures in the locality. However, views from the National Park are likely to be limited in number and the development would be seen in the context of the existing industrial estate buildings, electricity pylons and wind turbines. Some adverse effects on the National Park are likely, including cumulative effects. We consider that the development is unlikely to have a significant adverse effect on the landscape character of the National Park and agree that a Landscape Assessment can be scoped out. The assessment can be confined to a Visual Impact Assessment. We note that the assessment would be carried out in accordance with GLVIA3 and NRW's recent LANDMAP Guidance Note GN46, which is acceptable."	Cumulative effects are assessed as part of Chapter 15 of the ES. The VIA has been carried out in accordance with GLVIA3 and NRW's LANDMAP Guidance Note GN46.
Natural Resources Wales: "Section 5.5.3 states that a ZTV will be used to analysis visibility and the selection of viewpoints. The discharge of vapour from chimneys has been scoped out as weather conditions needed for the formation of a vapour plume will only occur for approx. 0.1% of the year. The mitigation will be described in the DAS and Landscape Plans, including design, cladding and appearance. We consider that the detailed design,	The detailed design of the proposed development, including the material and colours have been considered as part of the visual assessment, along with all other proposed mitigation. The inter-project effects of the adjacent industrial buildings, wind turbine and pylons form part of the baseline conditions as they already form features in current views to and from the site. Therefore, they have been considered as part of the assessment and have

Scoping opinion comment	Applicant response
including the choice of material and colours, and potential mitigation may reduce the adverse effects to some extent and should be included in the assessment. Cumulative effects, including with the adjacent wind turbine will be appraised. We consider that cumulative effects with adjacent industrial buildings, wind turbine and pylons should be assessed."	been commented on where relevant. The cumulative effects consider additional effects of the development in conjunction with other proposed developments of the same or similar type, in accordance with GLVIA3. In this situation, the cumulative assessment does consider other development with tall features, like pylons, wind turbines and chimney stacks.
Natural Resources Wales: "Section 5.5.4 outlines the visual baseline for the National Park and five viewpoints within the park to be assessed (Viewpoints 16, 17, 18, 19, 20). We agree with the viewpoint selection and would add that the development has the potential to impact on the visual amenity of views towards the park from the south."	Views to the National Park from the south have been considered as part of the visual assessment and where relevant have been commented on in the assessment.
Natural Resources Wales: "Section 5.5.8 notes that there is the potential for significant adverse visual effects from tall structures, intensification of the industrial estate and infrastructure, loss of woodland in the site, increased hard standing and vehicle movements, and intensification of lighting. We agree that these elements have the potential for significant adverse effects and note that, although the site does not fall within the park's Dark Skies Area, light pollution should nevertheless be kept to a minimum through the design of a sensitive lighting scheme."	The lighting design has carefully considered effects to the wider environment, including the National Park. Key design changes include orientating the saw-tooth roof lights away from the National Park and external directional lighting that reduces light spill and skyglow.
Natural Resources Wales: "Whilst we note the height of the tall structure cannot be mitigated, the colour and finish of the building can make it appear recessive and integrate in views. It notes that a metallic grey reflective building will reflect the landscape back to the viewer. We consider the use of metallic and highly reflective materials far more likely to draw the eye, stand out against the landscape and increase the visual impact, rather than to reduce it and appear recessive. We advise that an Environmental Colour Assessment should be used to inform the colours and materials to be used in the buildings."	The approach taken by the architect embraces a bold solution which sets to create a statement building of high architectural quality. The proposals include the use of a natural anodised finish to provide a reflective finish. Using a reflective metallic finish to the facade, the building would be able to adapt to various viewpoints both locally and at a distance, subtly picking up on the tones of the sky, natural colours of the surrounding landscape and adjacent buildings. The finish would create a light structure to what would otherwise be a large mass and the reflective quality would change daily reflecting the weather and change of seasons. The use of a metallic finish not only serves to reflect the local context it also gives a lighter appearance to the building overall. Any dark tones applied to the building would only highlight its overall mass giving the appearance of a large, heavy building sat in the landscape.

Scoping opinion comment	Applicant response
	For further information, please refer to Appendix A2 in the ES Volume III for the Scoping Opinion responses.

Further consultation will be undertaken with all relevant stakeholders as the design or the development progresses. These include BGCBC, BBNPA, Welsh Government (WG) and Natural Resources Wales (NRW).

13.5 Methodology

The methodology used to undertake the VIA is set out below. The approach taken to only complete a VIA was agreed through consultation with BGCBC and confirmed during Scoping by the Council, NRW and BBNPA. A landscape assessment has been scoped out for the following reasons. The development is situated on the edge of an existing industrial estate, forming part of an allocated site within the Ebbw Vale Enterprise Zone with effects on the wider landscape likely to be minor. Consideration has been given to the Special Qualities of the BBNP and how they may be affected by the proposed development.

Utilising the baseline information, sensitivity of the visual receptors has been determined by combining their value and susceptibility to the type of change being proposed. The VIA describes the magnitude of effect predicted and separately assesses the resulting significance of the effect on the visual receptors.

The approach for assessing the visual effects is based on the principles set out in GLVIA3.

13.5.1 Methodology for establishing baseline conditions

The visual baseline presents the existing views to and from the site and potential visual receptors such as nearby communities and recreational users of public rights of way (PRoW) who's views may be affected by the proposed development. This assessment has considered the baseline condition as it was on site at the time of field work, across both summer and winter seasons, and for both day and night (during hours of darkness).

13.5.2 Assessment methodology

Assessing the sensitivity of visual receptors to change

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

The purpose of describing the baseline visual environment is to identify the most important sensitive visual receptors around the proposed development which have views to or across the proposed development. A visual receptor is essentially any viewer who will be likely to be affected as a result of the proposed development. The sensitivity of each visual receptor depends on:

- Their value derived from evaluation of its location and context;
- The relationship of a receptor to planning designations;
- The existence of documentation and interpretation relating to particular views; and
- The popularity or frequency of use of viewpoint or location.

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

Assessing the magnitude of visual change

The VIA compares the availability and quality of the existing view with that which will result from the construction and future presence of the scheme and then verbally quantifies the degree of change.

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

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

13.5.2.1 Determining receptor sensitivity

Visual value

GLVIA3 (paragraph 6.37) suggests that to determine visual value is done with reference to designated views, identified viewpoints on maps such as Ordnance Survey (OS) 1:25,000 mapping, or where mentioned in local policy documents or management plans that indicate value, such as aesthetic or scenic quality, special qualities or key characteristics of the landscape, recreational value and cultural associations, such as the Brecon Beacons National Park (BBNP).

Other indicators of visual value include the inclusion of viewpoints in guidebooks or tourist maps, or through the provision of facilities for their enjoyment (such as parking places, sign boards and interpretive materials) or reference to them in literature or art.

For each receptor the existing baseline is described in section 13.6, and its value assessed in terms of the level at which the resource is valued (national, local and community level importance).

Table 13.3: Definitions of visual value

Value	Typical descriptors
National Value	Views identified in the Brecon Beacons National Park management plan or landscape character assessment. Designed views recorded in citations for historic parks and gardens or views from historic landscape features (e.g. scheduled monuments). Views from National Trails, 'Recreational Routes', National Cycle Network (NCN), used in guide books to the UK, or marked on OS maps (as a blue viewpoint symbol). Views of the night sky in Dark Skies designated areas, like the Brecon Beacons International Dark Skies Reserve
Local Value	Views identified in local designation documents or local authority landscape/townscape assessments. Views recorded as of importance in Conservation Area Appraisals. Views from the District's PRoW including Long Distance Trails (that are not National Trails, 'Recreational Routes' or NCN) such as the Sirhowy Valley Walk.
Community Value	Views that are not documented as important in national or local documents but nevertheless are valued at a community level. This might include views from local green spaces, informal local footpaths or roads.

Susceptibility to change

Susceptibility to change refers to the degree to which a particular visual receptor is able to accommodate change without significant effects on its components or overall character.

GLVIA3 states that the susceptibility of different visual receptors to changes in views and visual amenity relates to:

"*the occupation or activity of people experiencing the view at particular locations; and the extent to which their attention or interest may therefore be focused on the views and the visual amenity they experience at particular locations*" (GLVIA3 paragraph 6.32).

The baseline has been reviewed alongside the proposed development to determine the level of susceptibility of each visual receptor to the type of development being proposed.

For visual receptors, people with the highest susceptibility to change include residents or communities where views contribute to the landscape setting enjoyed by residents in the area, people engaging in outdoor recreation (such as users of PRoW or special category land (Open Access Land or OAL)). This is particularly the case where their attention or interest is likely to be focused on the landscape and on particular views, and visitors to heritage assets, or other attractions where views of the surrounding are an important contributor to their outdoor experience.

Table 13.4: Visual Receptor Susceptibility

Susceptibility	Typical descriptors

High	Communities where views contribute to the landscape setting enjoyed by residents; people engaged in outdoor recreation (including users of public rights of way (PRoW) and National Cycle Routes whose interest is likely to be focussed on the landscape); visitors to heritage assets or other attractions where views of surroundings are an important contributor to experience.
Medium	Travellers on road, rail or other transport routes, or people at their place of work which may have some focus on the landscape.
Low	People engaged in outdoor sport or recreation which does not involve or depend upon appreciation of views of the landscape; people at their place of work whose attention is not on their surroundings.

The value of the receptor and its susceptibility to the type of change proposed is then combined to give its overall sensitivity to change (high, medium or low), as per Table 3.

Table 13.5:Visual sensitivity

Visual sensitivity	**Typical descriptors**
High	Major tourist attractions and cultural sites or views to and from very important national/international landscapes (Brecon Beacons National Park). Residential properties in dense areas. Longer transient views from designated public open space (Beaufort Common). Users of the PRoW or other recreational trails (for instance Sirhowy Valley Walk long distance footpath). Users of recreational facilities where the purpose of recreation is the enjoyment of the countryside or outward views (open access land or parks such as Parc Bryn Bach, or country parks). People enjoying the naturally dark night skies of the Brecon Beacons International Dark Skies Reserve.
Medium	Views from outdoor workers. Users of scenic roads, railways and waterways as designated/indicated on published maps (including parts of the B4560 as it crosses the BBNP). Static views from less populated residential areas.
Low	Views from indoor workers (Rassau Industrial Estate). Users of main roads and main arterial routes (motorists on the A465 Heads of the Valleys road or A4281). Views from users of local open spaces of little distinctiveness or sense of place. Users of recreational facilities where the purpose of recreation is not related to the view (i.e. sports, such as West Monmouthshire Golf Club)

13.5.2.2 Determining magnitude of change for visual receptors

For visual receptors, changes arising from the proposed development are described and quantified in relation to their scale of change, the nature of the change, the duration of the change, the distance, and nature of proposed and existing screening in order to assess the magnitude of effect.

The magnitude of effect to the current (baseline) visual environment depends on a combination of factors:

- The size and scale of change in the view;
- The proximity of the viewpoint to visible elements of the development;
- The extent and composition of the view (e.g. degree of existing screening, partial, glimpsed or unobstructed views, fleeting or constant nature of view);
- The degree of contrast or integration of proposed elements with the existing or remaining features or characteristics of the receiving landscape that may detract from or add to its amenity;
- The relative direct or oblique angle of the view in relation to the receptor; and
- The duration and reversibility of effect.

Size and scale of change:

This is dictated by the extent to which the visual resource or the composition of the view is altered, including the appearance of new or the removal of existing features in the view. Of particular concern is the degree of contrast or integration of proposed elements with the existing or remaining features of the view that may detract from or add to the visual quality of the view.

In this assessment, size and scale are described as being large, medium, small, negligible or no change, as set out in Table 4.

Table 13.6: Scale of visual change

Size/scale	Typical descriptors
Large	Large-scale visual changes resulting from the loss of key features or the addition of new features in the view, completely changing its composition, or as a result of new features which contrast to the baseline situation due to their form, scale, mass, size or appearance. Changes may form a dominant or overbearing feature within the view or will be experienced from several locations.
Medium	Medium-scale visual changes resulting from the loss of some features or the addition of new features in the view, changing its composition to part of the view, or as a result of new features which partly contrast with the baseline situation due to their form, scale, mass, size or appearance. Changes may form a new feature within the view or will be experienced from a few locations.
Small	Small-scale visual changes resulting from the minor loss of features or the addition of a few new features in the view, slightly changing the composition to a small part of the view, or as a result of new features which partly integrate with the baseline situation due to

	their form, scale, mass, size or appearance. Changes may form a small feature within the view.
Negligible	Negligible scale of change will be negligible or barely perceptual change in views or to the visual resource.
No change	The proposed development will not change the composition of the view, or the change will not be perceptible.

Geographical extent:

This describes the geographical area over which the changes would be visible from the receptor, for example:

- where there are only a few isolated locations from which the proposed development could be glimpsed, or where changes would be experienced by few people (small extent);
- where similar changes could be seen at several locations, or changes would be perceived by a moderate number of people (medium extent); or
- where changes could have a widespread influence on similar views or changes that would be experienced by a large number of people (large extent).

Duration and reversibility:

Duration is reported as:

- short term (0-4 years), i.e. the length of the construction phase, commencing in early 2022;
- medium term (4-19 years), i.e. the length of time (approximately 15 years) for proposed landscape planting to mature and provide some visual mitigation; or
- long term (over 19 years), i.e. mature planting providing visual screening. Longer term effects will likely result in higher overall effects.

Reversibility describes how easily an effect can be restored back to similar conditions to those observed in the baseline state. Effects are reported as reversible, partially reversible or not reversible. The timeframe in which the change is expected to be reversed is also outlined, for example within a generation. Effects arising from the presence of construction traffic will cease at the end of construction and are therefore classed as ‘reversible’, while restoration of features within a view to something similar to but not the same as the baseline scene may be recorded as ‘partially reversible’. The presence or removal of built structures or large-scale earthworks are not easily restored to the baseline, creating a permanent visual change. This is unlikely to be reversed in the long term and is therefore classed as ‘not reversible’.

The magnitude of effect is quantified for construction, operation year 1, and operation year 15 as set out in Table 5 below for the following criteria high, medium, low, negligible, no change.

Table 13.7: Visual magnitude of effect

Visual impact – magnitude of effect	Typical descriptors
High	The proposed development will contrast with or largely alter key features or characteristics of the views resulting in a dominant improvement or deterioration of the view These changes to often open and direct view may be medium or long-term and are likely to be irreversible or only partly reversible. New elements will occupy a large proportion of the view.
Medium	The proposed development will be visually prominent within the view and will result in either a noticeable improvement or deterioration of the view. The change will be moderate in scale, contrast with the view and be medium term permanent and sometimes irreversible or often partly reversible.
Low	Noticeable, often temporary and reversible alterations to the view that are small in scale or do not overtly contrast with the key features or characteristics of the view such that post development the existing view will be largely unchanged despite discernible differences.
Negligible (barely perceptible change)	Barely perceptible alteration to the features or characteristics of the existing view such that post development there will be barely discernible changes or no change to the view.
No change	The proposed development will not change the composition of the view, or the change will not be perceptible.

13.5.3 Significance criteria

The judgements on sensitivity and magnitude of change are combined to give an overall assessment of significance of the effect (substantial, moderate, minor or negligible), as set out in Table 6 below. This involves making an informed professional assessment of the overall level and significance of each effect, as set out in GLVIA3.

An assessment of the residual effects is made by reassessing the magnitude of change to each receptor once mitigation measures are known and in place.

The visual effects of the proposed development will vary through time. The assessment has considered the effects on visual amenity arising over the life of the project, through its construction and operation. The assessment takes into consideration how views change through the seasons with viewpoint photography for some viewpoint locations showing winter baseline scenarios and photography capturing the baseline night-time lighting and existing light sources during hours of darkness.

The significance of impacts is assessed using the appropriate national and international quality standards and professional judgement. For clarity and transparency, typical assessment criteria have been used to attribute levels of significance. These criteria and the method for combining them to judge the significance of effects follows guidance in GLVIA3. Broadly, the significance is a function of the magnitude of the impact and the sensitivity of receptors. The reversibility and duration of the effect are also important considerations.

Reversibility is judgement about the prospects and practicality of the particular effects being reversed in for example a generation, (GLVIA3, 2013).

Effects assessed as having a level of moderate or greater are considered to be significant. Effects assessed to have a level of minor or less are not considered to be significant. The significance scale is as set out in Table 6 below.

Table 13.8: Significance criteria

Impact Significance Rating	Definition
Substantial	These effects are generally, but not exclusively, associated with sites or features of international or national importance that are likely to experience dominant damaging or beneficial changes of medium to high magnitude leading to long term irreversible loss or enhancement of resource integrity. However, a high magnitude of change to a site or feature of local importance may also enter this category. The proposed development will cause substantial degradation or enhancement of the existing views/visual amenity. These effects are key factors in the decision-making process.
Moderate	These effects are generally, but not exclusively, associated with sites or features of local importance that are likely to experience damaging or beneficial changes of medium to high magnitude, often leading to reversible long or medium term loss or enhancement of resource integrity. The proposed development will cause noticeable degradation or enhancement of the existing views/visual amenity. These effects are material factors in the decision-making process. These effects are important in influencing the subsequent design of the project.
Minor	The proposed development will cause degradation or enhancements of low to medium magnitude to existing views/visual amenity of community importance. These adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process but are used in optimising the design of the project.
Negligible	The proposed development will cause barely perceptible degradation or enhancement of the existing views/visual amenity.
Neutral	Beneficial and adverse effects on the same receptor balance each other out, such that there is no overall beneficial or adverse effect

13.5.4 Zone of Theoretical Visibility methodology

The assessment study area has been informed by the Zone of Theoretical Visibility (ZTV), see Figure 13.1 in Volume III Figures. This is based on 2m digital terrain modelling (DTM) data, to identify areas from which the

development would theoretically be visible within the 5km study area. The ZTV was generated by 3D computer software which places virtual data points (observer feature) representing the tallest proposed heights of the development. These data points are located in the centre and at the corners of each proposed building, including the chimney stacks.

The data points are assumed to be a worst-case scenario for the tallest elements of the development. Using the ZTV supported by field work, a selection of representative viewpoints have been chosen for this assessment. This data is presented on Figure 13.1 in Volume III Figures.

The analysis does not include digital surface model (DSM) data, such as existing buildings and vegetation. In reality, these elements will provide additional screening and the ZTV therefore shows a worst-case scenario in terms of the predicted extent of visibility.

13.5.5 Viewpoint photography and visualisation methodology

Viewpoint photography

The photographic surveys were carried out by qualified landscape architects experienced with the methods and best practice required to produce verifiable photographs to be used in LVIA and visual representations, to the Landscape Institute TGN 06/19.

Photographs illustrating views from each viewpoint were taken with a full frame Nikon D610 digital camera using a fixed lens with a 50 mm focal length. Each frame was taken in portrait format, and a full 360 degrees has been taken and stitched together using the 'Rotating Motion' and 'Cylindrical Projection' settings in Microsoft Image Composite Editor software, which the horizontal field of view of 90 degrees was then calculated by cropping the 360 stitch to a fourth of its size.

The photographs provide a tool for assessment that can be compared with an actual view in the field; they should never be considered as a substitute to visiting a viewpoint in the field.

Night-time viewpoint photography

Night-time (darkness) viewpoint photography follows the method set out above for viewpoint photography with the addition of full manual adjustment of the aperture and shutter speed to capture the correct level of the existing lighting conditions as perceived by eye. The shutter is controlled by a self-timer to reduce the likelihood of camera shake which would result in blurred images.

Visualisations

The method for preparing the visualisations accords with the guidance contained in the Landscape Institute TGN 06/19 (Visual Representation of Development Proposals).

A three-dimensional (3D) model of the development is built in computer aided design software (CAD). The camera positions and surveyed reference points are

also modelled in CAD. The virtual camera is located at equivalent co-ordinates and height, and with the same 'lens', orientation and projection settings as used in the photograph at each viewpoint. The virtual 'reference points' such as built form and boundary features (for which the actual heights and co-ordinates are known from site survey work) are placed in the model.

Virtual images of the model are taken or 'rendered' with virtual cameras in the 3D CAD software in positions equivalent to the locations from which the actual photographs were taken at each representative viewpoint. Each virtual view is rendered twice; once with associated reference points and another without.

The virtual photograph of the model is matched to the equivalent baseline photograph from the representative viewpoint, with particular emphasis on ensuring the correct alignment of the 'reference points' to align the model correctly in the image. Once the alignment is made using Adobe Photoshop software, the virtual photograph of the model is superimposed onto the photograph. The parts of the model that would be masked by intervening land, trees, buildings or other structures has been removed, so that the visualisation only shows parts of the model that would in reality be visible.

Presentation of visualisations includes a baseline photograph displayed above the relevant visualisations for the viewpoints, as agreed through consultation with BGCBC. Viewpoint OS grid coordinates and viewpoint height above ordnance datum (AOD) are noted on the visualisation figure. Additional information on the visualisation figure includes details of the camera, the lens focal length, the horizontal field of view, the orientation of the view, and the distance of the viewpoint.

13.5.6 Limitations and assumptions

The assessment is based on the scheme description of the project in Chapter 3 of this ES and the authors understanding of the design information of the development proposals which form the Planning Application.

The photomontages and ZTV employed in support of this chapter are only a digital representation of the scheme used as tools to help inform the assessment process but are not fully relied upon for the assessment. They cannot provide an accurate prediction of how the building will look or how vegetation would mature or how other changes outside the remit of the proposed scheme may change over time.

A limitation of the ZTV is that in using digital surface model data, the projections pick out areas of tree cover or buildings as having higher visibility than would be expected or experienced on the ground. This is as a result of the 3D model assuming that a visual receptor (i.e. a person) could be stood at 1.6 metres on top of the trees or buildings. This has been reflected in the descriptions in the visual assessment in section 14.6 below. To overcome this, woodland blocks could have been cut out or excluded from the model but may have resulted in inconsistencies across the projected ZTV making it more difficult to interpret. The approach taken overestimates the likely extent of visibility, resulting in a worst-case scenario.

Field work and photography have been undertaken from publicly accessible areas including PRoWs or pavements adjacent to residential properties or roads.

Viewpoint photography has not been undertaken from private properties, the combined effects on several properties have been considered by aggregating properties within settlements and reported against community receptor groups.

In addition, an understanding of the landscape and visibility through field work and the use of Google Earth has enabled a robust assessment to be carried out on the effects on existing vegetation.

Scope of the visual assessment

Scoping Report and Scoping Opinion

A wide range of visual receptors have been considered in relation to how they may be affected by the proposed development. The desk study, including the ZTV, and site visit helped identify what receptors may experience significant effects and are set out in the table below, with a brief rationale for why they are proposed to be scoped in or out of the VIA.

Table 13.9: Visual receptors scoped in and out of the VIA

Assessment scope- Visual receptors			
Sub-topic	**Construction**	**Operation**	**Rationale for scoping sub-topics in or out**
Recreational Receptors			
Walkers on the Rhymney Hill	Scoped in	Scoped in	Scoped in due to likely intervisibility between Rhymney Hill with the proposed development and how the proposed development will be seen in views to the Brecon Beacons National Park.
Walkers on the Cefn Manmoel	Scoped in	Scoped in	Scoped in due to likely intervisibility between Cefn Manmoel with the proposed development and how the proposed development will be seen in views to the Brecon Beacons National Park.
Walkers on the Mynydd Carn-y-cefn	Scoped in	Scoped in	Scoped in due to likely intervisibility between Mynydd Carn-y-cefn with the proposed development and how the proposed development will be seen in views to the Brecon Beacons National Park.
Community Receptors			
Rassau	Scoped in	Scoped in	Scoped in due to likely intervisibility between the community of Rassau and its close proximity to the development.
Garnlydan	Scoped in	Scoped in	Scoped in due to likely intervisibility between the community of Garnlydan and its close proximity to the development.
Beaufort	Scoped in	Scoped in	Scoped in due to likely intervisibility between the community of Beaufort and the opportunity for views into the Brecon Beacons National Park.

Assessment scope- Visual receptors			
Sub-topic	**Construction**	**Operation**	**Rationale for scoping sub-topics in or out**
Tredegar	Scoped out	Scoped out	Scoped out due to the lack of potential intervisibility between the community of Tredegar and the development.
Tourism Receptors			
Visitors to the Brecon Beacons National Park	Scoped in	Scoped in	Scoped in due to likely intervisibility between the visitors to the National Park and their close proximity to the development, and the development appearing in views out of the Brecon Beacons National Park to the surrounding hills.
Visitors to Parc Bryn Bach	Scoped out	Scoped out	Scoped out due to the lack of potential intervisibility between the visitors to Parc Bryn Bach and the development.
Visitors to Blaenavon World Heritage Site	Scoped out	Scoped out	Scoped out due to distance between the proposed development and the World Heritage Site, which will unlikely give rise to significant visual effects.
Transport Receptors			
Users of the A465	Scoped out	Scoped out	Scoped out as users of the A465 will likely have their attention focused on the road corridor and not be susceptible to visual change outside of this.
Users of the A4281	Scoped out	Scoped out	Scoped out as users of the A465 will likely have their attention focused on the road corridor and not be susceptible to visual change outside of this.
Users of the B4560 Llangynidr Road	Scoped in	Scoped in	Scoped in due to likely intervisibility between the users of the B4560 (also visitors to the National Park) and their close proximity to the development, and the development appearing in views out of the Brecon Beacons National Park to the surrounding hills.

13.6 Baseline environment

The proposed development is situated on south facing sloping ground at approximately 400 to 420m AOD, to the north of Rassau and the A465 Heads of the Valleys road. The proposed development is enclosed by higher ground to the north which forms the foot slopes of Mynydd Llangynidr (557m AOD) within the BBNP. The site is more open to the south, overlooking the Ebbw Valley and neighbouring hills of Rhymney Hill (457m AOD, southwest of the Proposed development), Cefn Manmoel (467m and 504m AOD, south) and Mynydd Carn-y-cefn (550m AOD, southeast).

Due to its elevated position, the proposed development is visible from a wide area within the 5km study area. However, existing trees and vegetation and intervening landform do screen views in from some near viewpoints such as within the residential area of Rassau.

The ZTV (refer to Figure 13.1 in ES Volume III) indicates a wide dispersal of theoretical visibility across the 5km study area, picking up the high points on the local hills. It also shows that visibility of the proposed development is limited within the populated valleys. There are some localised areas which also have limited or no visibility due to intervening high land which screen views from behind these summits. Please refer to Figure 13.1 in ES Volume III for the illustration of the full extent of visibility on the ZTV.

A short description of the existing baseline condition, extent of views and visual amenity is provided in this section for each receptor group and covers the local communities of Rassau, Garnlydan, Beaufort and Tredegar. Views from these communities vary greatly depending on their elevation and position on the valley sides. Recreational users of Open Access Land (OAL), PRoW and parks within the areas of Rhymney Hill, Cefn Manmoel, and Mynydd Carn-y-cefn have also be considered. Views from these elevated locations are generally open and wide reaching due to limited vegetation cover and lack of buildings to screen views.

Baseline darkness survey was undertaken to record the existing night-time lighting conditions from two locations within the BBNP.

Finally, baseline views as experienced by visitors to the BBNP within the 5km study area have been described covering the area on the southern slopes of Mynydd Llangynidr.

Table 13.10: Details of viewpoints that were visited as part of the baseline study and appraisal, and reason for their selection

Viewpoint number and name	Viewpoint location (grid ref)	Reason for selection	Receptor group
VP1 Parc Bryn Bach	SO 13361 09731 Easting: 313361 Northing: 209731	Requested by BGCBC landscape officer.	Recreational users of the park's footpath network, east of the lake.

Viewpoint number and name	Viewpoint location (grid ref)	Reason for selection	Receptor group
VP2 Cefn Glas	SO 13852 09413 Easting: 313852 Northing: 209413	To represent the community of Tredegar.	The community of Tredegar, on higher elevations only.
VP3 Bern-Serth Road	SO 15280 11050 Easting: 315280 Northing: 211050	Requested by BGCBC landscape officer.	People moving between Rassau and Ebbw Vale
Manmoel Road	SO 15380 09667 Easting: 315380 Northing: 209667	Requested by BGCBC landscape officer.	No view of the proposed development was present from this viewpoint from the community of Mountain Air.
VP4 Sirhowy Valley Walk	SO 15947 08810 Easting: 315947 Northing: 208810	To represent recreational users of OAL and the Sirhowy Valley Walk.	Recreational users of the Sirhowy Valley Walk bridleway and surrounding Cefn Manmoel OAL.
VP5 Byway	SO 17826 10555 Easting: 317826 Northing: 210555	To represent recreational users of OAL and Byway.	Recreational users of the Byway between Newtown and Nantyglo.
VP6 West Monmouthshire Golf Club	SO 18278 09742 Easting: 318278 Northing: 209742	To represent recreational users of OAL, PRoW and the golf course.	Recreational users of the network of PRoW, OAL and parts of the West Monmouth Golf Club.
VP7 North of Mynydd Cern-y-Cefn	SO 18411 09012 Easting: 318411 Northing: 209012	To represent recreational users of OAL.	Recreational users of the OAL on Mynydd Carn-y-Cefn.
VP8 Mynydd Carn-y-Cefn	SO 18715 08491 Easting: 318715	To represent recreational users of OAL.	Recreational users of the OAL on Mynydd Carn-y-Cefn.

Viewpoint number and name	Viewpoint location (grid ref)	Reason for selection	Receptor group
	Northing: 208491		
VP9 Stonebridge Road	SO 15468 12084 Easting: 315468 Northing: 212084	To represent local views from the community of Rassau.	The community of Rassau.
Nant Melyn Road	SO 15558 12010 Easting: 315558 Northing: 212010	N/A	No view of the proposed development was present from this viewpoint.
VP10 Pen-y-Crug	SO 15868 12096 Easting: 315868 Northing: 212096	To represent local views from the community of Rassau.	The community of Rassau.
Rowan Way	SO 16059 12355 Easting: 316059 Northing: 212355	N/A	No view of the proposed development was present from this viewpoint.
VP11 Prince Philip Avenue	SO 16516 12242 Easting: 316516 Northing: 212242	To represent local views from the community of Garnlydan.	The community of Garnlydan.
VP12 Queensway	SO 16729 12366 Easting: 316729 Northing: 212366	To represent local views from the community of Garnlydan.	The community of Garnlydan.
VP13 Bryn Coch	SO 16661 11991 Easting: 316661 Northing: 211991	To represent local views from the community of Beaufort.	The community of Beaufort.
VP14 Beaufort Common	SO 17005 12066	Requested by BGCBC landscape officer to	The community of Beaufort and recreational

Viewpoint number and name	Viewpoint location (grid ref)	Reason for selection	Receptor group
	Easting: 317005 Northing: 212066	represent recreational users of Beaufort Common	users of Beaufort Common.
VP15 Garnlydan Sports Pitch	SO 16687 12737 Easting: 316687 Northing: 212737	To represent local views from the community of Garnlydan.	The community of Garnlydan.
VP16 B4560 Llangynidr Road	SO 16452 14486 Easting: 316452 Northing: 21448	Requested by BBNPA Senior Planning Officer to represent people entering and existing the National Park along the B4560. Darkness survey was undertaken and night-time photography taken from this viewpoint.	Visitors to the BBNP.
VP17 Twr Pen-cyrn trig point	SO 14702 15931 Easting: 314702 Northing: 215931	Requested by BBNPA Senior Planning Officer to pick up local high points within the National Park.	Visitors to the BBNP using PRoW and OAL.
VP18 PRoW Mynydd Llangynidr	SO 14320 14951 Easting: 314320 Northing: 214951	Requested by BBNPA Senior Planning Officer to pick up on the PRoW network within the National Park.	Visitors to the BBNP using PRoW and OAL.
VP19 PRoW Mynydd Llangynidr	SO 14102 13690 Easting: 314102 Northing: 213690	Requested by BBNPA Senior Planning Officer to pick up on the PRoW network within the National Park. Darkness survey was undertaken and night-time photography taken from this viewpoint.	Visitors to the BBNP using PRoW and OAL.
Ogof Fawr	SO 13398 15132 Easting: 313398 Northing: 215132	Requested by BBNPA Senior Planning Officer to represent views from an area of ‘shake holes’	No view of the proposed development was present from this viewpoint.
VP20 Mynydd Llangynidr	SO 12661 14827	Requested by BBNPA Senior Planning Officer to represent views out of the	Visitors to the BBNP using PRoW and OAL.

Viewpoint number and name	Viewpoint location (grid ref)	Reason for selection	Receptor group
	Easting: 312661 Northing: 214827	National Park from the high point of Mynydd Llangynidr.	

Note: Greyed out text signifies that there is no view from this location. Therefore, the viewpoint does not form part of the assessment but has been included to indicate it has been visited and ruled out.

Refer to Figure 13.1, Volume III – Viewpoint Locations and Zone of Theoretical Visibility to see the viewpoint locations mapped.

Visual baseline for local communities

Relevant viewpoint locations are VP2 Cefn Glas, VP3 Bern-Serth Road, VP9 Stonebridge Road, VP10 Pen-y-Crug, VP11 Prince Philip Avenue, VP12 Queensway, VP13 Bryn Coch, VP14 Beaufort Common, and VP15 Garnlydan Sports Pitch.

Please refer to Figure 13.1, ES Volume III – Viewpoint Locations and Zone of Theoretical Visibility and Appendix G1 Viewpoint Sheets 1 to 22 for baseline photography.

Rassau - Stonebridge Road (VP9) and Pen-y-Crug (VP10)

Taken from LANDMAP Unit Heads of the Valley Industrial Estate (neighbouring unit):

“geometric building forms contrast harshly with flowing natural lines of Brecon Beacons. Mainly unscreened or softened by planting, to effectively soften or integrate the buildings into the wider landscape. With the wind turbine being seen as an intrusion.”

Situated on a south facing slope, views from Rassau are generally focused to the south. Views north to the site tend to be glimpsed due to the enclosed nature of the area by rising topography of the Mynydd Llangynidr foot slopes, and further by existing buildings and vegetation. The layout of the residential streets further restricts from where views of the proposed development can be obtained. The A465 Heads of the Valley road is flanked by dense coniferous vegetation that is situated on embankments or higher ground effectively screening the majority of views to the proposed development. From a small number of locations, along Stonebridge Road (VP9) and Pen-y-Crug (VP10) glimpsed views can be obtained to the Infinite Renewables wind turbine at 77m tall at a close proximity, despite the dense screening of the wider industrial estate.

Garnlydan - Prince Philip Avenue (VP11), Queensway (VP12) and Llangynidr Road (VP15)

Garnlydan is part of the Tredegar town LANDMAP Unit which comments on local views, stating "many fine views to adjacent high ridges, to Brecon Beacons and down main valleys help to provide sense of place and orientation."

The community of Garnlydan is situated to the southeast of the site, on elevated land above Rassau. It is located on a northwest facing slope, at a lower elevation to the site, given some opportunity to gain open views out of the community towards the site. Views of this nature tend to be restricted to between buildings and along road corridors and are not widely available. From several locations, the Infinite Renewables wind turbine at 77m tall can be seen clearly on the near horizon in combination with the high voltage electricity pylons, including from Prince Philip Avenue (VP11) and Queensway (VP12). A dense conifer plantation that flanks the A465 Head of the Valleys road and borders the site can be seen, but effectively screens wider views into the industrial estate. Generally, views tend to be enclosed by buildings and channelled along streets, with only occasional and restricted views out over the lower valleys and surrounding hills.

On the north-eastern edge of Garnlydan, views from Garnlydan Sports Pitch on Llangynidr Road (VP15) are more open compared to within the community centre. From here the site's eastern edge and conifer woodland can be seen, along with the wind turbine and electricity pylons on the near horizon.

Beaufort - Bryn Coch (VP13) and Beaufort Common (VP14)

Part of the Beaufort Hills LANDMAP Unit:

"Variety of panoramic views along and across valleys on both sides, and to Brecon Beacons from high points, especially in the northern part which is generally north-facing. Recent development of public open spaces with woodland and water is improving the area."

Beaufort is situated to the southeast of the site at a similar elevation to the development at between 350 to 390 AOD. Generally, views are restricted by residential housing and existing wooded vegetation. Glimpsed views can be obtained between the buildings and along streets, similar to those available from Bryn Coch (VP13). From here, conifer woodland located within the site boundary can be seen in combination with the adjacent Infinite Renewables wind turbine and electricity pylons within the Rassau Industrial Estate.

From higher ground within Beaufort Common (VP14), views are more open and panoramic in nature, as commented on in the LANDMAP Unit description. Views can be gained for this elevated vantage point over the neighbouring communities of Garnlydan and Rassau within the lower valley towards the site. The proposed development appears on the foot slopes of the Brecon Beacons, clearly visible on the eastern edge of the existing industrial site. Prominent large white to grey industrial units extend west across the foot slopes, partially screened in places by dense vegetation along the road corridor. The Infinite Renewables wind turbine adjacent to the proposed site and electricity pylons within the Rassau Industrial Estate are seen punctuating the skyline above the site.

Tredegar Bryn Serth road (VP3) and Parc Bryn Bach (VP1)

Tredegar is part of the Tredegar town LANDMAP Unit which comments on local views, stating "many fine views to adjacent high ridges, to Brecon Beacons and down main valleys help to provide sense of place and orientation."

Visibility within Tredegar is predominately focused within the settlement, due to the layout of the houses and road network. However, where there are gaps between buildings or at green spaces, open, mid to long distance views can be gained north across the neighbouring valley bottom to the hills of the Brecon Beacons and the site. Features within views include residential buildings and the Tafarnaubach and Rassau industrial estates which are situated prominently on the opposite valley side, as seen from Cefn Glas, Tredegar (VP2). The proposed development is partially screened by intervening landform but the Infinite Renewables wind turbine at 77m (to blade tip) can just been seen on the distant horizon. Similar but more open views can be gained from the local road network that crosses elevated land between the communities of Tredegar and Rassau, such as from along the Bryn Serth road (VP3).

Views from the Parc Bryn Bach (VP1) are described under areas of high recreational activity for the Rhymney Hills.

Visual baseline for areas of recreational activity

Relevant viewpoints are VP1 Parc Bryn Bach, VP4 Sirhowy Valley Walk, VP5 Byway, VP6 West Monmouthshire Golf Club, VP7 North of Mynydd Cern-y-Cefn, VP8 Mynydd Carn-y-Cefn, and VP14 Beaufort Common.

Please refer to Figure 13.1, Volume III Figures – Viewpoint Locations and Zone of Theoretical Visibility and Appendix G1 Viewpoint Sheets 1 to 22 for baseline photography.

Rhymney Hill - Parc Bryn Bach VP1

Part of the Brynbach Parc LANDMAP Unit , which states that the area is situated on a "gentle north-facing slopes of Heads of the Valleys in western part of county on edge of Tredegar", with "open views to nearby ridge and to nearby upgraded A465 and large industry."

The Rhymney Hills are located approximately 4km to the southwest of the proposed development, rising up from the valley floor at Tredegar. From the north, northeast facing slopes and open views can be gained from higher elevations (up to 475m AOD) along the limited network of PRoW and more widely from the OAL. The former coal and iron workings at Parc Bryn Bach are situated on lower slopes, with very restricted views out, limited to gaps in the vegetation as shown at VP1. The site can be seen in distant views as part of the Rassau Industrial Estate. The Infinite Renewables wind turbine can be seen in combination with several other turbines and electricity pylons.

Cefn Manmoel - Sirhowy Valley Walk (VP4)

Part of the Waun-y-pound and Mynydd Bedwellte LANDMAP Units and described as "Heads of Valley undulating plateau between settlements of Tredegar

and Ebbw Vale", with, "panoramic views along and across valleys and to Brecon Beacons from high points and lips of valleys". Further description states that the hills act as a "series of north-south high open rounded ridges forming 'backbones' of Blaenau Gwent", which "provide sweeping skylines to both sides of most settled valleys" with "360-degree long-distance views from tops, with valleys totally hidden, gives very important remote quality."

Cefn Manmoel hills are situated between Rhymney Hill to the west and Mynydd Carn-y-cefn to the east, with the proposed development located approximately 3km to the north. Open, panoramic views can be gained over the Ebbw valley and the surrounding communities. Views of the site, from elevated slopes along the Sirhowy Valley Walk and surrounding OAL, can be gained, with the site appearing in the middle distance, with the Brecon Beacons serving as the background. The site appears as a continuation of the existing industrial site, formed of large white and grey storage units and factories. From here the Infinite Renewable wind turbine can be seen but is less discernible, as are the electricity pylons. The Brecon Beacons, Mynydd Llangynidr and surrounding hills, form a gently undulating horizon.

The communities of Hilltop and Mountain Air are located on lower slopes and have limited views out being enclosed by higher ground to the south, with dense woodland on higher ground to the north.

Mynydd Carn-y-cefn - West Monmouthshire Golf course (VP6) and Mynydd Carn-y-cefn edge of the upper slope and plateau summit (VP7 and VP8)

Northern most part of the hill located within the Beaufort Hills LANDMAP Unit describing the area with "old-established golf course covers part of the area but is not conspicuous" and "variety of panoramic views along and across valleys on both sides, and to Brecon Beacons from high points, especially in the northern part which is generally north-facing."

The mid and southern part of the upland area is situated within LANDMAP Unit TRFNVS024, stating "Upland area ranging from approximately 400m to 550mAOD, with land cover dominated by open grazed hill tops of rough grassland/heath, exposed/windy and with panoramic views over upland areas and over valleys. Strong sense of place result of views and simple set of defining /distinctive elements (open/ hilly /rough grassland/exposure/elevation)."

Mynydd Carn-y-cefn is crossed by an extensive network of PRoW, as well as being designated an OAL area and home to the West Monmouthshire Golf Club. The area is popular with walkers (and golfers) who come here to enjoy the open, exposed prospect and panoramic views. Mynydd Carn-y-cefn is located to the southwest of the proposed development boundary at approximately 2.5km. The lower slopes are easily accessible from communities of Ebbw Vale and Nantyglo, where the highest concentration of PRoW are located (VP5). Further south, as the landform rises, views become more open and far reaching from PRoW adjacent to the West Monmouthshire Golf course (VP6) and the edge of the upper slope and plateau summit (VP7 and VP8). From VPs 5-7, views of the site are easily obtained looking northwest over the surrounding valleys. It can be seen in relation to Rassau and the existing industrial units on the industrial estate. The site is

prominent on the opposite hillside, with the wind turbine adjacent to the proposed site clearly visible, despite the hills behind acting as a backdrop. The electricity pylons are not as visible from this location due to the distance between them and the viewer as the dark coniferous woodland provides a backdrop for the view. From here, the site forms part of a wider view, seen in the context of the neighbouring development within the valley.

From the trigonometrical point at the summit (VP8), views are more restricted, being screened by landform in the foreground. The site is still visible from here at approximately 5km away but becomes more recessive, being seen as a small part of a much wider panoramic view.

Visual baseline for the Brecon Beacons National Park

Relevant viewpoint locations include VP16-20 all within the BBNP north of the proposed development. These views are from VP16 B4560 Llangynidr Road, VP17 Twr Pen-cyrn trig point, VP18 PRoW Mynydd Llangynidr, VP19 PRoW Mynydd Llangynidr and VP20 Mynydd Llangynidr.

Please refer to Figure 13.1, Volume III Figures Viewpoint Locations and Zone of Theoretical Visibility and Appendix G1 Viewpoint Sheets 1 to 22 for baseline photography.

B4560 Llangynidr Road (VP16)

Part of the Mynydd Llangynidr and Mynydd Llangattock LANDMAP Unit that describes views out from the area as “superb panoramic views of the Black Mountains to the north and of the South Wales Valleys to the south. One road crosses the area from north to south and is often used by people wishing to enjoy the views. The laybys are well used.”

Views looking south out of the Brecon Beacons can be gained from along a section of the B4560 between Blaen Onneu Cave and Garnlydan. There is a well-used layby halfway along this stretch or road where views of the site can be gained at approximately 2km (VP16). The view consists of open moorland in the foreground, enclosed by conifer plantation to the south and the Rassau Industrial Estate. A number of wind turbines draw the eye, including the Infinite Renewables turbine adjacent to the proposed development. The industrial estate is mostly screened by dense conifer woodland, with only partial views to the tops of large white/grey warehouses and factories. These are seen in the context of the wider view to the settlements within the valleys. Wide, long distance views can be gained to the neighbouring hills of Rhymney, Cefn Manmoel and Mynydd Carn-y-cefn which form the horizon.

Darkness baseline

Travelling along the unlit road at night requires a high level of concentration to navigate the undulating and curving road. There is limited opportunity to take in the wider view.

Views from the B4560 during the hours off darkness consist predominantly of distant streetlighting on elevated slopes of neighbouring hill. Moving through the

dark landscape, lighting within the valleys contrast with the dark road crossing the Brecon Beacons.

Skyglow as a result of the existing development is limited with existing development contained within the valley bottom and enclosed by more elevated slopes. There are no key sources of light that dominate the view over and above residential streetlighting.

Mynydd Llangynidr PRoW Mynydd Llangynidr (VP18 & VP19) and Mynydd Llangynidr (VP20)

Part of the Mynydd Llangynidr LANDMAP Unit which comments on the area's visual amenity by stating that it "consists of generally of expansive south-facing gently undulating slopes of Brecon Beacons. It appears vast, uninviting, bleak, exposed and un-peopled contrasting abruptly with 'busy' Heads of Valleys areas. Wide views to empty horizons especially northward giving expansive sense of place." And, "recent adjacent developments relating to A465 and within industrial estates have added intrusion."

Taken from LANDMAP: "expansive south-facing gently undulating slopes of Brecon Beacons. It appears vast, uninviting, bleak, exposed and un-peopled contrasting abruptly with 'busy' Heads of Valleys areas. Wide views to empty horizons especially northward giving expansive sense of place. Recent adjacent developments relating to A465 and within industrial estates have added intrusion."

Situated on south-facing slopes of Mynydd Llangynidr, expansive views can be gained from PRoW and OAL within the BBNP, to the south over the Ebbw Valley and local communities of Ebbw Vale, Rassau, Beaufort and Tredegar. A thick belt of conifer plantation can be seen in the near horizon, partially screening views into the site and the surrounding industrial estate. From VP17 and 18, the wind turbine and electricity pylons are backclothed by the distant hills behind making them appear less intrusive, except from the PRoW leading up to Mynydd Llangynidr from Blaen-y-cwn, on the edge of the BBNP boundary (VP19).

Views to the site from the upper slopes of Mynydd Llangynidr (VP20) are more restricted by intervening landform in the foreground. Only the top part of the Infinite Renewables wind turbine can be seen from this distance.

Darkness baseline

Views out from the National Park during the hours of darkness consist predominantly of residential streetlights and security lighting associated with large industrial development, including both the Rassau and Tafarnaubach Industrial Estates and Pengarnddu Industrial Estate in the distance to the west.

Minor roads (including the B4560) can be picked out of the view as vehicle lights draw the eye as they move through the scene, typically on elevated, open slopes. The Heads of the Valley road (A436) is not visible being located within the valley below the industrial estates and neighbouring forestry plantations. Lighting within the valley contrasts with the dark unlit hilltops of Mynydd Bedwellte, Cefn

Manmoel, and Mynydd Carn-y-cefn. Wind turbines within the valley do not have aviation beacons and become recessive in the view at night.

Within Rassau Industrial Estate it is possible to make out the Envirowales Limited site with its tall chimneys as the building is lit by external lighting.

Generally, there is very little lighting visible at night. Skyglow as a result of the existing development within the valley (including Rassau Industrial Estate) is limited with development being contained within the valley bottom and enclosed by elevated slopes. There are no key sources of light that dominate the view over and above residential streetlighting.

13.7 Embedded mitigation

Due to the nature of the proposed development, its size, scale and massing with tall features e.g. chimney stacks (approx. 75m in height) and silos (approx. 40m in height), the design team took an innovative approach to the design, layout and positioning of the proposed development. Traditional mitigation methods, tree and woodland planting or other visual screening would not be effective in helping to integrate the proposed development into its setting or screen or break up the visual appearance of the building. However, the colour and finish of the building cladding has been sensitively designed to help make it appear recessive and integrate it into views. The use of metallic grey reflective building envelope will reflect the surrounding landscape back to the viewer providing a level of integration into the view or provide the opportunity to create a key building of exemplar architectural quality that would positively contribute to the character of the area in line with national and local policy. Further details of the design approach are set out in the Design and Access Statement.

Other embedded mitigating design features include directional lighting and orientation of skylights away from the BBNP and vertical fins over glazing to minimise light spill on the designated landscape's dark skies buffer zone (not affecting the core zone) during operational hours at night, and the retention of existing woodland along the site's southern boundary along with proposed landscape planting which would provide some visual context for the development.

13.8 Assessment of effects

13.8.1 Assessment of construction and operational effects

An assessment of likely visual effects has been undertaken for each identified visual receptor, with judgements made on their sensitivity, the predicted magnitude of visual change that each receptor may experience and a combined judgement on the significance of the overall effect. The assessment is set out in the tables below, with reference to the ZTV (Figure 13.1, Volume III Figures) and corresponding viewpoint photosheets (Appendix G1).

Consideration of the National Parks Special Qualities is provided below for context. It is not a full assessment and does not follow the visual assessment methodology as set out in Section 13.5.

Special Qualities of the Brecon Beacons National Park

In relation to the National Park as a place "*offering peace and tranquillity with opportunities for quiet enjoyment, inspiration, relaxation and spiritual renewal*", Natural Resources Wales provides a definition of Tranquillity, in their LANDMAP Methodology for Visual and Sensory guidance document dated 2016, to mean sense of peace without disruptive noise or movement.

LANDMAP Visual and Sensory spatial dataset was used to consider the effect of the proposed development on the special qualities of the National Park. LANDMAP provides judgements on tranquillity and peace under the heading 'perceptual and other sensory qualities' in their descriptions of Aspect Areas. LANDMAP aspect areas define the character within the Visual and Sensory dataset.

In addition to noise, changes to perceived tranquillity also relate to the effects of human presence, such as human movement and traffic using terms like constant stream or frequent but interrupted human movement to occasional and rare movement.

Aspect Areas closest to the proposed development within the Brecon Beacons that may experience change to perceived tranquillity include Mynydd Llangynidr and Mynydd Llangattock (BRCKNVS372) and Cwm Carneilw (BRCKNVS908).

For Aspect Area Mynydd Llangynidr and Mynydd Llangattock tranquillity is not listed as a defining quality under perceptual and other sensory qualities heading. However, the LANDMAP descriptions does set out the level of human access as occasional. Aspect Area Cwm Carneilw is not reported to be tranquil under perceptual and other sensory qualities heading and is reported to have an 'infrequent' level of human access.

For both Aspect Areas within the National Park there is no consideration of the existing influence of the Heads of Valley Industrial Estates (BLNGWVS242) Aspect Area on the perceived tranquillity of the National Park. It is therefore assumed that this part of the National Park would not be affected by the existing 'frequent' level of human access present within the Heads of Valley Industrial Estates (BLNGWVS242) Aspect Area.

The ES acknowledges that there will be an increase in traffic numbers (including HGVs) with additional vehicle movements into and out from the Rassau Industrial Estate and that the construction and operation would increase noise levels. However, vehicle numbers would not be great enough to be significantly detrimental to tranquillity. It is unlikely that there would be a perceived change to level of tranquillity within this part of the BBNP.

The visual assessment in section 13.8 Tourism Receptors considers how the proposed development would affect views out from the National Park, in relation to the following Special Quality:

"*The Park's sweeping grandeur and outstanding natural beauty observed across a variety of harmoniously connected landscapes, including marvellous gorges and waterfalls, classic karst geology with caves and sink holes, contrasting glacial*

landforms such as cliffs and broad valleys carved from old red sandstone and prominent hilltops with extensive views in all directions."

Recreational Receptors

Table 13.11: Assessment of visual effects on Walkers on Rhymney Hill

Receptor: Walkers on Rhymney Hill (refer to VP2 Cefn Glas)
Nature of Receptor (sensitivity) Walkers on the Rhymney Hills are valued at a local level as they would be using Open Access Land and local PRoW to access the countryside. They would have a high susceptibility to the type of change being proposed as they would be engaging in outdoor recreation on PRoW, with a particular focus on enjoying visual scenery and views of the landscape. Combining judgement on the receptor's value and susceptibility to the type of change proposed provides a high sensitivity to the development.
Nature of Effects (magnitude of effect) during construction At this distance, it is predicted that the construction phase would give rise to a small scale of visual change resulting in the minor loss off existing features (woodland and open space) and the addition of construction activities (cranes, vehicle movements, earthworks and partially constructed buildings). Potential views of the construction activities would be experienced over a small geographical extent on the north-east slopes of Rhymney Hill for a period of up to 4 years (short-term) and would be partially reversible. Combining the scale of change with the geographical extent, duration and reversibility, it is predicted that the construction activities would give rise to a negligible magnitude of change, being barely perceptible from this distance.
Significance of construction effect The proposed development would give rise to a negligible significance of effect, due to the distance from the construction works causing a barely perceptible degradation to the existing view.
Nature of Effects (magnitude of effect) during operation years 1 and 15 Once completed the development would result in a small-scale visual change with the building and chimneys adding minor new features to a much wider, open view of a similar nature to existing built features. It is unlikely that any proposed mitigation planting will reduce the scale of change over time. Therefore, the scale of change will be the same at years 1 and 15. Potential views of the development would be experience over a small geographical extent on the north-east slopes of Rhymney Hill in the long-term and would not be reversible. Combining the small-scale of change with the small geographical extent, long-term duration and non-reversibility there would be a negligible magnitude of effect on walker on Rhymney Hill.
Significance of operational effects at years 1 and 15 The proposed development would give rise to a negligible significance of effect, due to the distance from the development causing a barely perceptible degradation to the existing view.

Table 13.12: Assessment of visual effects on Walkers on Cefn Manmoel

Receptor: Walkers on Cefn Manmoel (ref to VP4 Sirhowy Valley Walk)
Nature of Receptor (sensitivity) Walkers on the Cefn Manmoel are valued at a local level as they would be using Open Access Land and local PRoW. They would have a high susceptibility to the type of change being proposed as they would be engaging in outdoor recreation on PRoW (Sirhowy Valley Walk), with a particular focus on enjoying visual scenery and views of the landscape. Walkers on Cefn Manmoel have a high sensitivity to the development, due to their local value and high susceptibility to the type of change proposed.

Receptor: Walkers on Cefn Manmoel (ref to VP4 Sirhowy Valley Walk)
Nature of Effects (magnitude of effect) during construction Construction activities would give rise to a small-scale of visual change with the introduction of features not typical in views such as cranes, earthworks, partially constructed buildings, and the movement of construction vehicles. These changes would be experienced over a medium geographical extent, for a short-term duration and would be partially reversible. Overall, there would be a low magnitude of effect as a result of the combined small-scale of change, over a medium geographical extent for a short-term duration, that would be partially reversible. The introduced visual change would be noticeable as it would be at odds with existing features in the view, mostly due to the presence of cranes, large earthworks, and the movement of vehicles.
Significance of construction effect The proposed construction activity would cause a minor significance of effect on views and the visual amenity for walkers on Cefn Manmoel.
Nature of Effects (magnitude of effect) during operation years 1 and 15 At years 1 and 15, the development would result in a small-scale of change to part of a much wider, open view from the slopes of Cefn Manmoel, as experienced by walkers. The new buildings and chimneys would form a new feature which partly integrate with the baseline situation due to the existing neighbouring development on Rassau Industrial Estate and as a result of the development being backclothed by the hillside and conifer plantation behind. These changes would be experienced over a medium geographical extent, in the long-term and would not be reversible. It is unlikely that any proposed mitigation planting will reduce the scale of change over time. Therefore, the scale of change will be the same at years 1 and 15. Overall, these combined factors would result in a low magnitude of effect being experienced by walkers on Cefn Manmoel. Proposed mitigation tree planting would not reduce the magnitude of effect given the size, scale and layout of the building and associated chimney stacks at 75m in height.
Significance of operational effects at years 1 and 15 The proposed development would cause a minor significance of effect on views and the visual amenity for walkers on Cefn Manmoel at over 3km away from the development.

Table 13.13: Assessment of visual effects on Walkers on Mynydd Carn-y-cefn

Receptor: Walkers on Mynydd Carn-y-cefn (refer to VP5 Byway, VP6 West Monmouthshire Golf Club, VP7 North of Mynydd Cern-y-Cefn, and VP8 Mynydd Carn-y-Cefn)
Nature of Receptor (sensitivity) Walkers on Mynydd Carn-y-cefn are valued at a local level as they would be using Open Access Land and local PRoW. They would have a high susceptibility to the type of change being proposed as they would be engaging in outdoor recreation on PRoW and Open Access Land, with a particular focus on enjoying visual scenery and views of the landscape. People using the West Monmouthshire Golf Club would have a slightly lower susceptibility as their attention would be more focused on play golf. Combining judgement on the receptor's value and susceptibility to the type of change proposed provides a high sensitivity to the development.
Nature of Effects (magnitude of effect) during construction For walkers, recreational users and golfers on Mynydd Carn-y-cefn they would experience a range of changes depending on where they are on the hill and the type of activity they are engaged in. The largest scale of change would be experienced by walkers on the lower to middle slopes of Mynydd Carn-y-cefn. From here, the construction activities would introduce new features to part of the view, resulting in a small-scale of change, that would be experienced over a medium geographical extent. The construction phase would take up to 4 years to complete resulting in a short-term duration and effects that would be partially reversible.

Receptor: Walkers on Mynydd Carn-y-cefn (refer to VP5 Byway, VP6 West Monmouthshire Golf Club, VP7 North of Mynydd Cern-y-Cefn, and VP8 Mynydd Carn-y-Cefn)
Combining the scale of change, geographical extent, duration and reversibility would result in walkers experiencing a low magnitude of effect, with some construction activities being noticeable in part of the wider view.
Significance of construction effect During the construction phase, walkers on Mynydd Carn-y-cefn would experience a minor significance of effect, with some degradation to existing views. This level of effect would likely be experienced from the nearer, lower slopes with a slight reduction toward the more distant summit of the hill.
Nature of Effects (magnitude of effect) during operation years 1 and 15 Once completed, the development will appear large, contrasting with features in the existing view due to its size, scale, massing and height of the chimney stacks at 75 metres tall. It would create a noticeable new feature in views from Mynydd Carn-y-cefn and be readily apparent to walkers and recreational users. The development would be visible over a medium geographical extent, in the long-term (over 19 years) and would not be reversible. It is unlikely that any proposed mitigation planting will reduce the scale of change over time. Therefore, the scale of change will be the same at years 1 and 15. Overall, the development will be visually prominent within the view, resulting in a noticeable deterioration of the view to the BBNP and would give rise to a medium magnitude of change for walkers on Mynydd Carn-y-cefn.
Significance of operational effects at years 1 and 15 On completion at years 1 and 15, walkers on the lower slopes of Mynydd Carn-y-cefn would experience a moderate significance of effect, reducing to minor the further from the development the walkers go toward the summit at nearly 5km away from the site boundary.

Community Receptors

Table 13.14: Assessment of visual effects on Rassau

Receptor: Rassau (refer to VP9 Stonebridge Road and VP10 Pen-y-Crug)
Nature of Receptor (sensitivity) The community of Rassau are valued at the community level with some partial views from parks and open green spaces within the residential area. They would have a high susceptibility to visual change. The community of Rassau have a high sensitivity to the development, due to their community value and high susceptibility to the type of change proposed.
Nature of Effects (magnitude of effect) during construction For the community of Rassau, there would be limited opportunities to gain views to the construction activity, despite their close proximity to the development. Where views are possible there would be a small-scale of change to the visual amenity. The majority of the construction activities would be screened by intervening landform and existing vegetation to the north of Rassau. Visible element of the works would be cranes and the partially constructed upper sections of the buildings and chimneys. These changes would be experienced over a small geographical extent, limited to a few locations between residential properties for a short-term duration. Construction activities would be partially reversible with the removal of construction activities once the development is complete. The construction activities would have a low magnitude of effect on the residents of Rassau, with only the cranes and partially constructed chimney stacks being visible from a few locations.
Significance of construction effect

Receptor: Rassau (refer to VP9 Stonebridge Road and VP10 Pen-y-Crug)
During the construction phase, the community of Rassau would experience a minor significance of effect.
Nature of Effects (magnitude of effect) during operation years 1 and 15 The development would have a medium scale of change to the visual amenity to the community of Rassau, with the introduction of new built features to the local skyline. Views of the 75m chimney stacks and the upper sections of the buildings would be visible from a few locations, over a small geographical extent. The effects would be long-term lasting more than 19 years and would not be reversible. It is unlikely that any proposed mitigation planting will reduce the scale of change over time. Therefore, the scale of change will be the same at years 1 and 15. The community of Rassau would experience a medium magnitude of change as a result of the development. The chimney stacks and upper sections of the buildings would be prominent in near views, creating new contrasting features on the local skyline and providing visual clutter with the existing Infinite Renewables wind turbine.
Significance of operational effects at years 1 and 15 The community of Rassau would experience a moderate significance of effect on views and their visual amenity at years 1 and 15 on completion of the development.

Table 13.15: Assessment of visual effects on Garnlydan

Receptor: Garnlydan (VP11 Prince Philip Avenue, VP12 Queensway and VP15 Garnlydan Sports Pitch)
Nature of Receptor (sensitivity) The community of Garnlydan are valued at the community level with some elevated glimpsed views of the development from the Garnlydan football club and open green spaces off Queensway. They have a high susceptibility to visual change as the landscape setting does contribute to the enjoyment by residents. Combining judgement on the receptor's value and susceptibility to the type of change proposed provides a high sensitivity to the development, due to being valued at a community level with a high susceptibility to visual change.
Nature of Effects (magnitude of effect) during construction The community of Garnlydan would experience a small scale of change to views as a result of the construction activity, of particular note would be the tall cranes used to construct the chimney stacks that would form new features on the local skyline. Views of the construction activity could be gained over a medium geographical extent, within Garnlydan and the immediate surrounding area. Visual change of this nature would be experienced for a short-term duration of up to 4 years, with visibility of cranes for a very short periiod, and would be partially reversible. The cranes and the upper sections of the buildings would form noticeable features on local skylines, contrasting with the existing woodland horizon. Overall, the construction activities would cause a low magnitude of effect for residents of Garnlydan.
Significance of construction effect During the construction phase the community of Garnlydan would experience a minor significance of effect on views and their visual amenity.
Nature of Effects (magnitude of effect) during operation years 1 and 15 At years 1 and 15, the development would create prominent features on the skyline, creating visual clutter with the existing turbine and electricity pylons and causing a medium scale of change. The community of Garnlydan would experience these effects over a medium geographical extent affecting them in the long-term, with these effects not being reversible. Overall, there would be a medium magnitude of effect for the residents of Garnlydan due to the visual prominence of the chimney stacks and upper sections of the buildings, contrasting with the existing generally wooded skyline.
Significance of operational effects at years 1 and 15

Receptor: Garnlydan (VP11 Prince Philip Avenue, VP12 Queensway and VP15 Garnlydan Sports Pitch)
The community of Garnlydan would experience a combination of minor effects and moderate significance of effects depending on their location and the availability of views to the development. From some locations, the development will appear on the skyline, creating a new and noticeable degrading feature.

Table 13.16: Assessment of visual effects on Beaufort

Receptor: Beaufort (refer to VP13 Bryn Coch, VP14 Beaufort Common)
Nature of Receptor (sensitivity) The community of Beaufort are valued at the community level, with views to the development from elevated open spaces like Beaufort Common (viewpoint 14). They would have a high susceptibility to visual change as the landscape setting does contribute to the enjoyment by residents. The community of Beaufort have a high sensitivity to the development, due to their community value and high susceptibility to the type of change proposed.
Nature of Effects (magnitude of effect) during construction The construction activities would introduce new features into views out from the community causing a medium scale of change. Given the communities elevated position in relation to the site on the opposite valley slope, direct views of the works would be gained from a number of locations, over a medium geographical extent. Views of construction vehicles, personnel, large-scale earthworks and partially constructed buildings would be clearly seen and experienced for a short-term duration with the construction activities being partially reversible. The construction activities would be visually prominent in views for the community of Beaufort, creating a deterioration of the view to the BBNP, resulting in a medium magnitude of change.
Significance of construction effect The community of Beaufort would experience a moderate significance of effect on views and their visual amenity.
Nature of Effects (magnitude of effect) during operation years 1 and 15 The community of Beaufort enjoy elevated, long distance views across the lower valley slope and the BBNP. The development at years 1 and 15 would create a large-scale of visual change to these views, introducing large built features (chimney stacks and buildings) on a prominent slope that would be dominant in local views. The development would form a new intrusive feature on the existing skyline and would interrupt intervisibility between the BBNP and the community. These effects would be experienced over a medium geographical extent for long-term duration (over 19 years) and the effects that would not be reversible. Due to the size, scale and massing of the development, mitigation would not effectively reduce these effects over time. From a number of locations, the community of Beaufort would experience a high magnitude of effect as a result of the development introducing new features in to views that would contrast to the existing baseline, particularly views to the BBNP.
Significance of operational effects at years 1 and 15 For years 1 and 15, the community of Beaufort would experience a substantial significance of effect from locations such as Beaufort Common and Bryn Coch where there are readily available views to the development. The development will appear on the skyline, creating a new and dominate degrading feature, particularly when interrupting views into the BBNP.

Tourism Receptors

Table 13.17: Assessment of visual effects on Visitors to the Brecon Beacons National Park

Receptor: Visitors to the Brecon Beacons National Park (refer to VP17 Twr Pen-cyrn trig point, VP18 PRoW Mynydd Llangynidr, VP19 PRoW Mynydd Llangynidr and VP20 Mynydd Llangynidr)
Nature of Receptor (sensitivity) Visitors to the BBNP would have a national value due to the area's designation as a National Park for its scenic beauty and recreational value, and dark skies. People engaged in outdoor recreation (including users of public rights of way (PRoW) would have a high susceptibility to visual change of the type being proposed. Area is designated as an International Dark Skies Reserve which is valued for its exceptional or distinguished quality of starry nights and nocturnal environment specifically protected for scientific, natural, educational, cultural, heritage or public enjoyment. The Brecon Beacons Dark Skies Reserve contributes to the area's value and susceptibility of people using the National Park at night. Combining judgement on the receptor's value and susceptibility to the type of change proposed provides a high sensitivity to the development, due to being valued at a national level with a high susceptibility to visual change.
Nature of Effects (magnitude of effect) during construction Construction activities would introduce visually prominent features to views from the BBNP. Views that are valued as a special quality of the BBNP. The presence of cranes, construction vehicles, personnel, large-scale earthworks and partially constructed buildings would cause a medium scale of visual change for visitors to this part of the BBNP. Views to the construction activities would be experienced over a medium geographical extent, on the south-side of Mynydd Llangynidr only and would not affect the wider designated area. Tall elements of the construction activities such as the cranes and partially constructed chimneys would interrupt views out from the designated landscape to the neighbouring hill above Ebbw Vale. Visual change would last for a short-term duration that would be partially reversible, with the removal of the activity once the development is complete. There are no construction activities planned during the hours of darkness. Therefore, there would be no effect on the BBNP or the Dark Skies International Reserve during the construction phase. Overall, the construction activity would result in a medium magnitude of effect due to the close proximity of the works and their visual prominence, introducing new features into views and disrupting intervisibility between the BBNP and the surrounding hills.
Significance of construction effect Visitors to the BBNP at Mynydd Llangynidr would experience a moderate significance of effect on views and their visual amenity during the construction phase of the development.
Nature of Effects (magnitude of effect) during operation year 1 and year 15 Visitors to the BBNP would experience a large visual change with the introduction of the development in views out of the National Park. The chimney stacks at 75m and the large-scale building would interrupt intervisibility with neighbouring hills that are valued as a key characteristic of the area. The proposed development would operate 24 hours a day requiring internal and external lighting. Night-time views of the proposed development would be possible from a small area within the BBNP at Mynydd Llangynidr. However, these would be seen in the context of the existing large-scale industrial buildings located within the Rassau Industrial Estate. The majority of windows and roof lights have been positioned to face away from the National Park, where practicable. Roof lights face north-east away from the Core Zone of the Dark Skies Reserve. Windows and roof lights have been kept to a minimum to reduce the level of visible internal lighting emitted from the building. External lighting would consist of LED directional lights with shields to reduce the amount of light spill visible from the National Park.

Receptor: Visitors to the Brecon Beacons National Park (refer to VP17 Twr Pen-cyrn trig point, VP18 PRoW Mynydd Llangynidr, VP19 PRoW Mynydd Llangynidr and VP20 Mynydd Llangynidr)
The tall chimneys and silos would not include aviation beacons and would be unlit, becoming recessive against a background of street lighting. The proposed development would be partially visible at night by very few receptors using the open access land and PRoW across Mynydd Llangynidr only and would not be visible from the wider National Park. Mitigation planting would not effectively reduce the effects due to the size, scale and massing of the development. These effects would be experienced from a number of PRoW and Open Access Land on the south side of Mynydd Llangynidr over a medium geographical extent. The effects would be long-term and would not be reversible. It is unlikely that any proposed mitigation planting will reduce the scale of change over time. Therefore, the scale of change will be the same at years 1 and 15. Overall, the development would give rise to a high magnitude of effect as it would contrast with the otherwise open views out from the designated landscape, views which form the key characteristics of the BBNP.
Significance of operational effects at year 1 and year 15 Visitors to the BBNP, limited to Mynydd Llangynidr, would experience a substantial significance of effect on views and their visual amenity at years 1 and 15 on completion of the development.

Transport Receptors

Table 13.18: Assessment of visual effects on Users of the B4560 Llangynidr Road

Receptor: Users of the B4560 Llangynidr Road (refer to VP16 B4560 Llangynidr Road)
Nature of Receptor (sensitivity) Users of the B4560 Llangynidr Road are valued at a community level, with attractive views gained from within the BBNP. However, the driver's attention will be focused on the road and only partially on the surrounding landscape resulting in a medium susceptibility to visual change. Combining judgement on the receptor's value and susceptibility to the type of change proposed provides a medium sensitivity to the development, due to being valued at a community level with a medium susceptibility to visual change.
Nature of Effects (magnitude of effect) during construction The construction activities (tree felling, tall cranes, large-scale earthworks, and partially constructed buildings) would cause a medium scale of change for users of the B4560. There would be no change in night-time views as construction activities are not planned during the hours of darkness. Views would only be available as motorists pass the development in either direction between Garnlydan and Llangynidr car park, effecting a small geographical extent. Construction activities would be short-term and partially reversible. Overall, there would be a medium magnitude of effect for users of the B4560 travelling between Llangynidr car park and Garnlydan, with construction activities being visually prominent in views.
Significance of construction effect Users of the B4560 between Garnlydan and Llangynidr car park would experience a moderate significance of effect as a result of the construction activities.
Nature of Effects (magnitude of effect) during operation years 1 and 15 Once completed, the development would remain prominent in views from the road causing a medium scale of change. At night, it would be possible to gain views of the proposed development as the facility would operate 24 hours a day requiring internal and external lighting. Windows and roof lights have been kept to a minimum to reduce the level of visible internal lighting emitted from the building. External lighting would consist of LED directional lights with shields to reduce the amount of light spill visible from the road.

Receptor: Users of the B4560 Llangynidr Road (refer to VP16 B4560 Llangynidr Road)
The size, scale and massing of the buildings and the tall chimney stacks will introduce new noticeable features in views that would be experienced over a small geographical extent. These features would not be lit and would not be visual prominent at night. These effects would be long-term lasting for over 19 years and would not be reversible. For users of the B4560, the development would give rise to a medium magnitude of effect, due to the medium scale of visual change, in the long-term, being experienced over a small geographical extent.
Significance of operational effects at years 1 and 15 For years 1 and 15, users of the B4560 between Garnlydan and Llangynidr car park would experience a moderate significance of effect to views and their visual amenity as they travel at speed along the road.

13.9 Mitigation and enhancement

13.9.1 Mitigation of effects from construction

During the construction phase, the following measures would help to mitigate construction effects:

- Adherence to the measures set out within the Construction Environmental Management Plan (CEMP), supported by the arboricultural impact assessment in accordance with BS 5837:2012, to retain and protect trees during the construction period in accordance with the recommendations made;
- Compounds and other construction facilities would be sited with temporary fencing and facilities would be rendered in appropriate tonal colours to reflect the landscape as well as screened in part by solid hoardings;
- Soil structures would be protected where land would be used temporarily, such as for compounds, haul roads, re-grading areas, so that when it is returned to the existing land use, it is in a suitable condition, with any soil remediation work strictly following soil management plan;
- Retention of woodland along the southern boundary to maintain part of the character and composition of the view; and,
- Early or advanced planting, where practical, would be established prior to main construction works for softening and filtering views of the construction and subsequent operational phase, as well as part of the wider visual mitigation if land is not required for other construction activities.

13.9.2 Mitigation of effects from operation

As mentioned in section 13.7, due to the size, scale and massing of the development with tall features (e.g. chimney stacks (approx. 75m in height) and silos (approx. 40m in height), there is no additional visual mitigation proposed that will further screen or break up the visual appearance of the building. The building façade will be clad with reflective materials that be able to adapt to various viewpoints both locally and at a distance, subtly picking up on the tones of the sky, natural colours of the surrounding landscape and adjacent buildings.

The finish would create a light structure to what would otherwise be a large mass and the reflective quality would change daily reflecting the weather and change of seasons.

13.9.3 Potential impacts due to climate change

This section considers how climate change could alter people's views and visual amenity as a result of:

- Long periods of drier weather and/or droughts have the potential to change the extent and patterns of vegetation which would change the composition and colour of views. Changes in vegetation on a landscape scale would alter the landscape character with the loss of typical species seen in views with different species. This could lead to the loss of some vegetation like mature trees that are not able to adapt to changes in temperature, extreme heat or drought events;
- The increase in frequency and intensity of heavy rainfall events and associated flooding resulting in the loss of species in certain area because of soil erosion or soils becoming water-saturated to the point that they cannot support existing species; and,
- Linked to the two events above, a general warming and wetter environment could lead to an increase in pests and diseases, leading to loss of vegetation and defoliation making species more susceptible to external stress.

Climate change could significantly alter the species, composition and extent of vegetation and the number and species of plants present within the landscape, which would significantly alter the composition and value of a view or people's visual amenity of a scene.

13.10 Residual effects

As set out under section 13.9, there will be no further mitigation proposed that will effectively reduce the visual effects of the development, given its size, scale and massing on a prominent hillside. Therefore, the judgements set out above in the assessment of effects will remain the same at this stage.

Summary of visual effects

Construction effects

Construction activities would give rise to a number of significant visual effects for receptors within the 5km study area.

Table 13.19: Summary of visual effects during construction

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Community of Beaufort	Visual impact on part of the community of Beaufort with views of	Moderate	No mitigation and enhancement measures proposed	Moderate

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
	construction vehicles, personnel, large-scale earthworks and partially constructed buildings.		for the construction phase.	
Visitors to the Brecon Beacons National Park	Visual impacts on a small part of the BBNP with the introduction of visually prominent construction activities. There would be no night-time effect as construction activity is not proposed during hours of darkness.	Moderate	No mitigation and enhancement measures proposed for the construction phase.	Moderate
Users of the B4560 Llangynidr Road	Visual impacts on road users on the B4560 with views of tree felling, tall cranes, large-scale earthworks, and partially constructed buildings.	Moderate	No mitigation and enhancement measures proposed for the construction phase.	Moderate

Operational effects (years 1 and 15)

The development, due to its size, scale and massing, would significantly affect the receptors as set out in the table below:

Table 13.20: Summary of visual effects during operation years 1 and 15

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Walkers on Mynydd Carn-y-cefn	Visual impact on walkers and recreational users able to see the operational development in the middle distance.	Operation: Yr 1 and 15 Moderate	Innovative design and high architectural quality using reflective material to bring in the surrounding environment, naturally breaking up the visual mass of the building. Perimeter landscape treat and tree planting embeds the development into the local landscape. No additional mitigation possible due to the size and scale of the development.	Moderate
Community of Rassau	Visual impact on the community of Rassau with the introduction of new built features to the local skyline, views of the 75m chimney stacks and the upper	Operation: Yr 1 and 15 Moderate	Innovative design and high architectural quality using reflective material to match the changing weather pattern and skies helping to soften the	Moderate

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
	sections of the buildings would be visible from a few locations.		edges of the building and blend the façade with the local skyline. There is no mitigation for the chimney stacks.	
Community of Garnlydan	Visual impact on part of the community of Garnlydan the development would create prominent features on the skyline, creating visual clutter with the existing turbine and electricity pylons and contrasting with the generally wooded skyline. At night it would be possible to see the development with external security lighting.	Operation: Yr 1 and 15 Moderate	Innovative design and high architectural quality using reflective material to match the changing weather pattern and skies helping to soften the edges of the building and blend the façade with the local skyline. External lighting to be carefully design with reflector, directional lighting and appropriate colour and lux levels. There is no mitigation for the chimney stacks.	Moderate
Community of Beaufort	Visual impact on part of the community of Beaufort with the introduction of large built features (chimney stacks and buildings) on a prominent slope that would be dominant in local views. The development would form a new intrusive feature on the existing skyline and would interrupt intervisibility between the BBNP and the community. At night it would be possible to see the development with external security lighting.	Operation: Yr 1 and 15 Substantial	Innovative design and high architectural quality using reflective material to match the changing weather pattern and skies helping to soften the edges of the building and blend the façade with the local skyline. External lighting to be carefully design with reflector, directional lighting and appropriate colour and lux levels. There is no mitigation for the chimney stacks.	Substantial
Visitors to the Brecon Beacons National Park	Visual impacts on a small part of the BBNP with the introduction of chimney stacks at 75m and the large-scale building to views that would interrupt intervisibility with neighbouring hills.	Operation: Yr 1 and 15 Substantial	Innovative design and high architectural quality using reflective material to match the changing weather pattern and skies helping to soften the edges of the building and blend the façade with the local skyline.	Substantial

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
	It would be possible to gain views of the development during the hours of darkness as the proposed development would operate 24 hours a day requiring internal and external lighting.		External lighting to be carefully design with reflector, directional lighting and appropriate colour and lux levels. There is no mitigation for the chimney stacks.	
Users of the B4560 Llangynidr Road	Visual impacts on road users on the B4560 with the introduction of buildings and tall chimney stacks that introduce new noticeable features in views. It would be possible to gain views of the development during the hours of darkness as the proposed development would operate 24 hours a day requiring internal and external lighting.	Operation: Yr 1 and 15 Moderate	Innovative design and high architectural quality using reflective material to match the changing weather pattern and skies helping to soften the edges of the building and blend the façade with the local skyline. External lighting to be carefully design with reflector, directional lighting and appropriate colour and lux levels. There is no mitigation for the chimney stacks.	Moderate

14 Water Environment

14.1 Introduction

This chapter of the Environmental Statement (ES) reports the potential impacts of the construction and operation of the proposed development on the water environment following the methodology set out in the Design Manual for Roads and Bridges (DMRB) LA 113 Road Drainage and the water environment.

The chapter describes the methodology used to assess potential impacts of the proposed development with the assumptions and limitations of the assessment within a defined study area. It describes the baseline conditions of the existing water environment in the study area and identifies potential impacts during the construction and operational phases with an assessment of likely effects and their significance. Design mitigation (including embedded and essential mitigation) and enhancement measures and mitigation measures or monitoring deemed necessary are identified. Residual effects post mitigation are also set out.

The assessment of impact on hydrology and flooding risks has been scoped out from the Environmental Statement. Therefore, for the purposes of this chapter, the water environment is considered to comprise:

- Groundwater contained within aquifer units that underlie the study area.
- Groundwater dependent features within the study area that may potentially be affected (e.g. groundwater-dependent terrestrial ecosystems (GWDTEs)).
- The aspects of potable water supply that directly depend on groundwater resources (e.g. private wells).
- Groundwater and surface water features within the study area that may potentially be affected by land contamination.

The assessment considers the potential effects on the quality, quantity, flow and level of groundwaters, and quality of surface water, that may result from construction activities and from land contamination in the end use scenario, during operation including site drainage.

14.2 Legislation, policy context and guidance

14.2.1 Legislation

The Environmental Permitting (England and Wales) (Amendment) (EU Exit) Regulations 2019

These came into force in accordance with the European Union (Withdrawal) Act 2018 on 31 December 2020, to ensure that The Environmental Permitting Regulations 2016 for England and Wales can continue to function. The Environmental Permitting Regulations 2016 are summarised below.

The Environment (Amendment etc.) (EU Exit) Regulations 2019, as amended in 2020

These came into force in accordance with the European Union (Withdrawal) Act 2018 on 31 December 2020. Part 2 amends the following primary legislation of relevance to the water environment:

- The Environmental Protection Act 1990 (summary provided below).
- The Environment Act 1995 (summary provided below).

Environmental Protection Act 1990

The Environmental Protection Act 1990 makes provision to control pollution arising from industrial and other processes. Under Part 2A of the Environmental Protection Act 1990, sites are identified as 'contaminated land' if they are causing, or if there is a significant possibility of causing significant harm to human health or significant pollution of controlled waters, as defined by Section 104 of the Water Resources Act 1991. In general terms, the legislation advocates the use of a risk assessment approach for the assessment of contamination and remedial requirements . The Act is amended by The Environment (Amendment etc.) (EU Exit) Regulations 2019.

Environment Act 1995

The Environment Act 1995 sets new standards for environmental management, such as requiring national strategies for air quality and waste. It also deals with the establishment of the EA. It is amended by The Environment (Amendment etc.) (EU Exit) Regulations 2019.

The Environment Act 2021

This Act allows the Welsh Ministers to set out objectives in relation to the substances and chemical status of groundwater and surface waters.

The Contaminated Land (Wales) Regulations 2006

The Contaminated Land (Wales) Regulations 2006 (as amended in 2012) define a special site, which includes contaminated land impacting the quality of controlled waters. The regulations also set out provisions for remediation notices. It is amended by Part 3 of the Environment (Amendment etc.) (EU Exit) Regulations 2019.

The Environmental Permitting Regulations 2016

The Environmental Permitting (England and Wales) Regulations 2016 were amended in order to extend the requirement for an environmental permit to flood risk activities, in addition to polluting activities included under the previous regulations. The 2010 Regulations revoked the 2009 Groundwater Regulations, which originally implemented the Groundwater Directive. It is amended by The Environmental Permitting (England and Wales) (Amendment) (EU Exit) Regulations 2019.

Water Resources Act 1991

In England and Wales, The Water Resources Act 1991 established the Environment Agency's powers and duties for the protection of water resources, which since 2013 have been devolved to Natural Resources Wales (NRW). NRW is a key statutory consultee responsible for ensuring that the proposed development does not adversely affect groundwater resources.

The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (WFD)

The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 aim to provide an integrated framework for the protection and restoration of the water environment through the delivery of actions set out in 11 River Basin Management Plans (RBMPs). Each River Basin District (RBD) comprises smaller management units known as water bodies, including all river, lake, groundwater, coastal and transitional waters located within that RBD.

Water Resources (Abstraction and Impounding) Regulations 2006

The Water Resources (Abstraction and Impounding) Regulations 2006 contain provisions relating to the licensing of abstraction and impounding of water in England and Wales in the light of amendments made by the Water Act 2003 to the Water Resources Act 1991. The 2006 regulations have been updated by the Water Abstraction and Impounding (Exemptions) Regulations 2017.

The Water Abstraction and Impounding (Exemptions) Regulations 2017

The Water Abstraction and Impounding (Exemptions) Regulations 2017 contain circumstances where water abstractions and impounding works are exempt from licensing requirements.

The Water Supply (Water Quality) Regulations 2018

The Water Supply (Water Quality) Regulations 2018 provide the framework for drinking water quality in England and Wales in respect of public supplies provided by water companies and licensed water suppliers. The Drinking Water Inspectorate, acting on behalf of the Secretary of State, enforces the legislation.

The Environmental Damage (Prevention and Remediation) (Wales) Regulations 2009, as amended in 2015

These Regulations are based on the 'polluter pays' principle and impose obligations on operators of economic activities requiring them to prevent, limit or remediate environmental damage. They apply to damage to protected species, natural habitats, sites of Special Scientific Interest (SSSI), water and land and implement directive 2004/35/EC, on environmental liability Environmental damage to groundwater would result in its conductivity, level or concentration of pollutants changes sufficiently to lower its Water Framework Directive (WFD) status. It is amended by Part 3 of the Environment (Amendment etc.) (EU Exit) Regulations 2019.

The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015

The WFD Directions present the updated environmental standards to be used in the second cycle of the WFD (2000/60/EC) river basin management planning process in England and Wales. Environmental standards help assess risks to ecological quality of the water environment.

The Groundwater (Water Framework Directive) (Wales) Direction 2016

The direction sets out instructions to NRW on obligations to protect groundwater, including requirements to monitor and set thresholds for pollutants, add new pollutants to the monitoring list and change the information reported to the European Commission.

The Conservation of Habitats and Species Regulations 2017 (the 'Habitat Regulations 2017')

The Habitat Regulations 2017 ensure the conservation of a range of rare or threatened species. The regulations are amended by the Conservation of Habitats and Species Amendment (EU Exit) Regulations 2019.

National planning policy

Planning Policy Wales, Edition 11 (2021)

PPW11 requires the planning system to ensure the protection of the quantity and quality of groundwater supplies is taken into account as part of development proposals.

Future Wales: The National Plan 2040

Future Wales 2040 promotes sustainable development with an ambition (Outcome 9) for Wales' natural resources, including its water, to support a range of activities and sectors and are assets of great value in their own right. The environmental, social and cultural value of water resources will be managed, maintained and enhanced, while economic benefits will be utilised sustainably and appropriately by promoting nature-based solutions and a circular economy. This will be reflected in more sustainable places, which benefit from reductions in levels of pollution, and be healthier and more liveable.

Local planning policy

Blaenau Gwent County Borough Council Local Development Plan up to 2021

Within the BGCBC LDP the policies of relevance to this chapter are:

- Strategic Policy (SP) 10 Protection and Enhancement of the Natural Environment.

- This policy states that proposals do not have an unacceptable adverse impact upon the water environment and contribute to improving water quality where practicable. This policy promotes the protection and improvement of the quality and quantity of controlled waters within the County Borough, including the groundwater resource. Development will not be allowed if it is demonstrated that there is likely to be adverse impact on the water resources. This re-emphasised by Development Management Policy 1 on new development.

14.2.2 Guidance and standards

The assessment methodology is based upon Design Manual for Roads and Bridges (DMRB) Guidance LA 104 Environmental assessment and monitoring (referred to hereafter as 'LA 104').

The water assessment has been carried out in accordance with relevant guidance produced by the UK Government, along with Natural Resources Wales, as listed below, and in broad alignment with DMRB Guidance LA 113 Road drainage and the water environment (referred to hereafter as 'LA 113') and Guidance LA109 Geology and soils (referred to hereafter as 'LA109').

LA 113 provides the methodology and criteria for identifying likely impacts of a road project on the water environment and predicting their magnitude and the significance of the resulting effects. There is no standard guidance for the methodology for a water environment EIA and therefore in the absence of any sector guidance, DMRB is recognised as the most tried, tested and robust approach.

LA 113 is specifically designed for assessing the impacts of road or bridge construction on the water environment and therefore sections of it (e.g. Highways England Water Risk Assessment Tool (HEWRAT)) are not applicable to the proposed development. Despite this, the DMRB methodology is widely used for all types of construction schemes and benefits from being recognised by regulators.

The methodology for groundwater assessment incorporates the Environment Agency (EA) guidance for dewatering abstractions (SC040020/SR1193) and groundwater abstractions (SC040020/SR2194), adopted by NRW.

LA 109 provides the methodology and criteria for identifying likely impacts of the proposed development on land contamination by either disturbing historical contamination or introducing new sources of contamination.

[193] Environment Agency (2007). Hydrogeological impact appraisal for dewatering abstractions [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/291080/scho0407bmae-e-e.pdf (Accessed 25/05/2021)
[194] Environment Agency (2007). Hydrogeological impact appraisal for groundwater abstractions [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/291083/scho0407bmah-e-e.pdf (Accessed 25/05/2021).

14.3 Study area

The study area for the assessment has been based on a source-pathway-receptor approach. For direct effects on groundwaters, the study area includes the geographical extent of the site boundary and all groundwater features within 500m of the site boundary. Indirect effects on groundwaters are considered up to 1km away where features have hydrological connectivity to the proposed development.

The study area with respect to assessment of land contamination impacts comprises the development boundary and an additional buffer of 250 metres in accordance with published guidance195. This area is considered appropriate for the consideration of historical and current potentially contaminative land uses, which could be impacted by, or impact on the proposed development. Where there is potential for sources of contamination outside the 250 metre buffer to migrate on-site, these have been included in the assessment and presented in this ES.

This study area has been selected based on professional judgement with consideration to the potential effects of the scheme.

14.4 Consultation

An EIA Scoping Report was prepared and submitted to BGCBC on 20th May 2021. The EIA Scoping Report sets out the proposed scope for the assessment of water and can be found on BGCBC's planning portal.

A Scoping Opinion was received from BGCBC on the 24th June 2021, which included responses relating to the water environment from NRW, Dŵr Cymru Welsh Water (DCWW) and local authorities – BGCBC and BBNPA. These responses have been considered and included, where appropriate, in this chapter and are. This can be viewed on BGCBC's planning portal (Application reference C/2021/0128) and has been summarised with responses to explain where the Scoping Opinion comments have been incorporated in the assessment. Table 14.1 below provides responses to relevant comments raised in this correspondence.

Table 14.1: Local authority response to scope of water assessment

Scoping opinion comment	Applicant response
NRW recommend that land contamination should not be scoped out due to the presence of made ground. The proposed development will require significant reprofiling. The site is underlain by a Secondary A aquifer with a risk from artesian pressure. Numerous springs and marshy ground are known to the north of the Rassau Industrial Estate, which would suggest heightened potential for groundwater and surface water interaction. This can influence the movement of contaminants, and design of storm water	Land contamination assessments will be considered as part of the scheme design in accordance with the governmental guidance on Land contamination risk management (LCRM). In response to NRW Scoping Opinion, we are proposing to consider land contamination issues with respect to controlled waters as part of the Environmental Statement Water Environment chapter. The assessments will be undertaken at Tier 1 Preliminary Risk Assessment level. Intrusive ground investigations will be completed after

[195] NHBC, Environment Agency, CIEH (2008), Guidance for the Safe Development of Housing on Land Affected by Contamination.

Scoping opinion comment	Applicant response
systems and piling, and management of surface water on site. A site specific geo-environmental site investigation has not been performed and is required to assess the ground conditions and the environmental quality of the ground materials.	submission of the planning application to verify the risks identified at Tier 1 assessments and to inform Tier 2 Generic Quantitative Risk Assessments. Further assessments will be completed, should Tier 2 find the risks unacceptable. If necessary, a remediation strategy will be prepared for the proposed development.
Controlled water quality impacts from land contamination and proposed development was scoped out from the assessments. However, in their response, NRW recommended that contamination is scoped in to the environmental impact assessments due to the presence of made ground and proposed significant ground reprofiling at the proposed development site. The presence of springs and marshy ground to the north of the Rassau Industrial Estate increases the potential for groundwater and surface water interaction, which in turn has a potential to influence the 'movement of contaminants, the design of stormwater management systems, piling design and managing legacy of water features such as the onsite culverted water course'. Consequently, the assessment of effects on groundwater and surface water quality from land contamination has been completed as part of this chapter.	

In addition, BGCBC were consulted to obtain baseline data on private water supplies. Following this, a local abstraction licence operator has been contacted to obtain the abstraction well details. No response has been received at the time of writing of this chapter.

14.5 Methodology

The assessment methodology conforms to the standards of LA 104, LA 109 and LA 113, which provide a methodology and criteria for assessing the impact of a proposed development on the water environment.

14.5.1 Methodology for establishing baseline conditions

Identification of receptors

The methodology for identifying potential water receptors within the study area, based on the features outlined in Table 14.2 and adapted from Table 3.69 of LA 113, includes undertaking a desk-based review of potential receptors within the study area (defined in section 15.3.1) and available historical investigations (detailed in the Geotechnical and Geo-environmental desk study report[196], presented in Appendix H1 in Volume II Appendices). Surface water receptors have been included in the assessment as changes to the groundwater may impact these receptors.

[196] CiNER Glass Limited, Dragon Glass Bottle Manufacturing Facility, Geotechnical and Geo-environmental Desk Study, DRAGON-ARUP-GINV-XX-RP-C-001008, Rev A, 20 October 2020.

Table 14.2: Attributes and indicators of quality for groundwater features (adopted from Table 3.69 in LA 113)

Attribute	Indicator of quality	Possible measure
Water supply/ quality	Amount used for water supply Amount used for water supply (industrial/agricultural)	WFD groundwater quantitative and chemical status Catchment abstraction management Strategy (CAMS) status Location and number of abstraction points Volume abstracted daily and use (potable most important) Location and grade of Source Protection Zone (SPZ)
Soakaway	Presence of soakaways or other discharges to the ground	Location, type and number of discharge points. Daily volume discharged
Vulnerability	Groundwater vulnerability	Classification of aquifer vulnerability
Economic value	Extent of use for abstractions	Number of people employed, cost of alternatives
Conveyance of flow	Presence of groundwater supported watercourses Potential for groundwater flooding Groundwater interception by structures or drainage	Changes to groundwater recharge, levels or flows Number and size of watercourses fed by baseflow
Biodiversity	Presence of GWDTE	Changes to groundwater recharge, levels or flows. Status or classification of wetland including GWDTE under WFD

Assessment of value

The value of each water environment feature within the study area (defined in section 14.3.1) has been determined according to the DMRB criteria set out in, Table 14.3 as per Table 3.69 of LA 113.

Table 14.3: Estimating the value of groundwater and surface water attributes (adopted from Table 3.70 in LA 113)

Value	Criteria	Attribute	
Very High	Nationally significant attribute of high importance	Surface water	Watercourse having a WFD classification shown in a River Basin Management Plan (RBMP) and Q95 (flow exceeded 95% of the time) ≥1.0 m3/s Site protected/designated under UK legislation (Special Area of Conservation (SAC), Special Protection Area (SPA), Site of Special Scientific Interest (SSSI), Ramsar site, salmonid water) /Species protected by EC legislation Ecology and Nature Conservation

Value	Criteria	Attribute	
		Groundwater	Principal aquifer providing a regionally important resource and/or supporting a site protected under UK legislation Ecology and Nature Conservation Groundwater locally supports GWDTE SPZ1
High	Locally significant attribute of high importance	Surface water	Watercourse having a WFD classification shown in a RBMP and Q95 <1.0m3/s Species protected under EC or UK legislation Ecology and Nature Conservation
		Groundwater	Principal aquifer providing locally important resource or supporting a river ecosystem Groundwater supports a GWDTE SPZ2
Medium	Of moderate quality and rarity	Surface water	Watercourses not having a WFD classification shown in a RBMP and Q95 >0.001m3/s
		Groundwater	Aquifer providing water for agricultural or industrial use with limited connection to surface water SPZ3
Low	Lower quality	Surface water	Watercourses not having a WFD classification shown in a RBMP and Q95 ≤0.001m3/s
		Groundwater	Unproductive strata

14.5.2 Magnitude of impacts

The approach used to assess magnitude of impacts on water environment features considers the change to the receptor. This considers the severity of impact of the scheme, together with the vulnerability of the receptor to change.

Table 14.4 summarises the potential magnitude of any construction or operation impact on the receptor, as per Table 3.71 of LA 113.

Table 14.4: Estimating the magnitude of an impact on surface water and groundwater (adopted from Table 3.71 of LA 113)

Magnitude	Criteria	Attribute	
Major adverse	Results in loss of attribute and/or quality and integrity of the attribute	Surface water	Loss or extensive change to a fishery Loss of regionally important public water supply Loss or extensive change to a designated nature conservation site Reduction in water body WFD classification
		Groundwater	Loss of, or extensive change to, an aquifer Loss of regionally important water supply Loss of, or extensive change to GWDTE or baseflow contribution to protected surface water bodies Reduction in water body WFD classification Loss or significant damage to major structures through subsidence or similar effects

Magnitude	Criteria	Attribute	
Moderate adverse	Results in effect on integrity of attribute, or loss of part of attribute	Surface water	Partial loss in productivity of a fishery Degradation of regionally important public water supply or loss of major commercial/industrial/agricultural supplies Contribution to reduction in water body WFD classification
		Groundwater	Partial loss or change to an aquifer Degradation of regionally important public water supply or loss of significant commercial/industrial/agricultural supplies Partial loss of the integrity of GWDTE Contribution to reduction in water body WFD classification Damage to major structures through subsidence or similar effects or loss of minor structures
Minor adverse	Results in some measurable change in attributes, quality or vulnerability	Surface water	Minor effects on water supplies
		Groundwater	Minor effects on an aquifer, GWDTEs, abstractions and structures
Negligible	Results in effect on attribute, but of insufficient magnitude to affect the use or integrity	Surface water	The proposed project is unlikely to affect the integrity of the water environment
		Groundwater	No measurable impact upon an aquifer.
Minor beneficial	Results in some beneficial effect on attribute or a reduced risk of negative effect occurring	Surface water	Minor effects on water supplies
		Groundwater	Reduction of groundwater hazards to existing structures Reductions in waterlogging and groundwater flooding
Moderate beneficial	Results in moderate improvement of attribute quality	Surface water	Contribution to improvement in water body WFD classification
		Groundwater	Contribution to improvement in water body WFD classification Improvement in water body CAMS (or equivalent) classification Support to significant improvements in damaged GWDTE
Major beneficial	Results in major	Surface water	Improvement in water body WFD classification

Magnitude	Criteria	Attribute	
	improvement of attribute quality	Groundwater	Removal of existing polluting discharge to an aquifer or removing the likelihood of polluting discharges occurring Recharge of an aquifer. Improvement in water body WFD classification
No change		No loss or alteration of characteristics, features or elements; no observable impact in either direction	

14.5.3 Significance of effect

By combining the magnitude of impact (or change) and the value of each water environment feature, an assessment has been made of the significance of effect, considering the possibility and nature of mitigation. The resultant effects may be either negative (adverse), positive (beneficial) or neutral, depending on the nature of the impact.

In accordance with Table 3.8.1 of LA 104, the significance of effect upon the receptor is assessed using the matrix in Table 14.5. Effects are defined on a nine-point scale (very large beneficial, large beneficial, moderate beneficial, slight beneficial, neutral, slight adverse, moderate adverse, large adverse or very large adverse).

Where the matrix suggests more than one likely outcome, for instance slight or moderate, professional judgement has been used in conjunction with the descriptors in Table 14.5 to arrive at a robust conclusion.

Table 14.5: Significance matrix (taken from Table 3.8.1 of LA 104)

		Magnitude of impact (degree of change)				
		No change	**Negligible**	**Minor**	**Moderate**	**Major**
Environmental value (sensitivity)	**Very high**	Neutral	Slight	Moderate or large	Large or very large	Very large
	High	Neutral	Slight	Slight or moderate	Moderate or large	Large or very large
	Medium	Neutral	Neutral or slight	Slight	Moderate	Moderate or large
	Low	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate
	Negligible	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight

Effects of moderate significance or higher represent a significant effect. Moderate adverse effects represent a significant effect that require mitigation, and function as means for the decision maker to take account of the likely significant effects of the scheme.

14.5.4 Assessment methodology

The assessment methodology followed for the ES conforms to the standards of LA 104, LA 109 and LA 113, which provide a methodology and criteria for assessing the impact of a proposed development on the water environment. The assessment includes a review of relevant legislation and policy at national and local levels.

The methodology for assessing effects is based on the principle that the environmental effects of the proposed development, in relation to groundwater receptors, should be determined by identifying the potential receptors, assigning receptor's value, assessing the magnitude of change the scheme would have on the resource's significance (where significance is defined as the attributes that give the resource its value) and then combining these two elements to identify the significance of effect.

The LA 109 and LA 113 methodology comprises the following steps:

- Definition of a study area (as defined in section 15.3).
- Identification of potential water receptors within the study area to form baseline conditions, based on the features outlined in Table 14.2 adopted from Table 3.69 of LA 113.
- Assessment of the potential importance or value (hereafter referred to as value) and sensitivity of each of these receptors, shown in Table 14.3 adopted from Table 3.70 of LA 113.
- Assessment of the potential magnitude of any construction or operation impact on the receptor, shown in Table 14.4, adopted from Table 3.71 of LA 113.
- Assessment of the overall significance of any effects on receptors due to impacts, shown in Table 14.5 Table 14.4, as per Table 3.8.1 of LA 104. The significance of effect is determined by a combination of the identified importance/ sensitivity of the receptor with the estimated magnitude of the effect, considering embedded and essential mitigation.

Where potential adverse effects have been identified, additional mitigation measures have been identified and developed. An assessment of the residual effects of the development upon the water environment following inclusion of any additional mitigations proposed was then carried out to determine the significance of any residual effects.

The effects have been separated into either construction or operation effects. In this chapter, construction is defined as all the works undertaken to build a proposed development and typically the majority of the impacts on the groundwater will occur during this phase, as this is when physical changes occur. Operation is defined as the post-construction phase of the proposed development, including maintenance activities, until there is further development or until the site ceases to operate. Some impacts on groundwater may occur during this phase, e.g. resulting from permanent drainage.

14.5.4.1 Assessment of impact on groundwater levels and flows

An impact assessment on groundwater levels and flows has been undertaken following the procedures set out in Appendix A Groundwater levels and flow of LA 113. This followed a stepped approach.

- Step 1 – Establish regional groundwater body status.
- Step 2 – Develop a conceptual model for the surrounding area.
- Step 3 – Based on the conceptual model, identify all potential features which are susceptible to groundwater level and flow impacts.

The potential impacts of construction on hydrogeology have been assessed by consideration of the proposed construction activities in the context of a baseline conceptual model of the hydrogeological regime.

The source-pathway-receptor model has been applied to water resources and water features that are sensitive to groundwater levels and flow. In this context, sources include abstraction and recharge points, which may be for dewatering or drainage purposes, that are artificially altering groundwater level and flows. The pathway is the hydraulic connection between the water resource that will be changed and features up or down gradient, so this could include the aquifer that connects the two. The receptors are groundwater bodies and groundwater-dependent features.

Assessment of impact on GWDTEs

An impact assessment on groundwater dependent terrestrial ecosystems (GWDTEs) has been undertaken following the procedures set out in Appendix B Groundwater-dependent terrestrial ecosystems of LA 113, which follows a stepped, risk-based approach which depends upon establishing linkages between potential impacts from the scheme on the hydrological and hydrogeological regime and the GWDTEs.

The site-specific conceptual hydrogeological model provides an overview of the interactions between groundwater and surface water and identifies potential linkages between potential impacts from the scheme (during construction or operation) and GWDTEs. Groundwater flow paths, groundwater levels and the proximity of GWDTEs have been taken into account in the conceptual hydrogeological model.

14.5.4.2 Assessment of impact on groundwater quality from land contamination

An impact assessment on groundwater quality from land contamination has been undertaken following the procedures set out in LA 109 Geology and soils. LA 109 requires the baseline scenario to be informed by desk study information and existing survey data, where available. In accordance with this methodology, assessment process follows the following key stages:

- Undertake desk-based review and historical information review.

- Establish outline study area and baseline scenario.
- Establish the potential for significant effects based on the scoping questions in LA 109.
- Where likely significant effects are identified, complete a detailed baseline scenario.
- Finalise study area based on the scheme design and baseline scenarios.
- Establish design and mitigation measures.
- Undertake assessment of likely significant effects.
- Undertake monitoring where significant effects are reported.

Conceptual site model

Contaminated Land, as defined in Part IIA of Environmental Protection Act 1990, is assessed through the identification and assessment of pollutant linkages (contaminant-pathway-receptor relationships). Implicit in the guidance is the application of risk assessment to assess whether potential pollutant linkages may be significant. The meanings of the components are:

- Contaminant - a contaminant or pollutant that is in, on or under the land and that has the potential to cause harm or pollution.
- Pathway: a route by which a receptor is or could be affected by a contaminant.
- Receptor: a target that could be adversely affected by a contaminant, for example a person, controlled waters (in this case surface water or groundwater), an organism, property or an ecosystem.

The development of a Conceptual Site Model (CSM) for the proposed developmentLand contamination: risk management[197] (replacing the now withdrawn CLR11 Model Procedures for the Management of Land Contamination).

In accordance with CIRIA 552 guidance[198], for a potential risk to either environmental or human receptors to exist, a plausible pollutant linkage involving each of these components must exist. If one of the components is absent then a pollutant linkage, and thereby potentially unacceptable risk, is also unlikely to exist. Where all three components are or may be present, a potentially complete pollutant linkage can be considered to exist. This does not automatically imply the presence of unacceptable risk, but further investigation of the potential pollutant linkages is required.

Tier 1 Preliminary Risk Assessment

The process comprises a tiered approach, commencing with a Tier 1: Preliminary Risk Assessment. This involves the identification of potential pollutant linkages, the determination of hazards (hazard identification) and subsequent hazard

[197] Environment Agency, Land contamination risk management (LCRM), October 2020. Available at: https://www.gov.uk/guidance/land-contamination-how-to-manage-the-risks
[198] CIRIA, Contaminated land risk assessment- A guide to good practice (C552), 2001

assessment, as well as risk estimation and risk evaluation of the posed hazard identified in the CSM.

The CSM is based on the baseline studies completed in accordance with Section 15.6.7.3 of this chapter. The baseline has been primarily informed by desk-based information for the site and historical ground investigations.

In relation to the potential impacts of construction, the CSM has been developed with consideration of the construction processes that are anticipated to be required – i.e. to allow construction of the scheme. This includes the following proposed works:

- Construction of earthworks (including construction of basements and creating a development platform through cut and fill works).
- Piling.
- Installation of drainage.

Any pollution linkages deemed to pose a 'moderate' risk or greater at Tier 1: Preliminary Risk Assessment, in accordance with best practice guidelines CIRIA C552, have been subjected to environmental impact assessment.

14.5.5 Limitations and assumptions

The baseline conditions have been primarily derived from desk-based studies with very limited historical ground investigation data. Development specific investigations have been proposed and will be undertaken as part of the project design. Desk study information is however considered sufficient to complete the hydrogeological impact assessments for the proposed development in accordance with the assessment methodology presented in Section 15.5.4.

Every effort has been made to ensure that the findings of the available surveys present as accurate an interpretation as possible of the baseline conceptual model of the water environment within the study area.

This chapter includes the information reasonably required to assess potential environmental effects. The assessments represent a 'reasonable worst-case' and are based on conservative inputs derived from available desk study data and published research literature relevant to the study area.

14.6 Baseline environment

14.6.1 Completed surveys

A desk study review was completed with respect to the proposed development. This is presented in the Arup Geotechnical and Geo-environmental Desk study report[199] (Appendix H1 in Volume II Appendices).

[199] CiNER Glass Limited, Dragon Glass Bottle Manufacturing Facility, Geotechnical and Geo-environmental Desk Study, DRAGON-ARUP-GINV-XX-RP-C-001008, Rev A, 20 October 2020.

As reported in the desk study, various historical intrusive ground investigations were completed within the site and its vicinity and a site walkover was undertaken at the desk study stage. These provide an insight into the ground and groundwater conditions within the site and site vicinity and complemented the published information on the geological and hydrogeological setting.

14.6.2 Geology

Published geology review, as presented in the Arup desk study, show that the site is underlain by Devensian Glacial Till comprising a stiff grey clay, but it is normally weathered in the upper few meters to brown and yellow clay with clasts ranging in size up to boulders, and mainly consisting of sandstones. Peat deposits are shown on the map in the surrounding area, particularly to the north and west of the site. Coverage of the superficial deposits is shown on Figure 14.1 in Volume III Figures.

The site is located on the northern side of the South Wales Coalfield synclinorium, on an area where the bedrock is indicated by the geological map to be the South Wales Lower Coal Measures. The western part of the site is shown to be underlain by a sandstone member of the Lower Coal Measures (so called Farewell Rock) and the eastern part of the site is underlain by a member comprising undifferentiated mudstone, siltstone and sandstone. The general dip of the beds in the area is between 5° and 10° towards the south-south-east. The solid geology is shown on Figure 14.2 in Volume III Figures.

Two marked faults are indicated running through the site area, trending NNW-SSE. The western fault is shown to be down thrown to the east and the eastern fault to be downthrown to the west, forming a graben. It is quite likely that additional/subsidiary faults may also be present associated with these marked faults, but none are shown on the geological plans.

Two coal seams are shown outcropping in the eastern part of the site, within the undifferentiated mudstone, siltstone and sandstone member of the Lower Coal Measures. The coal seams are shown to be truncated by the eastern of the two NNW-SSE trending faults within the site boundary, meaning that in the western part of the site the two coal seams are likely to be at greater depth. The coal seams are associated with the marine bands (Hornley M2 marine band and Springwood M1 marine band) that occur directly above them and are recorded as thin seams in the geological section. The desk study concluded that the site and its vicinity is unlikely to have been subjected to historical mining.

14.6.3 Stratigraphy

The western and central parts of the site are located on the Rassau Industrial Estate, which was prepared as a series of cut-fill platforms in the late 1970s/ early 1980s. The western part lies outside the estate extent. As a result of the construction of the development plateaus and complex geology, the stratigraphy varies significantly across the site as summarised below.

Western part

The western part (referred to in the desk study as zone A, as shown on Figure 3 of the desk study enclosed in Appendix H1 in Volume II Appendices) is relatively flat with ground level falling from approximately 420mAOD in the north to 412mAOD in the south. This area is within the controlled fill placed during the development of the Rassau Industrial Estate. Shallow bedrock was encountered during historical investigations. It is anticipated that the depth to bedrock increases to the south east. There is potential that in-situ glacial till is present beneath the fill.

Central part

The central part (referred to in the desk study as zone B, as shown on Figure 3 of the desk study enclosed in Appendix H1 in Volume II Appendices) is approximately 500m long with ground level falling from 425mAOD in the north to 400mAOD in the south. It has a series of plateaus, although these are not as well defined as the plateau in the western area. Very limited historical investigations were completed in this part of the site. These also encountered fill associated with the Rassau Industrial Estate development. The thickness of these deposits is expected to increase towards the south and east, to up to 10m. There is also potential that in-situ glacial till is present beneath the fill.

Easter part

The eastern site area (referred to in the desk study as zone C, as shown on Figure 3 of the desk study enclosed in Appendix H1 in Volume II Appendices) is within an area of natural ground to the east of the Rassau Industrial Estate. No fill materials are anticipated to have been placed within this area. Due to there being no historical ground investigation information in this area of the site the depth to rockhead is uncertain. The ground investigation undertaken in the site vicinity, indicates that the depth to rockhead increases towards the east. In one of these boreholes to the south of the site, bedrock was not encountered to a depth of 30m below ground level (bgl). Ecological surveys identified potential areas of peat at the surface.

14.6.4 Hydrology

14.6.4.1 Regional hydrology

The proposed development is located in the Severn Basin District and lies in the South East Wales NRW Operational Catchment. There are no WFD surface waterbodies within the proposed development site boundary, but it is within the catchment for the Ebbw River - source to confluence Ebbw Fach River water body (GB109056032900), which is 480m east of the site. As of 2018, the waterbody has an overall status of ‘Moderate’, as a result of the status of quality elements including priority hazardous substances, fish, invertebrates and phosphates.

The surface water features on the site and within the surrounding area are annotated on Figure 14.3 in Volume III Figures. Collectively, these comprise a

complex network of surface water courses, ponds and reservoirs. The springs and headwaters feeding the catchment are mainly associated with the areas of peat, which has accumulated in low laying areas and valleys. In some areas these represent near surface storage in the peat marsh areas, however it is also considered that some areas of peat, particularly in areas of geological boundaries or faulting, rely on groundwater, as conceptually presented on Figure 14.4 in Volume III Figures. In addition to the recognisable springs there will also be diffuse flow from the peat marshes into the watercourses.

Numerous surface watercourses have been culverted below surface to accommodate the construction of the wider industrial estate and the A465 dual carriageway to the south of the site. The construction of the Rassau Industrial Estate is likely to have altered the state of the surface hydrology, to accommodate appropriate drainage and divert surface water away from the platform.

The general drainage direction of the identified surface watercourses is towards the Ebbw River and associated reservoirs, Llangynidr and Carno. The reservoirs are situated in the head and base of the Cwm Carno, respectively, with the identified surface water draining down topography along sides of the valley into the Ebbw River flowing along the axis of the valley.

The Carno Reservoir is located 400m north-east of the site. The reservoir is primarily recharged by the Ebbw River, which originates from the Llangynidr Reservoir, located approximately 900m to the north of the site. The Llangynidr Reservoir is fed by a number of minor watercourse, with the nearest originating approximately 870m to the north of the site. Anecdotal evidence indicates that the water level in these reservoirs increases rapidly as a result of rainfall suggesting that the catchment is from surface water and shallow geology.

Another reservoir, the Clydach Reservoir and its catchment, is located approximately 950m to the east of the site.

14.6.4.2 Site hydrology

A drainage ditch bounds the northern perimeter of the site and runs north to south through the eastern part of the site, along the boundary of the industrial estate. The ditch is a concrete lined drainage that conveys surface water flows from the north that originally flowed through the site, prior to the industrial estate development. It has been culverted beneath the gravel track that extends from the unadopted asphalt road. The ditch is anticipated to be hydrologically connected to the Ebbw River by a culvert at the south eastern edge of the site. There are also ephemeral water bodies and ditches running east to west within the site. Aerial imagery has identified a small pond in the centre of the site, see Figure 14.3 in Volume III Figures. No data is available on the water quality of these surface water features.

A review of the historical aerial photography indicates significant alteration of surface water features between 1977 and 1983, which coincides with the construction of the Rassau Industrial Estate development platform. A perimeter drainage ditch was constructed (from 1981) along the northern and eastern boundary of the development platform, which is still present. Photos, included in the geotechnical desk study (Appendix H1 Volume II Appendices), from a site

walkover undertaken by a Civil Engineer in June 2019 show that this feature is lined with concrete and corrugated sheet metal at the base of the drainage ditch. It is considered likely that this feature was constructed to divert surface water features from up-gradient sources around the platform and discharge into the Ebbw River.

A review of 1981 and 1983 aerial photography indicates the presence of 'Herringbone' pattern drainage systems across the western site area.

14.6.4.3 Surface water abstractions

The Carno, Llangynidr and Clydach reservoirs are all licensed for public water supply. The location is marked on Figure 14.3 in Volume III Figures. There are no private surface water supplies within the study area.

14.6.5 Hydrogeology

14.6.5.1 Regional hydrogeology

The site is underlain by 'SE Valleys Carboniferous Coal Measures' (GB40902G201900) groundwater WFD water body. As of 2015, the groundwater body had an overall status of Poor and a chemical status of Poor.

Geology maps show the majority of the site to be covered by superficial deposits of Glacial Till with areas of Peat north of the site, as shown on Figure 14.2 in Volume III Figures. The superficial Glacial Till deposits are designated as a Secondary Undifferentiated aquifer, whilst the Peat deposits are classified as unproductive. There are also granular fill materials with varying properties, distribution and thickness across the site that have arisen from industrial development of the area. No significant groundwater flows are anticipated within the glacial till however perched localised groundwater may be present in more permeable strata.

The bedrock underlying the western area of the site is the South Wales Lower Coal Measures – predominantly sandstone strata (Farewell Rock) interbedded with mudstone horizons, and the eastern area of the site is South Wales Lower Coal Measures – undifferentiated mudstone, siltstone and sandstone layers. This is shown on Figure 14.1 in Volume III Figures. Although the South Wales Lower Coal Measures are designated a Secondary A aquifer, mudstones are anticipated to comprise non-water bearing strata with main groundwater flows taking place within the sandstone strata. The Lower Coal measures are underlain by the Twrch Sandstone Formation, which in turn overlies the Carboniferous Limestones principal aquifer. This is discussed in more detail in the sections below .

Farewell Rock comprises horizons of very strong and fractured quartzitic sandstone overlying the mudstones of the Lower Cola Measures. Sandstones of the Lower Coal Measures have low material porosity (<2%), with the highest values in areas of intensive folding and faulting. The permeability of the sandstones is primarily associated with its secondary porosity due to natural joints and fissures, which can be highly variable both laterally and with depth.

Effective infiltration in the Lower Coal Measures is typically around 150mm/annum, with 95% contributing to baseflow of the rivers. This emerges as springs, which are prevalent in this region. The springs emerge at the base of sandstones, or relate to peat deposits or impeded drainage over the glacial till. The streams are typically quite 'flashy' due to a rapid response of the springs to rainfall, with subsurface velocities up to 570m/day (measured in sandstones in tension zones). Yields from the Lower Coal Measures rarely exceed 1l/s but may yield up to 10l/s.

Groundwater flow in the Lower Coal Measures is expected to be shallow, following the dip of the strata within the more permeable sandstone horizons. Therefore, it is considered unlikely that there is significant recharge into the deeper aquifer in this area. The geological map however indicates faulting in the site area and some leakage is possible through faulted ground. However, given the thickness of strata above the limestone (estimated to be at least 85m) and the numerous mudstone layers, significant leakage is considered unlikely.

Artesian or sub-artesian groundwater pressures may occur in the western site area, predominantly underlain by sandstone strata. The sandstone strata contain water locally confined by overlying impermeable strata such as mudstones or glacial till. This has potential to occasionally create high water pressures or even artesian groundwater conditions within the base strata. As a result, removal of the overlying material can result in the escape of groundwater or even disruption of formations. There is documented evidence of artesian and sub-artesian groundwater conditions within the Rassau Industrial Estate. Further detail can be found in the Arup Geotechnical and Geo-environmental desk study, Appendix H1 in Volume II Appendices.

Regionally, the groundwater flows are impacted by historical underground mine workings. There is no evidence of mining activity within the study area.

14.6.5.2 Site hydrogeology

Due to the potentially complex hydrogeological site conditions as a result of the presence of faulted and fractured sedimentary rock comprising interbedded sandstones and mudstones, significant localised variations in groundwater conditions are anticipated within the site area. The glacial till materials of a relatively low permeability overly the bedrock, which may locally confine the groundwater. Groundwater may also be confined in water bearing sandstone strata overlain by non-water bearing mudstones. In areas of faulting and fracturing there may be a hydraulic continuity between these units. There is also potential for the faults to create zones of trapped groundwater under pressure due to potential for mineralisation along the fault planes. Localised significant flows may occur during construction within excavations or pile bores.

Rainwater is likely to drain via surface run-off or shallow flows through more permeable zones within the superficial deposits, backfilled historical watercourses and via drainage incorporated into the development platforms. Such drainage will also intercept any springs that may be emerging within the development platforms.

Groundwater within the site is unlikely to be in hydraulic continuity with the concrete lined stream crossing the site. It was constructed as part of the estate development to divert surface water courses that convey flows draining from area to the north of the site. The stream is a direct tributary to the Ebbw River.

14.6.5.3 Groundwater abstractions

There are three active NRW licenced groundwater abstractions within 1km of the site located approximately 150m to the west, 930m to the south-west and 990m to the south-west. All three are used for abstracting process water. In addition, the nearest of the three is also used for drinking, cooking and sanitary washing on commercial premises. The locations are marked on Figure 14.3 in Volume III Figures.

There are no council registered private water supplies within the study area.

14.6.5.4 Carboniferous Limestone Source Protection Zone

The northern edge of the site encroaches on an inner Source Protection Zone (SPZ1). A large area to the north of the site is designated SPZ1 to protect water resources in the Carboniferous Limestone Aquifer, which is a designated Principal aquifer. The full extent of the zone, which covers the whole of the Carboniferous Limestone outcrop from just to the east of Merthyr Tydfil to south of Blaenavon and serves a number of sources is shown on Figure 14.5 in Volume III Figures (taken from Environment Agency Wales publication on Delineation of Source Protection Zones -South, East Wales Sources[200]).

Although the SPZ1 extends to within the site, the Carboniferous Limestone Aquifer is located 2.8km north of the site at its closest point. The Twrch Sandstone Formation (formerly called Millstone Grit Formation; that underlies the Lower Coal Measures and outcrop approximately 1km to the north of the site) has been shown to contribute to the recharge of the underlying Carboniferous Limestone, therefore the Source Protection Zone extends further south, encompassing the Twrch Sandstone Formation plus a margin of safety overlapping onto the basal part of the Lower and Middle Coal Measures; and thus extending into the site area.

This SPZ has been grouped to protect water resources from six potable groundwater sources. No sources are located within the study area. The closest source(s) to the site are the Shon Sheffrey sources located approximately 3km west of the site, however the nearest sink connecting with another source, Ffynnon Gisfaen, is located approximately 1.2km to the north, as shown on Figure 14.5 in Volume III Figures (taken from Environment Agency Wales publication on Delineation of Source Protection Zones -South, East Wales Sources8). The site boundary is superimposed on the figure and it shows that site lies outside the catchment.

[200] Entec UK Limited, Environment Agency Wales, Delineation of Source Protection Zones - South, East Wales Sources, Final Report, 2009

14.6.6 Groundwater-dependent terrestrial ecosystems (GWDTEs)

There are no designated sites for ecology within the study area. The nearest designated site is Mynydd Llangatwg (Mynydd Llangattock) SSSI, located 1.1km to the east of the site. It is part of the Usk Bat Sites Special Area of Conservation. Another designated site, Mynydd Llangynidr SSSI is located 1.5km to the north.

However, vegetation survey completed within the site area (presented in Appendix D3 in Volume II Appendices) identifies a number of groundwater dependent National Vegetation Classification (NVC) communities. These are:

- M25 Marshy grassland/heath mosaic, predominantly occupying the northern half of the central site area.
- M25/M23 Marshy grassland/ rush pasture/ disturbed ground mosaic, occupying the eastern part of the site.
- M23 Flushy grassland on former track running along the stream.
- M23 Tall herb/ rush and scrub mosaic, localised patches distributed primarily in the north-eastern parts of the site.
- W1/W6 Damp willow and alder scrub, localised patches distributed primarily in the north-eastern parts of the site.

Communities M23, M25 and W6 have low groundwater dependency, whereas community W1 has a moderate groundwater dependency[201]. There is a strong potential for groundwater dependent terrestrial ecosystems to be present within the site vicinity, particularly to the north of the site.

The Ecology Chapter and the Preliminary Ecological Assessment (see Section 7 Ecology and Appendix D2 in Volume II Appendices) provides an outline description of their ecological characteristics.

The Preliminary Ecological Appraisal identified areas of peat in the eastern part of the site, possibly associated with M25/M23 marshy grassland/rush pasture/ disturbed ground mosaic, that have been degraded from historical disturbance and poor management. There are also areas of peat to the north of the site, as shown on Figure 14.2 in Volume III Figures. These may also potentially support groundwater dependent communities.

14.6.7 Land contamination

14.6.7.1 Site history

The site remained grassland/marshland until the late 1970s, when the construction of the industrial estate commenced. The construction of the development plateaus continued throughout the 1980s and was completed by 1991 within the site area.

[201] UK Technical Advisory Group on the Water Framework Directive (UK TAG WFD), Guidance on the identification and risk assessment of groundwater dependent terrestrial ecosystems, Ver. 5 2004.

Based on available information, the development platforms were formed through a controlled earthworks programme, which largely comprised a balanced cut and fill design with a small amount of imported material from offsite sources. To form level platforms on previously sloping ground, excavations into glacial till and rock took place in the north and fill was placed in the south.

The site has remained in largely unchanged condition to the present day. The surrounding industrial estate continued its development with an introduction of electricity substations and new units. The section of the A465 adjacent to the site was constructed in the early 2010s. The site history is described in detail in the Geotechnical and Geo-environmental Desk Study presented in Appendix H1 in Volume II Appendices. The key features are shown on Figure 14.6 in Volume III Figures.

14.6.7.2 Regulatory data

The details of the identified features are provided in the Geotechnical and Geo-environmental Desk Study presented in Appendix H1 in Volume II Appendices. The key features are shown on Figure 14.6 in Volume III Figures.

Waste disposal sites

There are no active, recent or historical landfills within 250m of the site. These records indicate that there is a waste management facility site within 250m of the site comprising a 'Car Battery Recycling Facility', located 30m north-west on the Rassau Industrial Estate dating from 2005. This is still present.

COMAH and 'List 1 Dangerous Substances' sites

There is one registered COMAH (Control of Major Accident Hazards) site within 250m of the site. This is the EnviroWales Limited battery recycling facility, a COMAH Upper Tier Operator, located 30m north and west of the site.

There are two known uses of 'List 1 Dangerous Substances' within 250m of the site: GTS Flexible Materials Ltd (25m south) uses perchloroethylene, whilst EnviroWales Ltd uses mercury and cadmium (30m north-west).

Historical tank database

Ten historical tanks within 250m of the site have been identified within the study area. All ten of these tanks are located in the confines of the Rassau Industrial Estate, with nine tanks located within the grounds of the electricity substation directly to the south-west of the site. The other tank is associated with the GTS Flexible Materials Ltd building 230m to the south of the site, which is a designated 'List 1 Dangerous Substances' site for the use of perchloroethylene. All of the tanks are unspecified in use and are no longer annotated on present day Ordnance Survey plans. Aerial photography from 2000 indicates that all of the tanks associated with the electricity substation are located above surface. The most recent aerial photography does no longer show these tanks.

Pollution incidents, licensed pollution releases and licensed discharges to controlled waters

There are three recorded pollution incidents within 250m of the site. One of these recorded incidents was deemed to have had a significant impact on controlled waters (Category 2), located 195m south-east of the site (organic chemical product). The remaining incidents were deemed to have a minor/negligible impact on land and controlled waters.

There are also three recorded licensed pollutant releases (Part A(2)/B) within 250m of the site: 115m south-west, 200m south and 205m south. The former comprised di-isocyanate processes from Sears Manufacturing Company Ltd (Part B), whilst the other two releases were both from GTS Flexible Materials Ltd comprising coating processes (Part A2 and Part B).

One licensed discharge to controlled waters has been recorded within the site area, comprising the release of unspecified effluent discharge into a soakaway; issued in 1989 and revoked in 1994. This is likely to be associated with the Carno Reservoir. There is also another licensed discharge to controlled waters 10m north-west of the site, comprising the discharge of trade discharges from the Rassau 400Kv substation, issued in 2003 and revoked in 2010.

14.6.7.3 Conceptual Site Model (CSM)

A detailed preliminary CSM is presented in the Geotechnical and Geo-environmental Desk Study presented in Appendix H1 in Volume II Appendices, and summarised below.

Potential sources

In summary, the main on-site potential sources of contamination are associated with the fill material of the development platform and potential made ground.

Previous investigations indicate that the fill material in the western portion of the site and the north of the central site area comprise reworked glacial till (cohesive and granular) and lesser peats. This is not likely to contain significant contamination; however, this may be a potential source of ground gas. There is limited ground investigation data in the south of central site area and this area is likely to have the largest thickness of fill. It is possible that made ground was used in the south of central site area (imported from off-site sources) to achieve the necessary cut and fill volumes, which may be a potential source of asbestos, metals and PAHs. Made ground may also be associated with the unadopted asphalt road and the foundations of the pylons. However, this material is likely to have been regulated and controlled prior to import and is not likely to contain significant contamination.

Adjacent industries of the Rassau Industrial Estate are considered to be potential off-site sources of contamination. Historically, these have been associated with historical tanks, pollution incidents and licensed discharge/pollutant releases, which have been considered as potential sources.

Construction and operational phase will introduce new sources of contamination, such as fuels and oils used in construction plant or delivery fleet, chemicals stored on site or foul water generated as a result of construction or operation.

Potential pathways

The potential pathways for contamination migration to controlled waters include:

- The leaching of contaminants from site soils as a result of rainwater infiltration is likely in the absence of drainage or hard cover. Such infiltration would be limited in areas of cohesive Glacial Till or reworked cohesive natural ground, with surface run off a primarily drainage mechanism. The nature of the natural ground would also limit vertical and lateral migration of contamination, although the fill material may be variable and more granular in places;
- Increased rainwater infiltration into the ground during excavation works or point discharge into the ground of water removed during dewatering activities may result in mobilisation of contaminates and vertical migration into the underlying groundwater;
- Dewatering activities may mobilise contamination associated with off-site sources within the site vicinity;
- Reuse of made ground within landscaped areas may also result in leaching of contaminants into the underlying groundwater;
- Introduction of piled foundations may introduce new pathways for contamination migration;
- The proximity of surface water features in relation to the scheme makes the potential of surface run-off or direct discharge of potential contamination into adjacent surface waters a plausible pathway. New drainage or underground service corridors may introduce preferential flow paths for contaminants towards surface water receptors;
- The site is located downstream of some of the potentially contaminative industrial uses, including an active electricity substation. Potential contamination arising from up-gradient land uses may laterally migrate through underlying groundwater or across impermeable surfaces through surface runoff; and,
- Discharge of water removed from excavations as a result of dewatering activities to the ground or surface water.

Potential receptors

The following controlled water receptors have been identified as shown on Figure 14.3 in Volume III Figures:

- Groundwater resources within underlying Secondary A aquifers within the study area and associated water abstraction points. The works are unlikely to intersect groundwater directly feeding into the source protection zone (SPZ1 of the Dowlais Limestone), however there may be hydraulic connectivity between the site and the underlying Millstone Grit through the faults.

Therefore, there is a potential risk, albeit low, of impacting the groundwater quality feeding into the SPZ1;

- Surface waters and hydrological features including the Ebbw River and its tributaries; and,
- Groundwater fed surface water features such as springs and streams.

14.6.7.4 Tier 1: Preliminary Risk Assessment

A Tier 1: PRA has been undertaken to qualitatively classify the nature of risk(s) posed by potential pollution linkages. This is based on the identified sources, pathways and receptors of contamination in the CSM developed for the site. It is presented in the Geotechnical and Geo-environmental Desk Study presented in Appendix H1 in Volume II Appendices. The Tier 1: PRA with respect to controlled water is detailed in . Table 14.6.

Table 14.6: Preliminary risk assessment

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
Baseline						
On-site Fill material (development platform) Made ground associated with the unadopted asphalt road and pylon structures Off-site Licensed discharge consent (Carno soakaway) Electricity substations and associated historical tanks 'Unspecified pits' (18m NE) Pollution incidents, licensed pollution releases and licensed discharge consents COMAH and 'List 1 Dangerous Substance' sites Car battery recycling facility	Groundwater within the Secondary A sandstone aquifer and SPZ (1) Abstraction points	Leaching of potential contaminants and vertical migration into aquifer	Unlikely	Medium	Low	The site is currently undeveloped and exposed to rainwater infiltration. However, rainwater infiltration is likely to be limited in areas of cohesive Glacial Till or reworked cohesive natural ground, with surface run off a primarily drainage mechanism. The nature of the natural ground would also limit vertical and lateral migration of contamination, although the fill material may be variable and more granular in places. The granular components of the fill materials are unlikely to form continuous or extensive pathways for groundwater or contamination migration. There is however a potential for contamination migration through the sandstone aquifer through fissures, particularly in the fault zone. Intrusive ground investigations will be undertaken to confirm the hydrogeological regime within the site.
		Lateral migration from up-gradient sources	Low likelihood	Medium	Moderate/ low	
		Lateral migration via groundwater	Unlikely	Medium	Low	The site is located downstream of potentially contaminative industrial uses, including an active electricity substation. Potential contamination arising from up-gradient land uses may laterally migrate through underlying groundwater within the sandstone aquifer into the site area. Groundwater sampling and laboratory testing will be undertaken to confirm the risk.
	Surface water; the Ebbw River	Lateral migration via groundwater	Unlikely	Medium	Low	The site is located downstream of potentially contaminative industrial uses, including an active electricity substation. Potential contamination arising from up-gradient land uses may migrate into the site area across impermeable surfaces through surface runoff collected by drainage that may be connected to some extent with the site current surface water drainage regime.
		Surface run-off	Likely	Medium	Moderate	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						Groundwater within the Secondary A sandstone aquifer is likely to be in hydraulic continuity with the Ebbw River. Potentially contaminated groundwater would likely impact the Ebbw River through the lateral migration of groundwater. However, as discussed above the migration of contamination into the groundwater and lateral from the site is likely to be limited due to the nature of the superficial deposits. The surface run-off is likely to be the primarily drainage pathway for the site. The site is currently draining to a number of drainage features across the site. Surface run-off may contain both dissolved and suspended contaminates originating from the on-site and off-site sources. Potentially contaminated surface water may collect within the lined channel, which may act as a water conduit to the Ebbw River. Intrusive ground investigations will be undertaken to confirm the hydrogeological regime within the site.
Construction phase						
Baseline on-site and off-site sources Fuels and chemicals stored on site Spillages and leakages during use of construction plant Temporary site drainage	Groundwater within the Secondary A sandstone aquifer and SPZ (1) Abstraction points Surface water; the Ebbw River Surface water; the Ebbw River	Leaching of contaminants and vertical migration into aquifer	Low likelihood	Medium	Moderate/ low	Open excavations may be present during construction, allowing for increased infiltration and subsequent leaching of the fill material and migration into the aquifer, where the excavations resulted in reduced cover of superficial deposits. Potentially mobilised leachable contaminants may impact the identified controlled waters receptors due to migration through the sandstone aquifer in areas of faulting or increased fissuring of the rock. The risk is however temporary and application of environmental controls in accordance with good practice guidance as presented in the CEMP will further reduce the potential risks associated with the construction works. In addition, soil sampling and testing (including soil leachate analysis) will be undertaken to confirm the risks. Dewatering activities may mobilise potential sources of contamination (both on-site and off-site) and enable their migration
		Discharge of groundwater to ground	Unlikely	Medium	Low	
		Lateral migration within groundwater	Low likelihood	Medium	Moderate/ low	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						into the construction area. Contaminated groundwater may impact controlled water receptors quality if not managed appropriately during construction. Any discharge to the ground or surface water that may introduce pollution will be subject to an environmental permit and treatment. Groundwater sampling and laboratory testing will be undertaken to confirm the risk. Soil sampling and testing (including soil leachate) to investigate the nature of the made ground materials on site.
	Surface water; the Ebbw River	Contaminated surface water runoff and direct discharge	Unlikely	Medium	Low	Application of environmental controls in accordance with good practice guidance as presented in the CEMP will reduce the potential risks associated with the construction works.
Operational phase						
Baseline on-site and off-site sources Fuels and chemicals stored on site Permanent trade foul drainage	Groundwater within the Secondary A sandstone aquifer and SPZ (1) Abstraction points Surface water; the Ebbw River	Leaching of potential contaminants	Unlikely	Medium	Low	The proposed development in areas of potential made ground will predominantly comprise hardstanding with minimal landscaping. Landscaped areas and Sustainable Drainage Systems (SuDS) are proposed in the eastern site area, where no major areas of made ground are anticipated. Therefore, leachable contaminants are unlikely to pose a risk during the operational phase. Introduction of underground service corridors and piled foundations may however create preferential flow paths for contamination migration into the aquifer and subsequently potentially impacting off-site groundwater and surface water receptors. On confirmation of the design, a foundation works risk assessment will be undertaken to assess the risks and identify an acceptable piling technique.
		Lateral migration within groundwater	Unlikely	Medium	Low	
		Migration via preferable pathways created by piles/ service corridors/ drainage	Likely	Medium	Moderate	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	Surface water; the Ebbw River	Contaminated surface water runoff	Unlikely	Medium	Low	Generation of contaminated surface run-off during the operation of the site is unlikely due to the proposed development in areas of potential made ground will predominantly comprise hardstanding with minimal landscaping. Landscaped areas are proposed in the eastern site area, where no major areas of made ground are anticipated. Appropriate materials management during construction will ensure that only materials considered suitable for reuse with respect to the identified receptors will be used within the construction. The assessment of materials suitability for reuse will be informed by data obtained from soil sampling and laboratory testing.
		Direct discharge	Unlikely	Medium	Low	Application of SuDS will attenuate surface water run-off across the site and will buffer potentially contaminated runoff from immediate discharge to the wider water environment. There is also scope for surface water quality to be improved as part of the development through interventions such as channel re-naturalisation, riparian buffer zone planting and planting in the car park.

14.7 Embedded mitigation

In order to establish groundwater conditions and support land contamination assessment, ground investigations will be undertaken within the site area. The scope of these investigations will be based on the findings of the desk study review presented in Arup Geotechnical and Geo-environmental desk study report enclosed in Appendix H1 in Volume II Appendices. The investigations will include shallow and deep boreholes targeting superficial and solid deposits. The boreholes will allow rock cores recovery to establish the site geology and the location of the fault zones. Selected boreholes will be equipped with groundwater monitoring installations within both the superficial and solid deposits, and to investigate the effect that the faults may have on groundwater regime. Sampling and testing of soils and groundwater will also take place to assess the nature of the made ground materials within the site. The investigations will also gather information on aquifer properties of the underlying bedrock through permeability testing.

Data obtained from these investigations will inform the design of the proposed development and any required land contamination assessments in accordance with Environment Agency's advice on Land contamination: risk management[202] (replacing the now withdrawn CLR11 Model Procedures for the Management of Land Contamination).

Application of SuDS will attenuate surface water run-off across the site and will buffer potentially contaminated runoff from immediate discharge to the wider water environment. There is also scope for surface water quality to be improved as part of the development through interventions such as channel re-naturalisation, riparian buffer zone planting and planting in the car park.

Surface water management measures across the site during construction is presented in the Construction Environmental Management Plan (CEMP) in Appendix A3 in Volume II Appendices. This will minimise the risk to groundwater quality (e.g. pollution events) arising from construction activities. It included practices outlined in published good industry guidance such as Construction Industry Research and Information Association (CIRIA)[203] guidance including:

- Control of Water Pollution from Construction Sites – Guide to Good Practice (SP156);
- Control of Water Pollution from Construction Sites – Guidance for Consultants and Contractors (C532);
- Remedial processes for contaminated land - principles and practice (C549);

[202] Environment Agency, Land contamination risk management (LCRM), October 2020. Available at: https://www.gov.uk/guidance/land-contamination-how-to-manage-the-risks
[203] Construction Industry Research and Information Association (CIRIA), Free CIRIA Downloads Available: https://www.ciria.org/CIRIA/Resources/Free_CIRIA_publications/Resources/Free_CIRIA_publications.aspx?hkey=622b85b3-7d21-4e59-8093-459571496a0a [Accessed 20/04/2021].

- Environmental good practice on site (C692);
- Groundwater control: design and practice (second edition) (C750); and,
- Pollution Prevention Guidelines (PPG) are a series of documents developed by the Environment Agency for England and Wales. The PPGs are currently being reviewed and updated with a replacement guidance series, Guidance for Pollution Prevention (GPP). Some GPPs have been introduced but PPGs can still be used in the interim as good practice[204].

Construction activities will be undertaken in line with current best practice and guidance in accordance with the CEMP as set out in Appendix A3 in Volume II Appendices to ensure that contamination is addressed during construction and unacceptable risks with respect to controlled waters are mitigated. Where required, discharge activities will be subject to environmental permits.

Measures contained within the CEMP are designed to limit the possibility for dispersal and accidental releases of potential contaminants and uncontrolled contaminated run-off during construction. The CEMP will establish procedures for dealing with unexpected soil or groundwater contamination that may be encountered. Construction-related sources will be managed to negate their impact on the environment. The commitments incorporated in the CEMP include but are not limited to:

- A watching brief for the duration of site works in areas of potential contaminated land or groundwater (by a suitably qualified and experienced person);
- An Action Plan for safely dealing with unexpected contamination;
- Management of construction-related waters;
- Sustainable use of soils on a construction site;
- Environmental monitoring including surface water and ground water monitoring;
- Following the completion of construction groundwater monitoring observation boreholes may be decommissioned. The decommissioning of the boreholes will be done in such a way that the material placed in the observation well mimics the annulus construction; and,
- Foundation Works Risk Assessments for piling, to identify appropriate piling techniques. The detailed design of underground structures, such as piled foundations will also consider measures to reduce impacts on groundwater flow and quality. The selection of the piling methodology allowing to minimise the risks will be informed by foundation works risk assessment undertaken in accordance with published guidance.

[204] NetRefs, 2021. 'Guidance for Pollution Prevention: Full List' [Online]. Available from: https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/guidance-for-pollution-prevention-gpps-full-list/ [Accessed 27/04/2021]

14.8 Assessment of effects

14.8.1 Assessment of construction effects

14.8.1.1 Dewatering

Basements form part of the proposed development. The deepest basement will be located beneath two cullet[205] handling devices that form part of the northern and southern production lines accommodating Furnace 1 and Furnace 2. Each basement is to be founded at split level, at 409.06 and 405.1 m OD. Other basements will also be required beneath the silos, furnaces and fusion pools, and a utilities basement. These basements will be founded at between 412.51mOD and 415.51mOD. The site existing level in the location of the northern and southern production lines is approximately 419mOD and 415mOD, respectively. This means that excavations of up to 15m will be required to accommodate the basements. The desk study review has indicated shallow bedrock in that part of the site, which means that these excavations will be into the rock.

The rock beneath the proposed basement comprises predominantly sandstones with some mudstone horizons of the Farewell Rock underlain by the interbedded mudstones, sandstones and siltstones of the Lower Coal Measures.

Groundwater is likely to be confined within the sandstone strata. Farewell Rock may be hydraulically interconnected with the Twrch Sandstones (Millstone Grit) extending to the north of the site via sandstone horizons within the Lower Coal Measures, although this is likely to be limited. This and confinement of the sandstone horizons may result in artesian or sub-artesian groundwater conditions. Excavation works may intercept these sandstone bands resulting in significant groundwater flows. Although the flows are likely to subside with time due to the limited catchment associated with the sandstones present beneath the site and time requiring the recharge the saturated strata, active dewatering is likely to be required. This may impact groundwater levels and flows and subsequently groundwater dependent features.

The review of hydrological and hydrogeological conditions within the study area has identified a number of potential groundwater dependent features. These are detailed in Table 15.6 below. The location is marked on Figure 14.1 in Volume III Figures.

The assessment of effects of the proposed works on the identified groundwater dependent features, as detailed in Table 15.6, identified potential significant effects on the groundwater abstraction well (feature No 1) and GWDTE (feature No 5) with a moderate adverse significance. The proposed works are likely to result in non-significant effects on the remainder of the features with either neutral or slight adverse significance.

Dewatering has a potential to impact water balance within the surface water catchment, where groundwater provides a base flow. Groundwater removed from the excavations will be discharged into the surface water system, within the Ebbw

[205] recycled broken or waste glass used in glassmaking

River catchment, via land drainage. This is the same catchment, where the groundwater beneath the site will eventually discharge to. Therefore, the impacts on the water balance within the Ebbw River catchment are considered to be negligible. The value of the Ebbw River is very high. Therefore, the dewatering activities within the site will have a slight adverse effect on the Ebbw River catchment.

Table 14.7: Groundwater dependent features within the study area

Feature ID	Type	Value	Approximate distance	Elevation	Impact	Magnitude of impact	Significance of effect
1	Water supply abstraction borehole	Medium	150m W	Response zone unknown	Well details are unknown therefore it is assumed that there is a potential for hydraulic connectivity if water abstracted from Farewell Rock or underlying Lower Coal Measures. Zone of influence of the dewatering works needs to be confirmed. This may impact the groundwater levels and flows at the water supply location, albeit temporarily.	Moderate adverse	Moderate adverse
2	Headwaters of tributary of Ebbw River	Low	250m N	440 mOD	Located within the same geological unit as the works, Farewell Rock. Likely to be in hydraulic connectivity. Zone of influence of the dewatering works needs to be confirmed. This may impact the groundwater levels and flows at the headwaters location, albeit temporarily.	Minor adverse	Slight adverse
3	Headwaters of Nant Melyn stream	Medium	770m NW	435 mOD	Located outside the study area however as it is located within the same geological unit as the works, Farewell Rock there is a potential for hydraulic connectivity with the site. Zone of influence of the dewatering works needs to be confirmed. This may impact the groundwater levels and flows at the headwaters location, albeit insignificantly and temporarily, considering the distance from the site.	Negligible	Slight adverse
4		Medium	680m NW	445 mOD		Negligible	Slight adverse
5	Potential GWDTE (peat area)	High	320m NW	425mOD	Located within the same geological unit as the works, Farewell Rock. Likely to be in hydraulic connectivity. Zone of influence of the dewatering works needs to be confirmed. This may impact the groundwater levels at the GWDTE location, albeit temporarily.	Minor adverse	Moderate adverse

Feature ID	Type	Value	Approximate distance	Elevation	Impact	Magnitude of impact	Significance of effect
6	Spring	Low	850m N	455m OD	Located outside the study area however as it is located within the same geological unit as the works, Farewell Rock and therefore there is a potential for hydraulic connectivity with the site. Zone of influence of the dewatering works needs to be confirmed. This may impact the groundwater levels and flows at the springs location, albeit insignificantly and temporarily, considering the distance from the site.	Negligible	Slight adverse
7	Headwaters of stream feeding into Llangynidr Reservoir	Low	880m N	455m OD	Located outside the study area and within a different geological unit - Lower Coal Measures. Limited hydraulic connectivity is possible through sandstone bands but unlikely. Likely to be underlain by impermeable mudstones and therefore associated with surface run-off rather than groundwater.	No change	Neutral
8		Low	1100m N	465m OD		No change	Neutral
9		Low	990m N	465m OD		No change	Neutral
10	Water supply abstraction boreholes	Medium	930 – 990m SW	355 - 365mOD	Located outside the study area and abstraction is from a different geological unit- Millstone Grit and from greater depth than the extent of the basements. Limited connectivity may exist through the faults but unlikely to impact flows in the geological units associated with the water supply.	No change	Neutral
11	GWDTE	High	On site (central part)	420 -425m OD	The communities will be directly impacted by the proposed development. The assessment of effects on these communities is undertaken in the Biodiversity chapter.		
12	GWDTE and peat	High	On site (eastern part)	390 -415m OD	Located within a different geological unit - Lower Coal Measures. Limited connectivity may exist through the faults or minor sandstone bands at depth Likely to be underlain by impermeable mudstones and therefore these communities are most likely sustained by shallow groundwater perched over impermeable mudstones.	Negligible	Slight adverse

Feature ID	Type	Value	Approximate distance	Elevation	Impact	Magnitude of impact	Significance of effect
13	SPZ	Very high	North-easter site edge	N/A	SPZ and its sources are associated with different geological unit than the site works - Carboniferous Limestones and overlying Millstone Grit. Limited connectivity may exist through the faults but unlikely to impact flows in the geological units associated with the SPZ.	No change	Neutral
14	Potential GWDTE (peat area)	High	830m NW	455 – 465m OD	Located outside the study area located on a boundary between two geological units, Farewell Rock and Lower Coal Measures. Likely to be in limited hydraulic connectivity. It is more likely to be underlain by impermeable mudstones and very thin layer of sandstones therefore these communities are most likely sustained by shallow groundwater perched over impermeable mudstones and therefore associated with surface run-off rather than groundwater.	Negligible	Slight adverse
15	Potential GWDTE (peat area)	High	800m W	430 - 460m OD	Located outside the study area however as it is located within the same geological unit as the works, Farewell Rock. Therefore there is a potential for hydraulic connectivity with the site. Zone of influence of the dewatering works needs to be confirmed. This may impact the groundwater levels and flows at the GWDTE location, albeit insignificantly and temporarily, considering the distance from the site.	Negligible	Slight adverse
16	Headwaters of stream feeding into Carno Reservoir	Low	800m NE	430m OD	Located within the same geological unit as the works, Farewell Rock but unlikely to be in hydraulic connectivity due to the presence of faulting and graben.	No change	Neutral

Feature ID	Type	Value	Approximate distance	Elevation	Impact	Magnitude of impact	Significance of effect
17	Headwaters of streams feeding into Clydach Reservoir	Low	800m NE	420m OD	Located within the same geological unit as the works, Farewell Rock but unlikely to be in hydraulic connectivity due to the presence of faulting and graben.	No change	Neutral
18	Pond with streams	Low	430m E	410m OD	Partially located within the same geological unit as the works, Farewell Rock but unlikely to be in hydraulic connectivity due to the presence of faulting and graben.	No change	Neutral

14.8.1.2 Land contamination

Construction of the proposed development will result in introduction of new pathways for the existing sources of contamination to potentially affect the controlled water receptors. The Tier 1: Preliminary Risk Assessment identified the following adverse impacts that could potentially arise as a result of construction of the proposed development after application of embedded mitigation measures:

- Mobilisation of existing contaminants in soil and groundwater as a result of ground disturbance during construction, which has a potential to increase potential for contaminants in unsaturated soils to leach to groundwater. Open excavations may be present during construction, allowing for increased infiltration and subsequent leaching of the fill material and other on-site sources. The fill material is not known to comprise 'typical' made ground, however made ground may have been used to achieve the necessary cut/fill balances in the central site area. Potentially mobilised leachable contaminants may impact the identified controlled waters receptors.
- Dewatering activities may also mobilise contamination from both on-site and off-site sources. Groundwater quality within the site may already be impacted by off-site sources through contamination migration. Discharged contaminated groundwater may impact the receptor.

The Tier 1: Preliminary Risk Assessment identified both groundwater and surface water within the scheme area and its vicinity as potential receptors of the identified sources of contamination. Construction activities may result in the contamination mobilisation and migration towards these receptors or in direct discharge of contaminants to groundwater or surface water, resulting in pollution.

No intrusive ground investigations have been completed within the site area, however the desk study review indicates that the made ground materials present on site are likely to primarily comprise reworked natural fill materials won from the site or its vicinity during the formation of the industrial estate in the 1970s and 1980s. There is potential for isolated areas of made ground imported from off-site sources, particularly in the south of central site area, which may be a potential source of contamination. No major excavations are proposed in that part of the site, as the ground level will require raising rather than reducing.

As set out in the embedded mitigation Section 15.7, ground investigations have been proposed to gather information required to complete appropriate land contamination assessments, which will inform water and materials management during construction works. Therefore, the impact of the proposed development on risks from contamination on controlled waters during earthworks is likely to be negligible.

However, there are potential sources of contamination within the site vicinity that under baseline conditions are not impacting the site. Dewatering during construction may affect groundwater flows and groundwater contamination present within the zone of influence may be drawn in the direction of the site and impact the quality of abstracted water. This may result in a minor magnitude of impact.

The receptors that may be potentially impacted by these works are those located within the site area and hydraulically downstream of the works. These will include on-site and off-site groundwater resources to the south of the site (secondary A aquifer in sandstones) of medium sensitivity, SPZ1 (Feature ID11) of very high value, GWDTE (Feature ID12) of high value and the Ebbw River and its tributaries located to the south of the site of high value. Therefore, the overall effect of mobilisation of contamination during earthworks on controlled waters is assessed as slight adverse and not significant, and during dewatering as moderate adverse and significant requiring mitigation measures.

Construction has the potential to result in beneficial impacts such as the removal or treatment of any contaminated soil identified, with the effect that existing adverse effects on receptors are removed. Considering the overall low risk of the site with respect to land contamination, these are likely to be negligible in impact with a slight beneficial effect and not significant on the controlled water receptors.

14.8.2 Assessment of operation effects

14.8.2.1 Permanent drainage

The proposed development will not require permanent drainage to maintain reduced groundwater levels in areas of the basements, as these will be designed to be watertight. Therefore, there will not be a permanent impact on groundwater levels and flows during the proposed development during operation, with a neutral effect, which is not significant.

14.8.2.2 Underground structures

The proposed development will also require retaining structures and deep piled foundations. In addition, a number of basements will be incorporated into the development. These underground structures have a potential to locally impact groundwater flow paths and levels. The retaining walls and basements may form a barrier to groundwater flow and result in groundwater mounding (rise in groundwater level into the unsaturated zone) potentially leading to groundwater flooding. However, the design of the retaining walls will incorporate a drainage solution to prevent groundwater build up and the foundation piles are likely to be constructed in groups with gaps in between individual piles, with the impact likely to be very local. The basements are not extensive in size and therefore impact on groundwater flows is also likely to be very localised.

Therefore, the impact on groundwater flows and levels from underground structures will be negligible. The proposed development is likely to impact only groundwater contained within the Farewell Rock and the Lower Coal Measures, which support a Secondary A aquifer. The value of that aquifer is medium. Therefore, the construction of underground structures within the site will have a slight adverse effect on the groundwater flows and levels.

14.8.2.3 Aquifer recharge

The proposed development will introduce buildings and hardstanding across the majority of the site area. This may cause a reduction in the resource extent and recharge area that feeds into the underlying aquifer. The site is currently overlain by materials of relatively low permeability, which limits rainwater infiltration in the baseline conditions. Therefore, the introduction of the buildings and hardstanding is unlikely to have a major impact on the recharge within the site area, with a negligible impact on the underlying groundwater resources. The value of that aquifer is medium. Therefore, the reduction of infiltration within the site will have a slight adverse effect on the groundwater resources.

14.8.2.4 Groundwater quality

The operation of the proposed development will result in production of trade effluent. Potential pollutants include nutrients such as nitrate, from staff facilities as well as pollutants specific to glass manufacturing such as pH, temperature, TSS, oil and grease, lead, arsenic, antimony, boric acid and fluorides. Due to the manufacturing process, this water will be considered contaminated and will need to be disposed via Dwr Cymru Welsh Water's (DCWW) foul sewer as trade effluent. Foul flows will also result from development of staff facilities including canteens, toilets and welfare facilities. In accordance with the drainage strategy developed for the proposed development[206] all trade effluent and foul flows will be disposed of via the foul drainage. The risk of leakages from the trade and foul effluents that may migrate into the underling ground posing a risk to the groundwater is considered to be very low.

During operation there may be a risk of leakages and spillages of raw process chemicals or fuels stored on site, particularly in the service yard and HGV yard areas. This may result in pollution of the surface water run-off. The proposed development will be equipped with a drainage system, which will collect and treat the run-off before discharging into the environment. This is presented in the Arup Drainage Strategy Report and part of the planning application submission15.

The proposed development is likely to require piled foundations, which may create preferential pathways for contaminants migration into the groundwater. The piled foundations would not extend into the Millstone Grit Formation and therefore are unlikely to intersect groundwater directly feeding into the SPZ1. However, there may be hydraulic connectivity between the site and the underlying Millstone Grit through the faults. Therefore, there is a potential, albeit low, risk of impacting the groundwater quality feeding into the SPZ1.

The assessment of potential effects on groundwater quality has been scoped out on the basis that operation of the proposed development will be subject to an environmental permit and best practice will be adhered to in terms of chemical storage and trade effluent disposal via the foul drainage system throughout the lifespan of the glass manufacturing facility. This will minimise risks to groundwater quality arising from the operational phase. In addition, the design of

[206] CiNER, Dragon Glass Bottle Manufacturing Facility, Drainage Strategy Report, ref. DRAGON-ARUP-DRNG-XX-RP-C-300001, Issue 2,Arup, June 2021

the piled foundations will consider risks associated with creating pathways for pollution migration through foundation works risk assessment. This will allow the identification of the most appropriate piling methodology with respect to groundwater quality.

14.8.2.5 Land contamination

Operation of the proposed development will result in introduction of new pathways for contamination migration. The Tier 1: Preliminary Risk Assessment identified adverse impacts that could potentially arise during the operation of the proposed development after application of embedded mitigation measures due to migration of contaminants via new preferable pathways created by piles, service corridors or drainage, and/or lateral migration into the underlying aquifer or directly into the surface water system. The risks associated with piled foundations will be mitigated by completion of foundation works risk assessment as part of the pile design process therefore the main risks will remain with respect to services and drainage creating a preferential flow paths for contamination.

The proposed development design will incorporate appropriate land contamination assessments, and any subsequent mitigation measures will have already been undertaken to satisfactorily close out any residual land contamination risks identified as part of the construction phase. This will result in negligible beneficial impact with an overall effect of the proposed development on risks from contamination on controlled waters during the operation assessed as slight beneficial and not significant.

14.8.3 Potential impacts due to climate change

Future climate conditions derived from the UK Climate Projections 2018 (UKCP18) indicates that the study area may undergo climatic changes including higher temperatures, increase in heat waves, reduced precipitation in summer and increased precipitation in winter. Surface water flows are likely to become more variable, with more frequent extremes including wetter winters and drier summers. Increasing long spells of hot weather and wildfires may result in soils developing temporary water repellence, which may reduce or temporarily impede water infiltration, leading to preferential flow and increased surface runoff.

These conditions are likely to reduce the amount of recharge to the groundwater, which may have impacts upon features in the study area and cause some perennial features to become ephemeral. Abstractions, springs, groundwater-fed watercourses, areas of flooded ground are likely to be particularly sensitive to these impacts. Groundwater quality is also likely to be affected by a reduction in the flushing of aquifers, which may increase the residence time of groundwater within them.

While the impacts of climate change are likely to affect the water environment, no significant effects are predicted as a result of the incorporation of embedded mitigation in the proposed development design, such as the proposed development's drainage having been designed for the latest climate change allowances.

14.9 Mitigation and enhancement

14.9.1 Mitigation of effects from construction

The assessment has identified potential significant effects as a result of construction on a groundwater abstraction well (feature No 1) and the potential GWDTE (feature No 5) resulting from dewatering activities. Following site specific ground investigations (outlined in section 15.7), a hydrogeological impact assessment (HIA) will be undertaken. Mitigation may be required should the HIA confirm the impact on the identified groundwater dependent features. The HIA will evaluate the quantitative impacts of the scheme on the identified groundwater receptors. It will be conducted in accordance with LA 113 and EA guidance for dewatering abstractions (SC040020/SR1[207]) and groundwater abstractions (SC040020/SR2[208]). The HIA will be informed by site specific ground investigations that are currently proposed as outlined in section 15.7.

This impact assessment will estimate the zone of influence of the proposed work based on site specific parameters obtained from intrusive ground investigations. Should impact on any of the identified features be confirmed the following mitigation will be considered, as set out in the Construction Environmental Management Plan (CEMP):

- Construction sequencing and zoning to reduce the pumping rates and the surface area that has to be dewatered;
- Using 'closed-circuit' dewatering systems that involve recharging the abstracted water to ground within or close to the site, rather than pumping off-site;
- Groundwater level monitoring on the boundary during basement construction; and,
- Surveillance of the potentially impacted features including water level monitoring in the abstraction well.

The estimated zone of influence will also allow identification of off-site sources and potential contaminants associated with these sources that may potentially impact the site during the dewatering works. In addition, ground investigations will gather information on the aquifer to estimate travel times of these contaminants within the aquifer to inform the risk assessments, which in turn will form basis to water management practices during construction.

[207] Environment Agency (2007). Hydrogeological impact appraisal for dewatering abstractions [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/291080/scho0407bmae-e-e.pdf (Accessed 25/05/2021)
[208] Environment Agency (2007). Hydrogeological impact appraisal for groundwater abstractions [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/291083/scho0407bmah-e-e.pdf (Accessed 25/05/2021).

14.9.2 Mitigation of effects from operation

No significant effects during site operation have been identified, therefore no mitigation measures are required.

14.10 Residual effects

On application of mitigation measures during construction, where significant effects have been identified, the residual impact on the identified features will be reduced to negligible, with a slight adverse effect, which is not significant, as summarised in ES Chapter 16.

No residual effects are predicted as no mitigation measures have been required on other attributes during construction or operation and therefore the potential effects remain not significant.

Table 14.8: Summary of the predicted effects

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Groundwater	Dewatering activities during basement construction may impact groundwater levels and flows. This can impact groundwater dependent features (particularly feature ID 1 and ID5)	Moderate adverse	HIA informed by site specific parameters obtained from GI CEMP (incl. construction sequencing, appropriate dewatering systems, environmental monitoring, treatment prior to discharge)	Slight adverse
Groundwater and surface water	Dewatering activities during basement construction may impact controlled water quality.	Moderate adverse		
Surface water	Dewatering may impact water balance within the surface water catchment, where groundwater provides a base flow	Slight adverse	N/A	Slight adverse
Groundwater and surface water	Earthworks may mobilise contamination and impact controlled waters.	Slight adverse	CEMP (incl. dealing with unexpected contamination, measures to limit dispersal and accidental release of contamination)	Slight adverse

15 Cumulative effects

15.1 Introduction

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

This chapter provides an assessment of cumulative effects arising from the proposed development in combination with other reasonably foreseeable projects in the local area.

15.2 Legislation, policy context and guidance

15.2.1 Legislation

The requirement for cumulative effects assessment (CEA) is set out in Schedule 4 of the EIA Regulations, which states that the EIA should include an assessment of "the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development."

15.2.2 Guidance and standards

There is currently no standard methodology for CEA although there is a range of guidance available. Whilst the proposed project is not classified as a nationally significant infrastructure scheme, it is considered that Advice Note 17: Cumulative effects assessment relevant to nationally significant infrastructure projects (Planning Inspectorate, V2 August 2019) is the most relevant guidance available.

15.3 Methodology

Advice Note 17 provides a systematic approach to cumulative effects assessment which can be split into four distinct stages explained in Table 15.1. The guidance notes that the recommended process focusses on cumulative effects with 'other developments'. It should not be confused with the assessment of interrelationships between topics, which are assessed within the individual specialist topic chapters.

Table 15.1: Stages of Cumulative Effects Assessment

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

15.3.1 Zone of Influence

The Zone of Influence (ZoI) refers to the spatial area over which an effect from a project is likely to be experienced. The ZoI for the proposed development varies for each environmental topic and these are set out in Table 15.2 below along with the identification of what type of impact is likely.

Table 15.2: Zone of Influence, potential impacts and receptors for EIS environmental topics

Environmental topic	Zone of Influence for assessments	Potential impact (construction and operation)	Receptor/ resource
Air quality	Up to 350m for the construction dust assessment and 200m from the road network for operational and construction traffic assessment 5km x 5km for operational emission from chimneys	Reduction in air quality from: dust emissions during construction; exhaust emissions from vehicles during construction and operation; combustion emissions discharge from chimneys	People living and working within the ZoI. Designated habitats (combustion emissions receptor)
Noise	Within 300m of construction works for construction, except where there is an uninterrupted line of sight(1km)	The increase in noise from construction and/or operation.	Residential and commercial facilities within the ZoI.

Environmental topic	Zone of Influence for assessments	Potential impact (construction and operation)	Receptor/ resource
Traffic and transport	Local highways and active travel network (as defined in the ES Chapter 4)	Increased traffic and congestion, changes to provision of public transport and Public Rights of Way (PRoW)	Road users, pedestrians, cyclists
Biodiversity	Up to 5km for protected and notable species, and designated sites	Disturbance, habitat fragmentation and severance, habitat loss, habitat damage and species mortalities.	Protected species, habitats, ecologically designated sites (as the only SAC for bats within 10km is the Usk Bats Sites SAC within 1km and there are no others designated for bats, 5km is used instead of 10km)
Ground conditions	Site area and within 1km of site boundary (depending on receptors)	Groundwater, human health	Groundwater quality and flow, human health of people living and working within the study area distance
Health	Up to 2km from the proposed development boundary.	Changes to health determinants resulting in health effects during both construction and operation.	Residents Employees Visitors to the site
Materials and waste	South-east Wales, potentially Wales and England	Potential competition for resources and limited capacity at waste management facilities	Material resources/waste management facilities
Socio-economics	Rassau and Beaufort wards. Blaenau Gwent local authority area	Potential benefit of construction spend, displacement of construction workers, demands on accommodation and other businesses and amenity effects.	People Employers / employees Businesses
Visual Impact	5km in all directions as consulted on and agreed with BGCBC and Brecon Beacons National Park Authority (BBNPA).	Change to the character of landscape and to visual amenity.	Landscape Character Areas (LCAs) including designated features. People's views.

Environmental topic	Zone of Influence for assessments	Potential impact (construction and operation)	Receptor/ resource
Climate change	Unconfined – GHG emission compared against UK Carbon Budgets	Reduction in climate change resilience	People
Water	Within 500m of the site boundary. Indirect effects up to 1km	Ground water levels around site impacting drinking water Source Protection Zone (SPZ1) to north of site Potential groundwater impacts effecting dependent terrestrial ecosystems within the site	Drinking water supply On site terrestrial ecosystems

15.3.2 Establishing the long list of 'other developments'

The Planning Inspectorate guidance recommends that a wide range of future projects is included within the CEA which can be tiered (from Tier 1 – 3) according to how far advanced the development is within the planning system and to the level of detail that is likely to be available for each tier. These different tiers are set out in Table 15.3, adapted to the context of Blaenau Gwent.

Table 15.3: Project tiering for the purpose of CEA

Tier 1	Projects under construction; Permitted application(s) but not yet implemented; Submitted application(s) but not yet determined;	**Decreasing level of detail likely to be available.** 
Tier 2	Projects on BGCBC Programme of Projects where a scoping report has been submitted;	
Tier 3	Projects on BGCBC Programme of Projects where a scoping report has not been submitted; Identified in the Blaenau Gwent Local Development Plan (2006-2021) cognising that much information on any relevant proposals may be limited; and Identified in other plans and programmes (as appropriate) which set the framework for future development consents/approvals, where such development is reasonably likely to come forward.	

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

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

15.3.3 Assessment criteria

The CEA does not aim to assign significance levels to any of the cumulative effects identified. Rather, a judgement has been made on whether the cumulative effects are likely to be more or less significant than the effects identified for the proposed Dragon Glass Bottle Manufacturing Facility development alone.

15.4 Topics scoped out of the CEA

The following topics have been scoped out of the CEA:

- Traffic – in order to generate the future baseline, likely future developments are included within the traffic model and are therefore already considered within the transport assessment. Effects related to traffic are therefore not considered further within the CEA.

15.5 Limitations and assumptions

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

15.5.1 Consultation undertaken

The list of projects considered within the CEA has been obtained through consultation with BGCBC Planning Department. Environmental information relating to each of the developments identified has been obtained from the Council where available.

15.6 Identification of Cumulative Developments

Developments relevant to the CEA have been identified in consultation with BGCBC and represent developments within approximately 5km of the site. The long list of developments is set out in Appendix I1.

Not all the identified committed developments are considered to have the potential to add any cumulative effects to the environmental impacts identified for the proposed development. This is based either on their spatial separation or because the temporal scope of the developments does not align (i.e. the impacts will occur at different times and will therefore not be cumulative).

Table 15.4 lists the developments selected from the long list to make the short list of those to be investigated further. It identifies which of these are considered to have the potential to have cumulative effects with the proposed development, providing justification for the inclusion or exclusion from the assessment. Where it has been identified that cumulative impacts may arise, a more detailed assessment has been undertaken for the relevant environmental topics in the sections below, and mitigation measures identified where relevant. Where it transpired that committed developments from the long list have been completed,

these were also removed from the shortlist as they would, where relevant, now form part of the baseline used for this EIA.

The location of the shortlisted cumulative developments is shown on Figure 15.1.

Table 15.4 Identified developments with potential for cumulative effects (short list)

Committed development Ref. (See Figure 15.1)	Development	Planning Reference	Status	Development classification	Tier	Within ZoI?	Potential for cumulative effects?	Justification for cumulative effects
Developments within 500m of proposed development								
1	Extension to existing industrial unit	C/2016/0011	unknown	B2	3	Yes	Unlikely	There is no available environmental information to review. However, the application relates to an extension of an existing unit on the industrial estate.
2	Renewal of outline planning permission for residential development and new site access	C/20217/0167	Commenced	C3	3	Yes	Unlikely	Construction of 4 homes and site access which is a relatively small development.
3	New unit for handling and storage of slag which is derived from authorised on-site processes	C/2018/0068	Commenced	B2	1	Yes	Unlikely	Existing facility that has been in operation for the last 13 years. Activities take place under cover and the buildings have existing air management systems fit for occupational health and environmental compliance.

Committed development Ref. (See Figure 15.1)	Development	Planning Reference	Status	Development classification	Tier	Within ZoI?	Potential for cumulative effects?	Justification for cumulative effects
4	Proposed new building for storing processed slag produced by authorised use on site.	C/2018/0155	Commenced	B2	1	Yes	Unlikely	Existing facilities within the existing plant. No new employees. No loss or gain of public open space. The proposed building is to be used for the storage of bagged slag which is processed in the building approved under pre-existing application. The slag handling/processing is a pre-existing authorised operation already carried out on the site.
5	Proposed extension to existing industrial unit	C/2018/0190	Unknown	B2	1	Yes	Unlikely	Development on vacant area within existing industrial complex (3350m2). 12 new employees. 24/7 operation. Extension to existing facility for an increase in the processes currently undertaken. To be used as lead rolling mill. No flues or emissions from any equipment to be installed/required.
Developments between 500m – 2km of proposed development								

Committed development Ref. (See Figure 15.1)	Development	Planning Reference	Status	Development classification	Tier	Within ZoI?	Potential for cumulative effects?	Justification for cumulative effects
6	Proposed two storey extension to factory unit 11	C/2016/0248	Unknown	B2	3	Yes	Unlikely	No environmental information provided
7	Change of use from Class B2 to a facility for the baling of recyclable materials (paper, cardboard, plastics and tin cans)	C/2018/0142	Commenced	Sui generis	3	Yes	Unlikely	A waste assessment did not identify any significant issues. No other environmental information provided.
8	Outline application for residential development (50 dwellings) with all matters reserved except for access from A4281	C/2018/0205	Permitted/ not commenced	C3	1	Yes	Yes (Ecology)	Ecological information available. Study considered: - great crested newts - further survey recommended - reptiles - further survey needed - nesting birds - bird boxes - otter - precautionary working - bats- bat boxes

Committed development Ref. (See Figure 15.1)	Development	Planning Reference	Status	Development classification	Tier	Within ZoI?	Potential for cumulative effects?	Justification for cumulative effects
								- a SINC on east of the site Recommendations for further ecological surveys to be carried out.
9	Detailed application for erection of a 4955 sq.m (50,000 sq.ft) employment unit for B1, B2 or B8 uses, with highway & site access, car parking, service area, sub-station, along with footpath and cycleway provision, drainage & landscaping.	C/2018/0310	Commenced	B1, B2, B3	1	Yes	Yes (Ecology/socio-economic)	Ecological appraisal report was prepared in 2018 covering Rhyd Y Blew which is a plateau and mitigation area. Survey identified a mosaic of habitats including marshy grassland, broad leaved plantation woodland, semi-improved grassland and ditches/ponds. Marshy grassland area suitable to support ground nesting birds, amphibians, reptiles and terrestrial invertebrates. Three skylark nests observed. Lapwing present. Development would result in loss of some of the SINC. Agreed mitigation put in place with an ecological mitigation strategy. Potential for socioeconomic cumulative impacts from job creation.

Committed development Ref. (See Figure 15.1)	Development	Planning Reference	Status	Development classification	Tier	Within ZoI?	Potential for cumulative effects?	Justification for cumulative effects
10	Residential development of 277 units, including associated works	C/2019/0005	Commenced	C3	1	Yes	Yes (Ecology)	Reptile mitigation strategy prepared for the site. No other environmental information available.
Developments between 2km and 5km of proposed development								
11	Hybrid planning application comprising of: outline application for: retail units 2, 3 and 4 (Unit 2 Class A1 Convenience food store 1,392sqm retail; Unit 3 Class A1 Comparison 1631 sq m, and a flexible use for Unit 4 Classes A1/A2/A3 121 sqm.); and a full application for restaurant (Unit 1 Class A3 McDonald's 415sqm)	C/2017/0019	Commenced	A1/2/A3	1	Yes	No	No protected species or habitats impacted by this application. Unlikely to be any visual connection but not information available to confirm this.

Committed development Ref. (See Figure 15.1)	Development	Planning Reference	Status	Development classification	Tier	Within ZoI?	Potential for cumulative effects?	Justification for cumulative effects
12	Proposed residential development (18 Dwellings) with associated highways and parking provision for adjacent dwellings (Outline)	C/2017/0143	Permitted/ not commenced	C3	1	Yes	No	The site does not support notable species and ecological appraisal report concludes that development would have little impact on current ecological worth of the area (with standard mitigation). Unlikely to be visual connection between developments but not information available to confirm this.
13	Outline planning application for the erection of residential dwellings (up to 25 units), a drive-thru restaurant, and associated works with all matters reserved other than means of access	C/2017/0159	Drive through element completed	A3/ C3	1	Yes	Yes (Ecology)	Ecological report states that the site includes existing grassland of poor quality with potential to support reptiles, terrestrial amphibians, breeding birds and inverts and commuting/foraging bats. Further reptile survey is recommended. Recommendations made in regard to bat and nesting bird mitigation. Unlikely to be visual connection between developments but not information available to confirm this.

Committed development Ref. (See Figure 15.1)	Development	Planning Reference	Status	Development classification	Tier	Within ZoI?	Potential for cumulative effects?	Justification for cumulative effects
14	Construction of 35 residential units and associated works	C/2017/0280	Permitted/ not commenced	C3	1	Yes	Yes (Ecology)	Site offers some suitable habitats for reptiles, commuting bats and nesting birds. Recommendations are made regarding bats, birds, reptiles, hedgehogs and invertebrates which would mitigate cumulative effects. Unlikely to be visual connection between developments but not information available to confirm this.
15	Full planning application for the provision of 3 retail units (Unt 2 Class A1 convenience food store, Unit 3 Class A1 comparison and flexible use for Unit 4 Classes A1/A2/A3) and associated works	C/2019/0035	Commenced	A1/A2/A3	1	Yes	Yes (Socio-economics)	500 jobs created. No other cumulative effects considered likely. Tree survey submitted but no ecological appraisal as site mostly hard standing
16	Construction of 6 buildings to provide 25 employment units for B1 and B2 uses, new access	C/2019/0054	Permitted/ not commenced	B1/B2	1	Yes	Unlikely	Ecological connectivity between the two sites is unlikely.

Committed development Ref. (See Figure 15.1)	Development	Planning Reference	Status	Development classification	Tier	Within ZoI?	Potential for cumulative effects?	Justification for cumulative effects
	road and junctions off Lime Avenue & associated parking and other infrastructure							Unlikely to be visual connection between developments but not information available to confirm this.
17	Outline application for the demolition of Tredegar health centre partial demolition of Tredegar general hospital and erection of a new class D1 health and well being centre	C/2019/0237	Demolition complete. Construction not commenced	D1	1	Yes	Unlikely	Ecological interest related to bats which used the buildings as roosting sites. As these buildings have now been demolished there is no potential for cumulative bat impacts.
18	Industrial Unit subdivided into 6 units and 14 metal containers Land at Western End of HOV Hub Crown Avenue Tredegar	C/2021/0006	Permitted/ not commenced	B2	1	Yes	Unlikely	Ecological report considers it highly unlikely the proposals would cause any impacts to locally protected habitats. GCNs highly unlikely to be present. No dormice. No bats. No otters. Unlikely to be badgers. Mitigation for loss of nesting opportunities for birds required. Site unlikely to support reptiles.

Committed development Ref. (See Figure 15.1)	Development	Planning Reference	Status	Development classification	Tier	Within ZoI?	Potential for cumulative effects?	Justification for cumulative effects
								Unlikely to be visual connection between developments but not information available to confirm this.
19	Construction of 8 Industrial Units, OOV Hub Crown Avenue Industrial Estate	C/2021/0079	Permitted/ not commenced	B2	1	Yes	No	Brownfield land with limited environmental information available for review.

15.7 Assessment of effects

Based on the outputs from Table 15.4 and, assuming that all the committed developments would employ appropriate mitigation methods in line with regulatory requirements and best practice, it is evident that there is only considered to be potential for cumulative impacts in relation to ecology and socio-economic factors. These are discussed further below, and consideration is given to both cumulative construction and cumulative operational effects. Any proposed mitigation is set out within the sections below.

15.7.1 Ecology

Developments listed in Table 15.4, highlighted as having the potential for cumulative impacts with regards to ecology include developments 8, 9, 10, 13 and 14. There are also a number of development where potential cumulative impacts have been identified (i.e. 17 and 18) but which are considered unlikely to have any cumulative impacts due to the limited ecology present within these sites, or potential impacts have taken place; and as such these developments are not considered further.

The identified sites support some habitats of conservation importance, in addition to protected species namely common amphibians, common reptiles, breeding birds, commuting and foraging bats, commuting otter and terrestrial invertebrates; all of which could be potentially affected by the developments, and result in cumulative impacts when considered with the proposed Dragon Glass Manufacturing Facility development. Mitigation is however proposed as part of these proposals to address potential impacts; and as such it is considered unlikely that there would be any cumulative impacts during construction or operational phases of the proposed development.

Furthermore, the majority of these development sites are beyond 2km from the proposed development at which effects on habitats and species are unlikely to occur (see Chapter 7: Ecology), unless they support qualifying features of Internationally or nationally designated sites such as the Usk Bat SAC which is designated for bats. None of the development sites are known to support qualifying bats species associated with the Usk Bat SAC and therefore are unlikely to result in cumulative effects. Developments 8, 9 and 10 are within 2 km however there is no hydrological connectivity and populations of species present within these sites are unlikely to be connected to habitats present within the site for the proposed development.

In summary, it is not considered that impacts from these developments would result in any cumulative impacts to the proposed Dragon Glass Manufacturing Facility development during construction or operation, in addition to those already considered within the Chapter 7: Ecology, for which mitigation and compensation measures are proposed.

15.7.2 Socio-economic

The following assessment is based on the assumption that a number of the identified committed developments will be delivered during the construction programme for the proposed development.

During construction, there may be the potential for some displacement of local construction workers, which could impact on resourcing for other projects in the region, particularly where projects require a similar range of construction skills.

Some committed developments, particularly those that are housing-led, are likely to require different sets of skills, which could reduce the potential for displacement, however many of the developments identified are within the commercial or retail sectors and therefore skills requirements are likely to be similar.

There may be the potential for some cumulative benefits from the combined construction workforce, associated with direct employment and training opportunities, as well as indirect effects such as workforce expenditure and additional local income within the economy.

During operation, a number of the committed developments identified are expected to provide expanded or new commercial and employment space. While this has the potential to lead to an oversupply of floorspace, the proposed development is a very specialist operation and would not therefore take floorspace which may otherwise be utilised by the wider committed developments.

With the level of growth, the committed developments could lead to impacts in terms of labour supply, although the site and surroundings are well connected and would reach into the wider region for their workforce.

16 Summary

This chapter presents a summary of the environmental topic chapter assessment findings undertaken as part of the EIA. These findings are summarised below.

16.1 Air quality

Table 16.5: Construction - temporary effects on air quality that arise during the construction of the development

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Human and ecological receptors	Dust impacts	Slight adverse	Dust suppression measures and CEMP	Not significant
Human and ecological receptors	Increased air pollution concentration from construction vehicles	Not significant – Screened out of assessment	None proposed	Not significant

Table 16.6: Operation - effects on air quality that arise during the operation of the development

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Human receptors	Increased air pollutant concentrations	Not significant	None	No change
Ecological receptors	Increased air pollutant concentrations and deposition	See Table 16.10 for further Ecology details	See Table 16.10 for further Ecology details	Not Significant
Human receptors	Odour introduced by the proposed development	Not significant	None	Not significant

16.2 Climate change

Table 16.7: Construction - temporary effects on climate change that arise during the construction of the development

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Atmosphere	Greenhouse gases	Significant	Recommended mitigation for embodied carbon (designing out waste and select alternative materials and local suppliers)	Significant

Table 16.8: Operation - effects on climate change that arise during the operation of the development

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Atmosphere	Greenhouse gases	Significant	Embedded design mitigation (passive design, furnace heat recovery, on-site renewable generation and rainwater harvesting) and recommended mitigation (future decarbonisation plan, energy management plan and low-carbon transport plan)	Significant
The proposed development	Climate change resilience	Significant	Embedded design mitigation	Not significant

16.3 Ecology

Table 16.9: Construction - temporary effects on ecology that arise during the construction of the development

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Designated sites				
Usk Bat SAC	Habitat degradation of qualifying habitats through changes in air quality Disturbance (to qualifying bat species) Harm/mortality (to qualifying bat species) Habitat loss and fragmentation (to qualifying bat species)	Not significant	Implementation of CEMP Creation of habitat mosaic including woodland planting within the site. Sensitive lighting design with regard to bats. Implementation of traffic management plan Implementation of Landscape and Ecological Management Plan (LEMP) Off-site habitats will be enhanced for the benefit of local bat populations through long term management.	Not significant
Cwm Clydach SAC	Habitat degradation of qualifying habitats through changes in air quality	Not significant	Implementation of CEMP	Not significant

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Mynydd Llangatwyg SSSI	Habitat degradation of qualifying habitats through changes in air quality Disturbance (to qualifying bat species) Harm/mortality (to qualifying bat species) Habitat loss and fragmentation (to qualifying bat species)	Not significant	Implementation of CEMP Creation of habitat mosaic including woodland planting within the site. Sensitive lighting design with regard to bats. Implementation of traffic management plan Implementation of Landscape and Ecological Management Plan (LEMP) Off-site habitats will be enhanced for the benefit of local bat populations through long term management.	Not significant
Mynydd Llangynidyr SSSI	None (designated for geological features)	NA	NA	NA
Ancient Woodland	Habitat degradation	Not significant	Implementation of CEMP	Not significant
River Ebbw SINC	Habitat degradation	Not significant	Implementation of CEMP SuDS design to protect water quality	Not significant
Other SINCs designated for terrestrial habitats	Habitat degradation	Not significant	Implementation of CEMP	Not significant
Habitats				

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
County valued habitats	Habitat loss Habitat Degradation/disturbance	Significant	Off-site habitat provision. These off site habitats will be subject to long term management as detailed within a LEMP.	Positive significance
Locally valued habitats	Habitat loss Habitat Degradation/disturbance	Not significant	Landscaping proposed within the site including mosaic of grassland, woodland and waterbodies Implementation of CEMP	Not significant / Minor beneficial significance
Protected species				
Fungi	Habitat loss Habitat Degradation/disturbance	Nor significant	Implementation of CEMP Translocation of broadleaved branches into similar woodland off site Creation of log piles within retained woodland in the site Off-site woodlands will be subject to long term management to enhance conditions for fungi including notable species.	Not significant / Minor beneficial significance
Invertebrates	Habitat loss Habitat Degradation/disturbance	Not significant	Implementation of CEMP Landscaping proposed within the site including mosaic of grassland, woodland and waterbodies. These will be subject to long term management. Off-site habitats will be enhanced for the benefit of local invertebrate	Not significant / Minor beneficial significance

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
			populations through long term management.	
Amphibians (including great crested newts)	Habitat loss Habitat Degradation/disturbance Disturbance Mortality	Not significant	Implementation of CEMP Implementation of great crested newt conservation strategy within the site including: Landscaping proposed within the site including mosaic of grassland, woodland and waterbodies. These habitats will be subject to long term management. Trapping and relocation programme Enhancement of adjacent marshy grassland with hibernacula and pond Hard landscaping including newt underpasses and fencing Off-site habitats will be enhanced for the benefit of local amphibian populations through long term management.	Not significant / Minor beneficial significance
Reptiles	Habitat loss Habitat Degradation/disturbance Disturbance Mortality	Not significant	Implementation of CEMP Landscaping proposed within the site including mosaic of grassland, woodland and waterbodies. These habitats will be subject to long term management. Implementation of trapping and	Not significant / Minor beneficial significance

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
			relocation programme. Enhancement of marshy grassland and creation of hibernaculum Off-site habitats will be enhanced for the benefit of local reptile populations through long term management.	
Breeding birds	Habitat loss Habitat Degradation/disturbance Disturbance Mortality	Not significant	Implementation of CEMP Landscaping proposed within the site including mosaic of grassland, woodland and waterbodies. These habitats will be subject to long term management. Provision of bird boxes within trees/woodland in the site Off-site habitats will be enhanced for the benefit of local bird populations through long term management.	Not significant / Minor beneficial significance

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Badger	Habitat loss Habitat Degradation/disturbance Disturbance Mortality	Not significant	Implementation of CEMP Closure of badger setts under licence Landscaping proposed within the site including mosaic of grassland, woodland and waterbodies. These habitats will be subject to long term management. Off-site habitats will be enhanced for the benefit of local badger populations through long term management.	Not significant / Minor beneficial significance
Otter	Habitat Degradation/disturbance Disturbance Mortality	Not significant	Implementation of CEMP Sensitive lighting design with regard to bats. Implementation of traffic management plan Landscaping proposed within the site including mosaic of grassland, woodland and waterbodies. These habitats will be subject to long term management. Off-site habitats will be enhanced for the benefit of local reptile populations through long term management.	Not significant / Minor beneficial significance

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Bats	Habitat loss Habitat Degradation/disturbance Disturbance Mortality	Not significant	Implementation of CEMP Sensitive lighting design with regard to bats. Implementation of traffic management plan Landscaping proposed within the site including mosaic of grassland, woodland and waterbodies. These habitats will be subject to long term management. Provision of bat boxes within the site Off-site habitats will be enhanced for the benefit of local bat populations through long term management.	Not significant / Minor beneficial significance
Notable mammals	Habitat loss Habitat Degradation/disturbance Disturbance Mortality	Not significant	Implementation of CEMP Sensitive lighting design with regard to bats. Implementation of traffic management plan Newly created habitats and retained habitats within the site will be subject to long term management as detailed within a LEMP. Off-site habitats will be enhanced for the benefit of local notable mammal populations through long term management.	Not significant / Minor beneficial significance

Table 16.10: Operation - effects on ecology that arise during the operation of the development

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Designated sites				
Usk Bat SAC	Disturbance (to qualifying bat species) Harm/mortality (to qualifying bat species)	Not significant	Sensitive lighting design with regard to bats. Implementation of traffic management plan Implementation of Landscape and Ecological Management Plan (LEMP) Off-site habitats will be enhanced for the benefit of local bat populations through long term management.	Not significant / Minor beneficial significance
Cwm Clydach SAC	None anticipated	NA	NA	NA
Mynydd Llangatwyg SSSI	Disturbance (to qualifying bat species) Harm/mortality (to qualifying bat species)	Not significant	Sensitive lighting design with regard to bats. Implementation of traffic management plan Implementation of Landscape and Ecological Management Plan (LEMP) Off-site habitats will be enhanced for the benefit of local bat populations through long term management.	Not significant / Minor beneficial significance

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Mynydd Llangynidyr SSSI	None anticipated	NA	NA	NA
Ancient Woodland	None anticipated	NA	NA	NA
River Ebbw SINC	Habitat degradation	Not significant	SuDS design to manage water quality	Not significant
Other SINCs designated for terrestrial habitats	None anticipated	NA	NA	NA
Habitats				
County valued habitats	Habitat Degradation/disturbance	Significant	Off-site woodland and grassland habitat will be subject to long term management.	Not significant / Positive significance
Locally valued habitats	Habitat Degradation/disturbance	Not significant	Implementation of LEMP within the site.	Not significant / Minor beneficial significance
Protected species				
Fungi	Habitat degradation/disturbance	Not significant	Implementation of LEMP within the site Off-site woodland and grassland habitat will be subject to long term management.	Not significant / Minor beneficial significance
Invertebrates	Habitat degradation/disturbance	Not significant	Implementation of LEMP within the site Off-site woodland and grassland habitat will be subject to long term management.	Not significant / Minor beneficial significance

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Amphibians (including great crested newts)	Habitat degradation/disturbance Species disturbance Species mortality	Not significant	Implementation of LEMP within the site. Implementation of great crested newt conservation strategy within the site. Off-site woodland and grassland habitat will be subject to long term management.	Not significant
Reptiles	Habitat degradation/disturbance Species disturbance Species mortality	Not significant	Implementation of LEMP within the site. Off-site woodland and grassland habitat will be subject to long term management.	Not significant / Minor beneficial significance
Breeding birds	Habitat degradation/disturbance Species disturbance Species mortality	Not significant	Implementation of LEMP within the site. Off-site woodland and grassland habitat will be subject to long term management.	Not significant / Minor beneficial significance
Badger	Habitat degradation/disturbance Species disturbance Species mortality	Not significant	Implementation of sensitive lighting plan. Implementation of traffic management plan. Implementation of LEMP within the site. Off-site woodland and grassland habitat will be subject to long term management.	Not significant / Minor beneficial significance

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Otter	Habitat degradation/disturbance Species disturbance Species mortality	Not significant	Implementation of sensitive lighting plan. Implementation of traffic management plan. Implementation of LEMP within the site. Off-site woodland and grassland habitat will be subject to long term management.	Not significant / Minor beneficial significance
Bats	Habitat degradation/disturbance Species disturbance Species mortality	Not significant	Implementation of sensitive lighting plan. Implementation of traffic management plan. Implementation of LEMP within the site. Off-site woodland and grassland habitat will be subject to long term management.	Not significant / Minor beneficial significance
Notable mammals	Habitat degradation/disturbance Species disturbance Species mortality	Not significant	Implementation of lighting plan Implementation of traffic management plan Implementation of LEMP within the site. Off-site woodland and grassland habitat will be subject to long term management.	Not significant / Minor beneficial significance

16.4 Health

Table 16.11: Construction - temporary effects on health determinants that arise during the construction of the development

Sensitivity of population to changes in health determinant[209]	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Air quality: Medium	Exposure to dust from demolition, earthworks, construction and trackout	Minor	Following measures set out in CEMP	Minor
Noise: Low	Exposure to noise	Minor	Following measures set out in CEMP	Minor
Crime and community safety: Medium	Increased traffic and influx of construction workers	Minor	None	Minor
Access to work and training: Medium	Increased opportunities for training and work	Minor (+)	Local procurement and recruitment plan	Minor (+)

Table 16.12: Operation - effects on health determinants that arise during the operation of the development

Sensitivity of population to changes in health determinant[1]	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Air quality: Medium	Exposure to pollutants	Minor	None (assumed adherence to Environmental Permit)	Minor
Noise: Low	Exposure to operational noise and traffic	Minor	Utilisation of Best Available Techniques (BAT)	Minor
Crime and community safety: Medium	Increased traffic (HGVs)	Minor	None	Minor
Access to work and training: Medium	Increased opportunities for training and work	Moderate (+)	Local procurement and recruitment plan	Moderate (+)

[209] Health assessments are based on consideration of the population as a whole rather than individuals within that population. Reference is therefore made in terms of how sensitive the population as a whole is to changes in health determinants.

16.5 Materials and waste

Table 16.13: Construction - temporary effects on materials and waste that arise during the construction of the development

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Primary onsite materials sources	Risk of neutralising material resources on-site	Neutral	None	Not significant
Primary offsite materials sources	Primary materials imported from off-site required for construction of proposed development	Neutral	Embedded design mitigation - use of onsite won materials for site preparation.	Not significant
Manufactured materials offsite availability	Manufactured materials required for construction of proposed development	Neutral or slight	None	Not significant
Landfill and waste management	15,000m^3 excess material generated by proposed development	Neutral or slight	Embedded design mitigation to use onsite won material. Further opportunities to reuse materials on-site will be incorporated in the design where suitable.	Not significant

Table 16.14: Operation - effects on materials and waste that arise during the operation of the development

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Primary offsite materials sources	Use of raw materials to manufacture glass bottles	Neutral or slight	Materials from readily available sources. Use of glass cullet to reduce use of primary materials	Not significant

16.6 Noise and vibration

Table 16.15: Construction - temporary effects on noise and vibration that arise during the construction of the development

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Residential receptors	Construction noise	Not significant	None other than CEMP controls	Not significant

	Construction traffic	Not significant	Mitigation not required	Not significant
Non-residential receptors	Construction noise	Not significant	None other than CEMP controls	Not significant
	Construction traffic	Not significant	Mitigation not required	Not significant

Table 16.16: Operation - effects on noise and vibration that arise during the operation of the development

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Residential receptors	Operational noise	Not significant	None other than embedded mitigation	Not significant
	Operational traffic	Not significant	Mitigation not required	Not significant
Non-residential receptors	Operational noise	Not significant	None other than embedded mitigation	Not significant
	Operational traffic	Not significant	Mitigation not required	Not significant

16.7 Socio-economics

Table 16.17: Construction - temporary effects on socio-economics that arise during the construction of the development

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Construction employment and supply chain opportunities	Construction employment	Moderate Beneficial	n/a	Moderate Beneficial
Construction training and apprenticeships	Creation of training and	Minor Beneficial	Commitment to engage with relevant parties and	Minor Beneficial

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
	apprenticeship opportunities		requirement on contractor.	

Table 16.18: Operation - effects on socio-economics that arise during the operation of the development

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Operational employment and supply chain opportunities	Operational employment	Moderate Beneficial	n/a	Moderate Beneficial
Operational training and apprenticeships	Creation of training and apprenticeship opportunities	Minor Beneficial	Commitment to engage with relevant parties.	Minor Beneficial

16.8 Transport

Table 16.19: Operation - effects on transport that arise during the operation of the development

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Pedestrians/ Cyclists	Impact of increased HGVs on pedestrian and cyclist amenity	Moderate adverse	The timings and number of HGV deliveries will be fairly well distributed across the day, as will traffic associated with staff arriving and departing. The associated Travel Plan that will be produced will also seek to encourage sustainable modes of transport to/from the site but will not limit in terms of HGV movements. Those walking to/from the site, particularly from Rassau and Beaufort are highly unlikely to utilise Alan Davies Way. Instead, pedestrians are likely to make use of the A465 underpass and are therefore unlikely to be impacted by any increase in traffic along Alan Davies Way.	Minor adverse (not significant)
Pedestrians/ Cyclists	Impact of increased HGVs on pedestrian and	Moderate adverse	The timings and number of HGV deliveries will be fairly well distributed across the day, as will traffic associated with	Minor adverse (not significant)

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
	cyclist amenity		staff arriving and departing. The associated Travel Plan that will be produced will also seek to encourage sustainable modes of transport to/from the site but will not limit in terms of HGV movements. Those walking to/from the site, particularly from Rassau and Beaufort are highly unlikely to utilise Alan Davies Way. Instead, pedestrians are likely to make use of the A465 underpass and are therefore unlikely to be impacted by any increase in traffic along Alan Davies Way.	

16.9 Visual

Table 16.20: Construction - temporary effects on visual receptors that arise during the construction of the development

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Community of Beaufort	Visual impact on part of the community of Beaufort with views of construction vehicles, personnel, large-scale earthworks and partially constructed buildings.	Moderate	No mitigation and enhancement measures proposed for the construction phase.	Moderate
Visitors to the Brecon Beacons National Park	Visual impacts on a small part of the BBNP with the introduction of visually prominent construction activities. There would be no night-time effect as construction activity is not proposed during hours of darkness.	Moderate	No mitigation and enhancement measures proposed for the construction phase.	Moderate
Users of the B4560 Llangynidr Road	Visual impacts on road users on the B4560 with views of tree felling, tall cranes, large-scale earthworks, and partially constructed buildings.	Moderate	No mitigation and enhancement measures proposed for the construction phase.	Moderate

Table 16.21: Operation - effects on visual receptors that arise during the operation of the development

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Walkers on Mynydd Carn-y-cefn	Visual impact on walkers and recreational users able to see the operational development in the middle distance.	Operation: Yr 1 and 15 Moderate	Innovative design and high architectural quality using reflective material to bring in the surrounding environment, naturally breaking up the visual mass of the building. Perimeter landscape treat and tree planting embeds the development into the local landscape. No additional mitigation possible due to the size and scale of the development.	Moderate
Community of Rassau	Visual impact on the community of Rassau with the introduction of new built features to the local skyline, views of the 75m chimney stacks and the upper sections of the buildings would be visible from a few locations.	Operation: Yr 1 and 15 Moderate	Innovative design and high architectural quality using reflective material to match the changing weather pattern and skies helping to soften the edges of the building and blend the façade with the local skyline. There is no mitigation for the chimney stacks.	Moderate
Community of Garnlydan	Visual impact on part of the community of Garnlydan the development would create prominent features on the skyline, creating visual clutter with the existing turbine and electricity pylons and contrasting with the generally wooded skyline. At night it would be possible to see the development with external security lighting.	Operation: Yr 1 and 15 Moderate	Innovative design and high architectural quality using reflective material to match the changing weather pattern and skies helping to soften the edges of the building and blend the façade with the local skyline. External lighting to be carefully design with reflector, directional lighting and appropriate colour and lux levels. There is no mitigation for the chimney stacks.	Moderate
Community of Beaufort	Visual impact on part of the community of Beaufort with the introduction of large built features (chimney stacks and	Operation: Yr 1 and 15 Substantial	Innovative design and high architectural quality using reflective material to match the changing weather pattern and skies helping to soften	Substantial

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
	buildings) on a prominent slope that would be dominant in local views. The development would form a new intrusive feature on the existing skyline and would interrupt intervisibility between the BBNP and the community. At night it would be possible to see the development with external security lighting.		the edges of the building and blend the façade with the local skyline. External lighting to be carefully design with reflector, directional lighting and appropriate colour and lux levels. There is no mitigation for the chimney stacks.	
Visitors to the Brecon Beacons National Park	Visual impacts on a small part of the BBNP with the introduction of chimney stacks at 75m and the large-scale building to views that would interrupt intervisibility with neighbouring hills. It would be possible to gain views of the development during the hours of darkness as the proposed development would operate 24 hours a day requiring internal and external lighting.	Operation: Yr 1 and 15 Substantial	Innovative design and high architectural quality using reflective material to match the changing weather pattern and skies helping to soften the edges of the building and blend the façade with the local skyline. Other embedded mitigating design features include directional lighting and orientation of skylights away from the BBNP and vertical fins over glazing to minimise light spill on the designated landscape's dark skies buffer zone. External lighting to be carefully design with reflector, directional lighting and appropriate colour and lux levels. There is no mitigation for the chimney stacks.	Substantial
Users of the B4560 Llangynidr Road	Visual impacts on road users on the B4560 with the introduction of buildings and tall chimney stacks that introduce new noticeable features in views. It would be possible to gain views of the	Operation: Yr 1 and 15 Moderate	Innovative design and high architectural quality using reflective material to match the changing weather pattern and skies helping to soften the edges of the building and blend the façade with the local skyline. Other embedded mitigating design features include	Moderate

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
	development during the hours of darkness as the proposed development would operate 24 hours a day requiring internal and external lighting.		directional lighting and orientation of skylights away from the BBNP and vertical fins over glazing to minimise light spill on the designated landscape's dark skies buffer zone. External lighting to be carefully design with reflector, directional lighting and appropriate colour and lux levels. There is no mitigation for the chimney stacks.	

16.10 Water environment

Table 16.22: Construction - temporary effects on water environment that arise during the construction of the development

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Groundwater	Dewatering activities during basement construction may impact groundwater levels and flows. This can impact groundwater dependent features (particularly feature ID 1 and ID5)	Moderate adverse	HIA informed by site specific parameters obtained from GI CEMP (incl. construction sequencing, appropriate dewatering systems, environmental monitoring, treatment prior to discharge)	Slight adverse
Groundwater and surface water	Dewatering activities during basement construction may impact controlled water quality.	Moderate adverse		
Surface water	Dewatering may impact water balance within the surface water catchment, where groundwater provides a base flow	Slight adverse	N/A	Slight adverse
Groundwater and surface water	Earthworks may mobilise contamination	Slight adverse	CEMP (incl. dealing with unexpected contamination,	Slight adverse

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
	and impact controlled waters.		measures to limit dispersal and accidental release of contamination)	

Table 16.23: Operation - effects on water environment that arise during the operation of the development

Receptor	Description of effect	Significance of effect	Mitigation and enhancement	Residual effects
Groundwater	Drainage associated with basements	Neutral	N/A	Neutral
Groundwater	Introduction of underground structures (incl. basements, retaining structures and deep foundations) may create a barrier to groundwater flow	Slight adverse	N/A	Slight adverse
Groundwater	Introduction of buildings and hardstanding may reduce rainwater infiltration and impact aquifer recharge	Slight adverse	N/A	Slight adverse
Groundwater and surface water	During operation the development may be impacting controlled waters as a result of land contamination	Slight beneficial	Land contamination assessments and remediation works to address unacceptable risks.	Slight beneficial

16.11 Cumulative effects

The assessment of cumulative effects demonstrated no significant effects with the exception of the potential to lead to impacts on labour supply (i.e. finding suitable people to employ). However, the site and surroundings are well connected and it is acknowledged that the supply of labour and workforce would reach into the wider region.