

# 11 Water Environment

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## 11.1 Introduction

11.1.1 This chapter provides an assessment of the likely significant effects on the water environment that may arise from the proposed development. For the purposes of this chapter, the water environment is considered to comprise the following elements within the study area:

- The water quality and hydromorphology of surface waters;
- Groundwater quality;
- Terrestrial ecosystems that are dependent on groundwater;
- Flood risk to, and resulting from, the project; and
- Climate change impacts.

11.1.2 Impacts associated with aquatic ecology will be assessed in Chapter 7 – Biodiversity.

11.1.3 The chapter provides sets out the baseline of the existing water environmental in the study area, provides an overview of the relevant legislation and describes changes to the water environmental as a result of the proposed development. The methodology used to assess potential impacts during construction and operation phases of the proposed development is detailed before presenting the results of the assessment. Where required, mitigation and/or monitoring has been suggested.

## 11.2 Review of proposed development

11.2.1 The proposed development would involve changes to the existing water environment that would have an impact on hydrology, hydrogeology and flooding. The elements of the proposed development that have been considered within this chapter include:

- Train testing track;
- Access roads and car parks within the site boundary;
- The washery site expected to comprise a four-road rolling stock maintenance shed, decommissioning facility, storage sidings, carriage wash and plant room (referred to hereafter as the ‘washery site’);
- Site drainage strategy including Sustainable Drainage System (SuDS) features expected to comprise filter drains, swales, attenuation basins and treatment forebays; and
- Construction practices.

11.2.2 The proposed development has been designed to incorporate mitigation such that issues related to the water environment are resolved. For further details please refer to Section 11.5.

11.2.3 For further details on the proposed development – please refer to Chapter 3 – Proposed Development.

## 11.3 Legislation, policy context and guidance

11.3.1 Legislation, policy and guidance relevant to the water environment and applicable with the proposed development is listed below.

### Legislation

#### Water Framework Directive

11.3.2 The Water Framework Directive (WFD) 2000/60/EC provides a framework for the protection of inland surface waters (rivers and lakes), transitional waters (estuaries), coastal waters and groundwater. The Directive requires Member States to establish river basin districts and for each of these prepare a river basin management plan (RBMP), which is prepared, implemented and reviewed every six years. The current period from 2015-21 is Cycle 2 of these RBMPs.

#### Groundwater Directive

11.3.3 A daughter directive of the WFD, the Groundwater Directive 2006/118/EC establishes a regime which sets groundwater quality standards and introduces measures to prevent or limit inputs of pollutants into groundwater. Amended by Directive 2014/80/EU to clarify groundwater information to be provided to the European Commission. Member States must provide information on groundwater bodies classified as being at risk and threshold values for the respective pollutants and indicators established.

#### Floods Directive

11.3.4 The Floods Directive 2007/60/EEC requires Member States to:

- assess if all watercourses and coastlines are at risk from flooding;
- to map the flood extent;
- to map assets and people at risk in these areas; and
- to take adequate and coordinated measures to reduce this flood risk.

11.3.5 The Directive requires that flood risk management plans be prepared, implemented and reviewed every six years for each river basin district, in coordination with RBMPs prepared under the WFD.

### **Priority Substances Directive**

- 11.3.6 The Priority Substances Directive amends WFD 2000/60/EC and the Directive on Environmental Quality Standards (Directive 2008/105/EC) by updating the list of priority substances that would apply to WFD assessment.

### **Drinking Water Directive**

- 11.3.7 The Drinking Water Directive 98/83/EC concerns the quality of water intended for human consumption. Its objective is to protect human health from adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean.

### **Environmental Protection Act 1990**

- 11.3.8 The Environmental Protection Act 1990 sets out legislative provisions aimed at controlling pollution arising from industrial and other processes for waste management.

### **Land Drainage Act 1991**

- 11.3.9 The Land Drainage Act 1991 requires that a watercourse be maintained by its owner. The Act provides functions to internal drainage boards and local authorities to manage watercourses and provide consenting powers for proposed works to watercourses associated with development.

### **Water Act 2003**

- 11.3.10 The Water Act 2003 amends the Water Resources Act 1991 and the Water Industry Act 1991 to make provision with respect to compensation under Section 61 of the Water Resources Act 1991.

### **Water Resources (Abstraction and Impounding) Regulations 2006**

- 11.3.11 These Regulations (SI 2006/641) 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.

### **Flood Risk Regulations 2009**

- 11.3.12 The Flood Risk Regulations 2009 transposes the EC Floods Directive (Directive 2008/60/EC) on the assessment and management of flood risk into domestic law in England and Wales and implements its provisions. The regulations designate a Local Lead Flood Authority (LLFA) and imposes duties on NRW and Lead Local Flood Authorities to prepare a number of documents including:

- Preliminary Flood Risk Assessments;
- Flood hazard and flood risk maps; and
- Flood Risk Management Plans.

### **Flood and Water Management Act 2010**

- 11.3.13** Flood and Water Management Act 2010 makes provision for water, including provision about the management of risks in connection with flooding and coastal erosion.

### **Environmental Damage (Prevention and Remediation) (England) Regulations 2015**

- 11.3.14** The Environmental Damage (Prevention and Remediation) (England) Regulations 2015 are based on the ‘polluter pays principle and imposes 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 (SSSIs), water and land, and implement Directive 2004/35/EC, on environmental liability.

### **Water Environment (Water Framework Directive) (England and Wales) Regulations 2017**

- 11.3.15** The Water Framework Directive (WFD) 2000/60/EC has been transposed into the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. WFD is delivered in England and Wales through a framework of River Basin Management Plans (RBMPs). England and Wales are divided into 11 River Basin Districts (RBDs), each comprising smaller management units known as water bodies, including all river, lake, groundwater, coastal, and transitional waters located within that RBD.

### **Schedule 3 of the Flood and Water Management Act 2010, Sustainable Drainage (Wales) Order**

- 11.3.16** Schedule 3 of the Flood and Water Management Act 2010 (the 2010 Act) relates to provisions for SuDS. These include the establishment of a SuDS Approving Body (SAB) to be set up within the local authority alongside their LLFA duty. SAB approval is required before construction of drainage systems can commence on new and redeveloped sites. Provided appropriate statutory National SuDS Standards are met, the SAB will be required to adopt and maintain the approved SuDS that serve more than one property.

## Policy context

### National Planning Policy Framework (NPPF) 2019

- 11.3.17 The National Planning Policy Framework (NPPF) 2019 provides a framework within which local people and their accountable councils can produce their own distinctive local and neighbourhood plans. Section 14, titled “Meeting the challenge of climate change, flooding and coastal change” relates to flooding. The document aims to direct development away from areas of the highest risk of flooding but where necessary, development must be safe without increasing flood risk elsewhere.

### Neath Port Talbot County Borough Council Local Development Plan (2011-2026)

- 11.3.18 Within the Neath Port Talbot County Borough Council (NPTCBC) Local Development Plan the policies of relevance to this chapter include:
- Policy EN8 – Pollution and Land Stability.  
The policy states that proposals that could have an unacceptable adverse effect on healthy, biodiversity and/or local amenity or would expose people to unacceptable risk due to water (including groundwater) pollution is not permitted unless mitigation measures are included to reduce the risk of harm to an acceptable level.
  - Policy EN 7 – Important Natural Features  
The policy states that proposals that could adversely affect ecologically or visually important natural features such as watercourses or ponds will only be permitted when measures are in place to retain or protect features or the value and role of feature has been taken into account and removal is unavoidable and mitigation measures agreed.
  - Policy SP 16 – Environmental Protection  
The policy states that water quality will be protected where feasible through preventing significant adverse effects from proposals, giving preference to brownfield sites and not increasing the number of people exposed to significant levels of pollution.
  - Policy BE 1 – Design  
The policy states that drainage systems should be designed to limit surface water run-off and flood risk and prevent pollution.

### Powys County Council Local Development Plan (2011-2026)

- 11.3.19 Within the Powys County Council (PCC) Local Development Plan the policies of relevance to this chapter include:

- Policy DM2 – The Natural Environment  
The policy states that development should not adversely impact the achievement of the Water Framework Directive’s overarching objectives.
- Policy DM6 – Flood Prevention Measures and Land Drainage  
The policy states development should avoid unnecessary flood risk, take opportunities for enhancements and provide undeveloped buffer strips adjacent to watercourses.

## Relevant guidance

### Design Manual for Roads and Bridges

- 11.3.20** The assessment has adapted from the Design Manual for Roads and Bridges (DMRB) Guidance LA 113 Road drainage and the water environment (formerly HD 45/09); hereby referred to as LA 113. This guidance provides the methodology and criteria for identifying likely impacts of a proposed 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 water resources assessment therefore in the absence of any sector guidance, DMRB is recognised as the most tried, tested and robust approach.
- 11.3.21** There are some areas of LA 113 that are not applicable to the proposed development (e.g. Highways England Water Risk Assessment Tool (HEWRAT)) as LA 113 is designed to assess major road schemes and therefore these areas have not been incorporated into the assessment.
- 11.3.22** The following guidance has also been considered in the assessment:
- Network Rail Standard NR/L2/CIV/005 module 9 on drainage design;
  - Planning Inspectorate Advice Note 18 (‘Water Framework Directive’). This guidance is specifically for Nationally Significant Infrastructure Projects (NSIP); however, it benefits from being recognised by regulators and details the relationship between WFD assessment and EIAs. The WFD Screening Assessment provided in Appendix 11A has been produced following this guidance;
  - Planning Policy Statement 15 (Revised): Planning and Flood Risk.

- Due reference has been made to GOV.UK guidance for preventing pollution<sup>1</sup>, working on or near water<sup>2</sup> and for managing water on land<sup>3</sup>;
- CIRIA<sup>4</sup> guidance used for the assessment includes:
  - 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);
  - Environmental good practice on site (C692); and
  - Groundwater control: design and practice (second edition) (C750).
- Pollution Prevention Guidelines (PPG)<sup>5</sup> 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.

## 11.4 Scoping and consultation

### Scoping

11.4.1 A scoping report was submitted to statutory consultees and key interest groups for comment in September 2019.

11.4.2 Comments were received from Natural Resources Wales (NRW) which focused on the site’s location in proximity to the River Pyrddin and River Dulais and the presence of ordinary watercourses in the vicinity. NRW has requested consideration of appropriate pollution

<sup>1</sup> The Environment Agency, “Pollution prevention for businesses,” 12 07 2016. [Online]. Available: <https://www.gov.uk/guidance/pollution-prevention-for-businesses>. [Accessed September 2019].

<sup>2</sup> The Environment Agency, “Check if you need permission to do work on a river, flood defence or sea defence,” 2017. [Online]. Available: <https://www.gov.uk/permission-work-on-river-flood-sea-defence>. [Accessed September 2019].

<sup>3</sup> The Environment Agency, “Manage water on land: guidance for land managers,” 19 02 2015. [Online]. Available: <https://www.gov.uk/guidance/manage-water-on-land-guidance-for-land-managers>. [Accessed September 2019].

<sup>4</sup> 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](https://www.ciria.org/CIRIA/Resources/Free_CIRIA_publications/Resources/Free_CIRIA_publications.aspx?hkey=622b85b3-7d21-4e59-8093-459571496a0a) [Accessed September 2019].

<sup>5</sup> NetRegs, “Guidance for Pollution Prevention (GPPs) – Full list” [Online]. Available at: <https://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/> [Accessed July 2020].



control measures and the development of a Construction Environmental Management Plan (CEMP). The topics NRW requested to be included in the CEMP are summarised in **Table 11.1** below, along with a response to the comments.

**11.4.3** The scoping report detailed that the water environment chapter would consider impacts on foul and storm drainage however this has now been considered within the Drainage Strategy in Appendix 11B.

**Table 11.1: Response to scoping opinion**

Scoping opinion clause	Response
Construction methods including details of materials, waste, contaminated land.	An outline CEMP will be submitted with the planning application. Once appointed, the contractor will develop the CEMP to provide more detailed construction methodology and information on materials, waste and contaminated land.
General Site Management: construction programme, site clearance requirements, construction drainage, site set-up plan detailing sensitive receptors and buffer zones, relevant protection measures e.g. fencing.	An outline CEMP will be submitted with the planning application. Once appointed, the contractor will develop the CEMP to provide more detailed information on general site management.
Biodiversity Management: tree and hedgerow protection, invasive species management.	Please refer to Chapter 7 – Biodiversity for information on Biodiversity Management.
Control of Nuisances: restrictions on timing/duration/frequency of works, dust control measures, control of light spill and conservation of dark skies.	An outline CEMP will be submitted with the planning application. Once appointed, the contractor will develop the CEMP to provide more detailed information on control of nuisances.
Resource Management: fuel and chemical storage, waste management, water consumption, energy consumption.	An outline CEMP will be submitted with the planning application. Once appointed, the contractor will develop the CEMP to provide more detailed information on resource management.
Traffic Management: deliveries, plant on site, wheel washing facilities.	An outline CEMP will be submitted with the planning application. Once appointed, the contractor will develop the CEMP to provide more detailed information on traffic management.
Pollution Prevention: demonstrate compliance with relevant Guidelines for Pollution Prevention, incident response plan, site drainage plan.	An outline CEMP will be submitted with the planning application. The outline CEMP will include the requirement to adhere to the relevant pollution prevention guidelines. An incident response plan and site drainage plan during construction will be developed by the appointed contractor.
Ecological clerk of works to ensure compliance with approved plans and environmental regulations.	Please refer to Chapter 7 – Biodiversity for information on ecological clerk of works.
Details of the persons/bodies responsible for activities associated with the CEMP and emergency contact details.	Contact details to be provided by contractor.



## Consultation

- 11.4.4 Consultation with statutory consultees including SABS Approval Body, NRW, PCC and NPTCBC has been undertaken with regards to the Drainage Strategy and ecological mitigation proposals that are referenced in this chapter for the Nant Helen project. No further consultation has been undertaken.

## 11.5 Methodology

### Overview

- 11.5.1 This section details the methodology for the water environment impact assessment. As stated in Section 11.3, the methodology is based on DMRB LA 113. The methodology includes a review of existing baseline conditions against which to assess impacts associated with construction and operation of the site. The impact assessment details construction practices and design mitigation that affect identified impacts.

### Methodology for establishing baseline conditions

- 11.5.2 The water environment baseline data for the study area has been obtained from a combination of desktop study and walkover study.
- 11.5.3 The following information sources have been used to complete the baseline assessment:
- NRW ‘Water Watch Wales’<sup>6</sup>;
  - Ordnance Survey (OS) Open Data;
  - Nant Helen Remainder Environmental Statement (2011);
  - Nant Helen Environmental Statement Addendum (2016);
  - Nant Helen Earthworks Environmental Statement (2019);
  - Groundsure report (2019);
  - NRW Geocortex Viewer<sup>7</sup>
  - Lle Development Advice Map; and
  - BGS GeoIndex.
- 11.5.4 A site visit was undertaken by a fluvial geomorphologist on 28<sup>th</sup> November 2018 in advance of the restoration works associated with the closure of the mine. It is unlikely that a site visit following the

<sup>6</sup> <http://waterwatchwales.naturalresourceswales.gov.uk/en/> (last accessed 17/07/2019)

<sup>7</sup> [https://maps.cyfoethnaturiolcymru.gov.uk/Html5Viewer/Index.html?configBase=https://maps.cyfoethnaturiolcymru.gov.uk/Geocortex/Essentials/REST/sites/Flood\\_Risk/viewers/Flood\\_Risk/virtual/directory/Resources/Config/Default&layerTheme=1](https://maps.cyfoethnaturiolcymru.gov.uk/Html5Viewer/Index.html?configBase=https://maps.cyfoethnaturiolcymru.gov.uk/Geocortex/Essentials/REST/sites/Flood_Risk/viewers/Flood_Risk/virtual/directory/Resources/Config/Default&layerTheme=1) (last accessed 30/07/2020)

restoration works is feasible for the project considering time constraints, but it is considered that there is sufficient knowledge of the site from the 2018 site visit in combination with existing desktop resources.

**11.5.5** For direct effects on surface waters, the study area will include the geographical extent of the proposed development and all surface water features within 500m of the proposed development. Indirect effects on surface waters will be considered up to 1km away where features have hydrological connectivity to the proposed development.

**11.5.6** For direct effects on groundwater features, the study area will include the extent of the proposed development and extending up to 250m away from the proposed development boundary. For further information on the groundwater feature study area, please refer to Chapter 6 – Ground Conditions.

**11.5.7** The size of the study area has been selected based on professional judgement and is proportionate with the potential impacts posed by the scheme.

### **Design mitigation**

**11.5.8** Measures have been built into the proposed development which seek to minimise the impact on the water environment once the development is operational. The measures include good culvert design, a series of SuDS features (referred to as a ‘treatment train’) as well as measures to manage point source pollution from the washery site. Further details are provided below.

**11.5.9** Culverts will be designed to CIRIA Guide C786 standard to allow the same volume and rate of flow as the existing watercourse. Further design measures include bottomless culverts that are oversized relative to the existing channel dimensions where the risk of scour can be managed safely. This would help to maintain natural processes and the ecological connectivity of the stream corridor. During detailed design, anticipated velocities within the culvert would be assessed to balance the risk of sedimentation whilst maintaining suitable conditions for fish passage.

**11.5.10** The SuDS features would manage surface water run-off across the testing track, washery site, development roads and car parks. The appropriate SuDS features required to mitigate impacts has been calculated based on the simple index approach, as specified in the SuDS manual, and will be subject to SABS approval. The simple index approach is the recognised method of assessing water quality within the Welsh Government Statutory Standards for SuDS. The proposed elements of the treatment train and track drainage for the areas of the proposed development specified include:

- Testing track: Surface run off from the tracks would percolate through the ballast into filter drains lining the track which would

convey flow to attenuation ponds. The attenuation ponds would discharge flow to the River Tawe, River Nant Llech, River Pyrddin and River Dulais catchment.

- **Development access roads and car park:** Surface water runoff from the tracks would collect in the swales that line the development roads and car park. The swales would convey flows into attenuation ponds. At this outline stage, it is anticipated that the attenuation ponds would discharge flow to the River Nant Llech, River Pyrddin and River Dulais catchment.
- **Washery site:** The washery site contains facilities that are expected to present a greater risk of pollution including carriage washing and rolling stock maintenance shed. To manage point source pollution from the washery site, the facilities within the site would comprise specific drainage systems to manage effluent released from this area. Following discharge from these systems, effluent will be collected in the filter drains within washery site. Run off would be conveyed through filter drains into swales which will deposit the run off into treatment forebays. The treatment forebays are designed to capture and contain sediment/soil. Following the treatment forebays, run off then passes into attenuation basins before being discharged to River Pyrddin and River Dulais catchment.

**11.5.11** The track drainage design would adhere to Network Rail Standard NR/L2/CIV/005 module 9 on drainage design. The standard states that environmental issues related to a new or existing drainage system will be identified and a potential form of mitigation proposed and supplied. The standard further states that where the quality of discharge is a risk and non-compliant to legislation, a relevant treatment shall be proposed.

### Assumed construction practices

**11.5.12** An Outline Construction Environmental Management Plan (CEMP) will be submitted with the planning application and will be developed by the appointed the contractor. The CEMP will ensure that industry standard working methods and mitigation measures set out in the Environment Agency's Pollution Prevention Guidelines (PPG) (withdrawn) and Guidance for Pollution Prevention (GPP) are implemented. The CEMP will include details of the management of water and sediment across the site and provisions to minimise the likelihood of run-off, provide containment of spillage and capture or treat wastewaters where necessary. These mitigation measures are

intended to prevent impacts upon surface water or groundwater quality.

### Assessment methodology

**11.5.13** As set out in Section 11.3, this assessment has been carried out in broad alignment with DMRB guidance LA 113 Road drainage and the water environment. It should be noted that LA 113 does not provide guidance on assessment of flood risk or climate change. For flood risk, therefore the assessment criteria have been developed based on professional judgement, the principles of LA 113 and the National Planning Policy Framework guidance. For the assessment of climate change impacts on the water environment, the assessment has been based on professional judgement in the absence of a defined, industry approved methodology.

**11.5.14** LA 113 provides a standard methodology for the impact assessment and has four key steps:

- Step 1 - Identification of receptors (surface water, groundwater, flood risk) within the study area. Receptors are assessed against criteria defining quality and importance (sensitivity). **Table 11.2** sets out the attributes used to define the sensitivity of surface water, groundwater and flood risk receptors. An assessment of the sensitivity of each of these receptors is then undertaken using the criteria set out in **Table 11.3**;
- Step 2 – Identification of potential impacts to the receptors identified in Step 1, from construction and/or operation;
- Step 3 – Assessment of the potential magnitude of any construction and/or operation impacts on the receptor based on the criteria in LA 113, summarised and defined in **Table 11.4**; and
- Step 4 – Assessment of overall significance of effect using the significance matrix provided in **Table 11.5**. This identifies the magnitude of impact on the top and the receptor sensitivity on the side. The significance of impact is identified where the two meet within the matrix. The assessment considers ‘Very Large’, ‘Large’ and ‘Moderate’ significance of effect as significant. ‘Slight’ and ‘Neutral’ significance of effect are not considered significant.

**Table 11.2: Surface water, groundwater and flood risk receptor attributes and indicators of quality (adapted from LA 113: Table 3.69)**

Feature	Attribute/Service	Indicator of quality	Possible measure
Watercourse	Water Supply/quality	Amount used for water supply (potable); Amount used for water supply (industrial/agricultural); Chemical water quality.	Location and number of abstraction points Volume abstracted daily Physio-chemical quality elements of WFD ecological status

Feature	Attribute/Service	Indicator of quality	Possible measure
			Supporting hydrological regime element of WFD ecological status
	Dilution and removal of waste products	Presence of surface water discharges and effluent discharges.	Daily volume of discharge (treated/untreated)
	Recreation	Access to watercourse; Use of watercourse for recreation.	Length of watercourse used for recreation (fishing, water sports) and number of clubs
	Biodiversity	Biological water quality	WFD ecological status class; NRW routine fish and/or invertebrate monitoring data
		Fisheries quality	Fish Status Supporting hydromorphological element of WFD ecological status, includes geomorphology
	Value to economy	Value of use of watercourse	Length of watercourse used for recreation commercially Number of people employed Length of river bank developed Length of watercourse fished commercially
Conveyance of flow	Presence of watercourses	Number and size of watercourses Number of watercourses artificially managed to control flow/levels	
Groundwater	Water supply/quality	Amount used for water supply (potable); 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 SPZ
	Soakaway	Presence of soakaways or other discharges to the ground.	Location 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 road structures or drainage.	Changes to groundwater recharge, levels or flows Number and size of watercourses

Feature	Attribute/Service	Indicator of quality	Possible measure
	Biodiversity	Presence of groundwater supported wetlands.	Changes to groundwater recharge, levels or flows Status or classification of wetland including Groundwater Dependent Terrestrial Ecosystems (GWDTE) under WFD
Receptors vulnerable to flooding	Development	Presence of development	Essential infrastructure: transport and utility infrastructure, wind turbines. <sup>8</sup> Highly vulnerable: emergency services (operational during flooding), basement dwellings, mobile homes, installations requiring hazardous substance consent. <sup>8</sup> More vulnerable: hospitals, residential institutions, dwelling houses, health services and education establishments, landfill/waste management, campsites. <sup>8</sup> Less vulnerable: emergency services, shops and businesses, waste/water/sewage treatment, land for agriculture and forestry. <sup>8</sup> Water-compatible development: Amenity open space, outdoor sport and water based recreation, docks etc. <sup>8</sup>

**Table 11.3: Criteria for estimating the importance of surface water, groundwater and flood risk receptors (adapted from DMRB LA 113: Table 3.70)**

Importance	Criteria	Examples
<b>Very High</b>	Attribute has a high quality and rarity on regional or national scale	Surface water: Watercourse having a WFD classification shown in a RBMP and Q95 ≥ 1.0 m3/s. Site protected/designated under EC or UK legislation (SAC, SPA, SSSI, Ramsar site, salmonid water)/Species protected by EC legislation Ecology and Nature Conservation. Groundwater: Principal aquifer providing a regionally important resource and/or supporting a site protected under EC and UK legislation Ecology and Nature Conservation. Groundwater locally supports GWDTE and/or Source Protection Zone 1 (SPZ1). Flood risk: Essential infrastructure or highly vulnerable development <sup>8</sup>
<b>High</b>	Attribute has a high quality and rarity on local scale	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.

<sup>8</sup> Communities and Local Government (2012), Technical Guidance to the National Policy Framework. Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/6000/2115548.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/6000/2115548.pdf)

Importance	Criteria	Examples
		Groundwater: Principal aquifer providing locally important resource or supporting a river ecosystem. Groundwater supports a GWDTE SPZ2 Flood risk: More vulnerable development <sup>8</sup>
<b>Medium</b>	Attribute has a medium quality and rarity on local scale	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 Flood risk: Less vulnerable development <sup>8</sup>
<b>Low</b>	Attribute has a low quality and rarity on local scale	Surface water: Watercourses not having a WFD classification shown in a RBMP and Q95 ≤0.001m3/s. Groundwater: Unproductive strata Flood risk: Water compatible development <sup>8</sup>

**Table 11.4: Criteria for estimating the magnitude of an impact (adapted from LA 113: Table 3.71)**

Magnitude	Criteria
<b>Major Adverse</b>	Results in loss of attribute and/or quality and integrity of the attribute.
<b>Moderate Adverse</b>	Results in effect on integrity of attribute, or loss of part of attribute
<b>Minor Adverse</b>	Results in some measurable change in attributes, quality or vulnerability
<b>Negligible</b>	Results in effect on attribute but of insufficient magnitude to affect the use or integrity
<b>Minor Beneficial</b>	Results in some beneficial effect on attribute or a reduced risk of negative effect occurring
<b>Moderate Beneficial</b>	Results in moderate improvement of attribute quality
<b>Major Beneficial</b>	Results in major improvement of attribute quality
<b>No Change</b>	No loss or alteration of characteristics, features and elements; no observable impact in either direction.

**Table 11.5: Significance matrix (adapted from DMRB LA 104: Table 3.8.1) as referenced in LA 113**

		Magnitude of impact (degree of change)				
Environmental value (sensitivity)		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



Magnitude of impact (degree of change)						
	<b>Medium</b>	Neutral	Neutral or Slight	Slight	<b>Moderate</b>	<b>Moderate or Large</b>
	<b>Low</b>	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or <b>Moderate</b>
	<b>Negligible</b>	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

Note: The impacts highlighted in red are deemed significant.

## 11.6 Limitations and assumptions

### Limitations

- 11.6.1 It has not been possible to undertake a site visit to the site following completion of the restoration and earthworks as these activities are still in progress. Therefore, our baseline conditions have been based on information gained from the site visit before these activities commenced and desktop research.
- 11.6.2 As the restoration plan has not yet been introduced, there is no desktop research available on the baseline.

### Assumptions

- 11.6.3 It is assumed that the measures within the CEMP will be adhered to and implemented.
- 11.6.4 It is assumed that construction will be undertaken by competent contractors with experience of working in and/or near to watercourses.
- 11.6.5 It is assumed that the site drainage strategy for the Nant Helen project will be implemented.

## 11.7 Baseline Environment

- 11.7.1 This section sets out the baseline conditions and identifies potential receptors, describing sensitivity according to the methodology described in Section 11.5. The baseline conditions detailed has accounted for the restoration works associated with the closure of the Nant Helen mining operations and therefore can be considered a future baseline.

### Surface Water

- 11.7.2 The following surface water receptors have been identified in the study area and are shown in Figure 11.1. The site overlaps with three

principal river catchments: the Tawe catchment, the Dulais catchment and the Pyrrddin catchment.

### **River Dulais**

- 11.7.3 The River Dulais (headwaters to confluence with River Neath - GB110058032430)<sup>9</sup> is located to the south of the proposed development.
- 11.7.4 There are multiple unnamed tributaries of the River Dulais within the site boundary that flow southwards from the southern portion of the proposed development into the River Dulais.

### **River Nant Llech**

- 11.7.5 The River Nant Llech (headwaters to confluence with Tawe - GB110059032240)<sup>9</sup> is located to the north east of the study area and, at its closest point, 280m from the proposed development although it is separated from the scheme by the A4221. The River is located within the Nant Llech Site of Special Scientific Interest (SSSI).
- 11.7.6 There are several unnamed tributaries of the River Nant Llech that flow north eastwards from the eastern portion of the proposed development.

### **River Tawe**

- 11.7.7 The River Tawe (conf with Giedd to confluence with Twrch - GB110059032180)<sup>9</sup> is located to the north of the proposed development and, at its closest point, is approximately 580m from the proposed development.
- 11.7.8 There are multiple unnamed tributaries of the River Tawe that flow northwards from the northern portion of the proposed development and one named tributary, Nant Helen located within the northern portion of the proposed development.

### **River Pyrrddin**

- 11.7.9 The River Pyrrddin (headwaters to conf with Nedd Fechan – GB110058032400)<sup>9</sup> is located to the south east of the proposed development and, at its closest point, is approximately 880m from the proposed development.
- 11.7.10 The Camnant is a named tributary of the River Pyrrddin that is located within the south eastern portion of the proposed development.

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<sup>9</sup> NRW, Cycle 2 Rivers and waterbodies [online]. Available at: <https://nrw.maps.arcgis.com/apps/webappviewer/index.html?id=4ef6ea25c5984c939636714dbf3e25f3>

- 11.7.11 NRW have monitoring stations located on the River Nant Llech, River Dulais and River Tawe. However, monitoring activities ceased in 2015 and the data is therefore not considered representative due to the length of time that has passed since monitoring ceased. Flow data for these watercourses, and their tributaries, is not available.
- 11.7.12 Site run off is collected in attenuation ponds across the site, the run off settles within these attenuation ponds and then is released at greenfield run off rates or below greenfield run off rates into tributaries of the River Dulais, Nant Llech, Tawe and Pyrddin.

### **Ponds and Wetlands**

- 11.7.13 The site contains a collection of small ponds to the south of the site. These ponds were historically water treatment areas associated with the mine workings. As part of the restoration works associated with the closure of the mine, these water treatment areas will be converted to ponds. These ponds are connected to the River Dulais.
- 11.7.14 The site contains two wetlands to the west and in the centre of the site. These wetlands have been created through the restoration works associated with the closure of the mine.

### **Ephemeral Drainage Ditches**

- 11.7.15 There are a series of drainage ditches located within the study area which are expected to have resulted from the mining activities or introduced as part of the restoration plan. These ditches are ephemeral and only wet following heavy rain.
- 11.7.16 In line with DMRB guidance, the surface water receptors have been valued according to their sensitivity in **Table 11.2** using the criteria for valuation in **Table 11.3**.

### **WFD Status**

- 11.7.17 The study area includes four WFD surface water bodies and one WFD groundwater body. These are:
- River Nant Llech (headwaters to confluence with Tawe - GB110059032240);
  - River Dulais (headwaters to confluence with River Neath - GB110058032430)
  - River Tawe (conf with Giedd to confluence with Twrch - GB110059032180);
  - River Pyrddin (headwaters to conf with Nedd Fechan - GB110058032400);
  - Swansea Carboniferous Coal Measures (GB41002G201000).

**11.7.18** The current status of each of these WFD water bodies (surface water and groundwater) is summarised in **Table 11.6**. The sensitivity of WFD water bodies is captured in surface water receptors and groundwater receptors.

**Table 11.6: Summary of WFD water bodies in the study area**

<b>WFD Waterbody</b>	<b>River Nant Llech (headwaters to confluence with Tawe)</b>	<b>River Dulais (headwaters to confluence with River Neath)</b>	<b>River Tawe (conf with Giedd to confluence with Twrch)</b>	<b>River Pyrddin (headwaters to conf with Nedd Fechan)</b>	<b>Swansea Carboniferous Coal Measures</b>
ID	GB110059032250	GB110058032360	GB110059032240	GB110058032400	GB41002G201000
Type of Waterbody	River	River	River	River	Groundwater
Area (km/km <sup>2</sup> )	3.97	16.06	5.94	7.09	758
HMWB/AWB	Not heavily modified or artificial	Not heavily modified or artificial	Not heavily modified or artificial	Not heavily modified or artificial	N/A
Overall Status	Good	Good	Good	Good	Poor
Objective	N/A	N/A	N/A	N/A	Objective not assigned as no known technical solution available
Chemical Status	Good	Good	Good	Good	Poor
Ecological Status (River) / Quantitative Status (Groundwater)	Good	Good	Good	Good	Good
Driver of failure to achieve 'Good' status	N/A	N/A	N/A	N/A	Poor Chemical status is driven by the results of a surface water dependent test for groundwater chemical status. The test showed there had been a significant diminution of surface water chemistry and ecology.

<b>WFD Waterbody</b>	<b>River Nant Llech (headwaters to confluence with Tawe)</b>	<b>River Dulais (headwaters to confluence with River Neath)</b>	<b>River Tawe (conf with Giedd to confluence with Twrch)</b>	<b>River Pyrddin (headwaters to conf with Nedd Fechan)</b>	<b>Swansea Carboniferous Coal Measures</b>
Reasons for not achieving 'Good' status	N/A	N/A	N/A	N/A	Point source pollution is defined as causing the poor Chemical status. Point source pollution is thought to have resulted from mining activities.
Other (including Mitigation Measures)	N/A	N/A	N/A	N/A	No known technical solution available.

**Table 11.7: Summary of surface water receptors within the study area**

Surface water receptor	Location relative to scheme	Scheme elements	Sensitivity	Value Rationale
River Dulais	Located 850m to the south west of the site boundary	None	High	WFD classification shown in RBMP Q95 < 1m <sup>3</sup> /s but >0.001m <sup>3</sup> /s
Unnamed tributaries of River Dulais	Southern area of site boundary	Attenuation pond outfall to tributaries Diversion Culvert	Medium	Drains with no WFD classification shown in RBMP Q95 expected to be ≤0.001m <sup>3</sup> /s
River Nant Llech	Located to the north east of the proposed development, located 300m at its closest point	None	Very High	WFD classification shown in RBMP Q95 < 1m <sup>3</sup> /s but >0.001m <sup>3</sup> /s Section of the river located within SSSI
Unnamed tributaries of the River Nant Llech	Located to the north east of the proposed development	Attenuation pond outfall to tributaries	Medium	Drains with no WFD classification shown in RBMP Q95 expected to be ≤0.001m <sup>3</sup> /s
River Tawe	Located to the north of the proposed development, approximately 350m from the proposed development at its closest point	None	High	WFD classification shown in RBMP Q95 < 1m <sup>3</sup> /s but >0.001m <sup>3</sup> /s
Unnamed tributaries of the River Tawe (and named tributary Nant Helen)	Located to the north of the development, several tributaries abut the proposed development	Attenuation pond outfall to tributaries	Medium	Drains with no WFD classification shown in RBMP Q95 expected to be ≤0.001m <sup>3</sup> /s
River Pyrddin	South eastern area of study area	None	Very High	WFD classification shown in RBMP Q95 < 1m <sup>3</sup> /s but >0.001m <sup>3</sup> /s Section of river within SSSI
Camnant (tributary of the River Pyrddin)	South eastern area of site boundary	Attenuation pond outfall to tributaries	High	Drains with no WFD classification shown in RBMP Q95 expected to be ≤0.001m <sup>3</sup> /s



				Section of the tributary located within SSSI
Ponds	Approximately 9 ponds located across the site boundary	Some ponds are expected to be removed, modified or relocated	Low	Ponds are artificial created through restoration plan and historic mine workings
Wetlands	Two wetlands, one to the east of the site boundary and one in the centre of the site	None	Low	Wetlands are artificial and recently introduced as part of the restoration plan
Ephemeral drainage ditches	There are drainage ditches throughout the study area and within the site boundary	Some drainage ditches will be cut off or diverted	Low	Majority of drainage ditches are a result of the restoration plan following the decommission of the mine

## Groundwater

### Groundwater Quality

- 11.7.19** The groundwater regime in the site boundary and its vicinity is likely to be fundamentally controlled by remnants of historical mining activities such as shafts or adits. The historical mine workings may act as preferential flow paths for groundwater flows and constitute a major drainage network, which would discharge into the surface water network.
- 11.7.20** Active dewatering was necessary to accommodate the open cast mining activities. Whilst there are no data to confirm this, it is likely to have had an impact on local hydrogeology including groundwater levels and flow direction. When the dewatering stops, the groundwater regime is likely to restore to pre-dewatering state. This is likely to result in an increase in groundwater levels from those currently present and potentially flooding of the void present in the western site area. This increase is however unlikely to be major due to the presence of the deep mine's drainage. Refer to Chapter 6 on ground conditions for more details on local hydrogeology.
- 11.7.21** The aquifer designations have been determined through review of the Groundsure EnviroInsight<sup>10</sup> report purchased for the site.
- 11.7.22** The glacial till deposits shown to be present in the southern and western portion of the site are designated as Secondary Undifferentiated. The designation is attributed to a stratum where it has not been possible to differentiate between a 'Secondary (A)' or 'Secondary (B)' designation.

<sup>10</sup> Groundsure, EnviroInsight report, Report ref.: GS-6396069, 14/10/2019

- 11.7.23** The deposits of peat shown to be present within the site are designated as ‘unproductive strata’.
- 11.7.24** The South Wales Coal Measures Formations (both Middle and Lower) shown to be present beneath the entirety of the site are both designated as ‘Secondary (A) Aquifers’. Secondary (A) Aquifers are defined as permeable layers capable of supporting water supplies at a local rather than strategic scale.
- 11.7.25** There are no private water supplies or Source Protection Zones within 1km of the proposed development.
- 11.7.26** The groundwater levels and flows and groundwater quality from existing contamination is detailed in Chapter 6 – Ground Conditions.
- 11.7.27** In line with DMRB guidance, the groundwater receptors have been valued according to their sensitivity in Table 11.8 using the criteria for valuation in Table 11.3.

**Table 11.8: Summary of groundwater receptors in the study area**

Groundwater receptor	Location relative to scheme	Scheme elements	Sensitivity	Value Rationale
Glacial till deposits	Southern and western portion of the site (above South Wales Coal Measures Formations)	Permanent drainage of cuttings	Low	Secondary undifferentiated Not in a Source Protection Zone
Peat deposits	Southern portion of the site (above South Wales Coal Measures Formations)	None	Low	Unproductive strata Not in a Source Protection Zone
South Wales Coal Measures Formations (both Middle and Lower) (part of Swansea Carboniferous Coal Measures WFD groundwater body)	Entire site is encompassed within the groundwater body	Permanent drainage of cuttings	Medium	Secondary A Aquifer Not in a Source Protection Zone

### Groundwater Dependent Terrestrial Ecosystems

- 11.7.28** There are three Sites of Special Scientific Interest (SSSI) partially located within the study area: Nant Llech, Gorsllwyn and Caeau Ton-y-Fildre. The SSSIs are shown in Figure 11.1. Each of the SSSI contains species of vegetation that are considered a Groundwater

Dependent Terrestrial Ecosystem (GWDTE)<sup>11</sup>. Potential ecological impacts to the protected sites are addressed in Chapter 7 – Biodiversity.

- 11.7.29** The Nant Llech is located approximately 100m, to the north east of the proposed development. The SSSI has been designated for: Broadleaved Semi-natural Woodland; Bryophytes (mosses and liverworts); Westphalian Sedimentary Rocks; and Westphalian Fossil Plants<sup>12</sup>. In the wet flushed areas of the site alder *Alnus glutinosa* are present, which has moderate dependency on groundwater.
- 11.7.30** The Gorsllwyn is located approximately 40m to the south east of the proposed development and is designated due to its raised mire. Much of the mire drains north into an area dominated by common reed *Phragmites australis* which has low dependency on groundwater. Greater tussock-sedge *Carex paniculata* is also present. Wetland species to be found include meadow thistle *Cirsium dissectum*.<sup>13</sup> Both species have moderate dependency on groundwater.
- 11.7.31** The Caeau Ton-y-Fildre is located approximately 260m to the east of the proposed development and is designated for its two unimproved herb-rich pastures that supports a range of species characteristic of damp, flushed peaty pasture including alder *Alnus glutinosa* which has moderate dependency on groundwater.<sup>14</sup>
- 11.7.32** Potential GWDTE receptors that will be considered in the assessment are summarised in **Table 11.9**.

**Table 11.9: Summary of GWDTE in the study area**

GWDTE	Location relative to scheme	Scheme elements	Sensitivity	Value Rationale
Nant Llech	100m north east of study area	Cutting in proposed development	Very High	GWDTE within SSSI
Gorsllywn	40m south east of study area	Cutting in proposed development	Very High	GWDTE within SSSI

<sup>11</sup> UK Technical Advisory Group on the Water Framework Directive, 2004. Guidance on the identification and risk assessment of groundwater dependent terrestrial ecosystems. Accessed: 17/07/2020. Available at: <[https://www.wfduk.org/sites/default/files/Media/Characterisation%20of%20the%20water%20environment/Risk%20assessment%20of%20terrestrial%20ecosystems%20groundwater\\_Draft\\_210104.pdf](https://www.wfduk.org/sites/default/files/Media/Characterisation%20of%20the%20water%20environment/Risk%20assessment%20of%20terrestrial%20ecosystems%20groundwater_Draft_210104.pdf)>

<sup>12</sup> NRW, 1990. *Site of Special Scientific Interest Citation: Nant Llech*. Accessed: 14/11/2019. Available at: <[https://naturalresources.wales/media/676915/sssi\\_0366\\_citation\\_en001.pdf](https://naturalresources.wales/media/676915/sssi_0366_citation_en001.pdf)>

<sup>13</sup> NRW, 1982. *Site of Special Scientific Interest Citation: Gorsllywn, Onllwyn*. Accessed: 17/07/2020 [https://naturalresources.wales/media/648654/SSSI\\_0657\\_Citation\\_EN0010893.pdf](https://naturalresources.wales/media/648654/SSSI_0657_Citation_EN0010893.pdf)

<sup>14</sup> NRW, 1996. *Site of Special Scientific Interest Citation: Caeau Ton-y-Fildre*. Accessed: 17/07/2020 <[https://naturalresources.wales/media/645611/SSSI\\_0544\\_Citation\\_EN001dd16.pdf](https://naturalresources.wales/media/645611/SSSI_0544_Citation_EN001dd16.pdf)>

GWDTE	Location relative to scheme	Scheme elements	Sensitivity	Value Rationale
Caeau Ton-y-Fildre	260m east of study area	Cutting in proposed development	Very High	GWDTE within SSSI

## Flood Risk

**11.7.33** Under TAN15, as shown in Lle Development Advice Map<sup>15</sup>, all of the site is within Zone A which is defined as ‘Considered to be at little or no risk of fluvial or tidal/coastal flooding’. There is a very small area of Flood Zone C2 in the south-east corner of the Washery site associated with a stream. Areas within Zone C2 and Zone B are outside of the site boundary but within the study area and predominantly localised to the immediate areas surrounding the major watercourses although Zone B extends into the southern part of the village of Ystradgynlais. However, the data has been based upon the mine workings as the restoration plan has not yet been introduced.

**11.7.34** Potential flood risk receptors are shown in **Table 11.10** and include the surrounding existing receptors as well as proposed receptors.

**Table 11.10: Summary of flood risk receptors in the study area**

Flood risk receptor	Location relative to scheme	Scheme elements	Sensitivity	Value Rationale
Existing communities within the River Tawe	Northern and western area of the site boundary and study area	Use of existing outfall to tributary of River Tawe	High	More vulnerable development
Existing communities within the River Pyrddin catchment	Eastern area of the site boundary and study area	Use of existing outfall to tributary of River Pyrddin	High	More vulnerable development
Existing communities within the River Dulais catchment	Southern area of the site boundary and study area	Use of existing outfall and addition of new outfall to tributary of River Dulais	High	More vulnerable development
Proposed central control building and research and development centre	Eastern area of the site boundary	N/A	Medium	Less vulnerable development
Proposed testing track	Extends across entire site	N/A	Medium	Less vulnerable development
Proposed carriage washing facility	South east area of the site boundary	N/A	Medium	Less vulnerable development

<sup>15</sup> Lle, 2016. Map Browser. Accessed: 14/11/2019. Available at: <http://lle.gov.wales/map#b=europa&l=328;329;330;&m=-3.72297,51.77936,14>

Flood risk receptor	Location relative to scheme	Scheme elements	Sensitivity	Value Rationale
Proposed car park and access roads	South east area of the site boundary extending to north east area of the site	N/A	Medium	Less vulnerable development

## Climate Change

**11.7.35** Current and future climate baselines are outlined in Chapter 15 Climate Change for key climate parameters, including winter and summer temperature and precipitation, using UK Climate Projections 2018 (UKCP18).

## 11.8 Assessment of effects

**11.8.1** Potential effects can occur as a result of construction or operation or a combination of construction and operation. Typically, these effects are grouped into temporary, short-term construction effects and permanent, long-term operational effects, although short and long-term effects can occur as a result of both construction and operation activities.

**11.8.2** The assessment has taken a precautionary approach, where the significance matrix in Table 11.5 specifies a range of two effects, the worst case effect has been chosen to provide a robust assessment. Any exceptions to this approach are detailed within the assessment.

**11.8.3** The assessment of effects from construction will focus on effects relating to the construction activities and methods and will not include assessment of effects of the proposed development scheme elements e.g. realignment of the tributary of the River Dulais.

**11.8.4** The assessment of effects from operation will focus on effects relating to the proposed development scheme elements.

### Assessment of effects from construction

**11.8.5** This section presents the assessment of potential effects to the water environment resulting from the construction of the proposed development. The significance of effects is based on a combination of the potential magnitude of effect and the sensitivity of the receptor.

**11.8.6** The potential effects of contamination associated with the made ground on surface water quality and groundwater quality has been assessed in Chapter 6 – Ground Conditions. Groundwater levels and flows have also been assessed in Chapter 6 – Ground Conditions.

**11.8.7** The potential effects associated with ecology have been assessed within Chapter 7 – Biodiversity.

11.8.8 The potential impacts experienced by receptors that will be considered in this section include:

- Surface water: surface water quality and quantity impacts and hydromorphology impacts;
- Groundwater: groundwater quality impacts and impacts on GWDTE; and
- Flood risk: impacts of flood risk on surrounding and on site receptors.

## Surface Water

### Surface Water Quality

11.8.9 The most likely sources of surface water impacts are:

- Disturbance of silt/soil generating surface runoff with high sediment concentrations (mobilised suspended solids). This includes the proposed earthworks for the Washery site and introduction of the track and ancillary infrastructure;
- Accidental spillage of fuels, oils and chemicals (e.g. concrete, plant fuels/oils, lubricants, hydraulic fluids and floating solids such as litter) resulting in pollution of watercourses and potential impact on fish; and
- Dewatering discharges from excavations causing high levels of suspended solids.

11.8.10 The risk of pollution is heightened during periods when vegetation has been removed and exposed and soil is present, such as during initial site preparation. Risks of surface water pollution impacts are also greater during works in close proximity to surface watercourses. Without control measures, the risk of runoff from exposed soil would remain until vegetation is established, which would take generally one growing season.

11.8.11 The magnitude of these impacts would be Major Adverse and short term. However, as outlined in Section 11.5, if the surface water management measures set out in the outline CEMP are implemented, then the magnitude of impact would reduce to Negligible. All surface waterbodies within the site boundary and immediate area surrounding the site have potential to receive run-off from the site. The tributaries of the River Nant Llech, River Dulais and River Tawe are considered to be of Medium sensitivity and the Camnant is considered to be of High sensitivity, the significance of effect on these features is considered to be *Slight Adverse* and not significant. The ponds, wetlands and ditches are considered to be of Low sensitivity, and the significance of effect on these features is considered to be *Slight Adverse* and not significant. As the effects on features is not significant, additional mitigation is not required.

### Surface Water Quantity

- 11.8.12 Potential impacts to surface water quantity during construction include an increase in the volume of surface water run off through removal of grassed areas and discharges associated the construction activities including wheel washing.
- 11.8.13 Surface water management measures are included within the outline CEMP (to be developed further at reserved matters stage) which would reduce the magnitude of impact on surface water quantity to Negligible. All surface waterbodies within the site boundary and immediate area surrounding the site have potential to receive run-off from the site. The tributaries of the River Nant Llech, River Dulais, River Tawe are considered to be of Medium sensitivity and the Camnant is considered to be of High sensitivity, the significance of effect on these features is considered to be *Slight Adverse* and not significant. The ponds, wetlands and ditches are considered to be of Low sensitivity, with the significance of effect on these features considered to be *Slight Adverse* and not significant. No additional mitigation is required.

### Hydromorphology

- 11.8.14 The most likely sources of hydromorphological impacts relate to direct physical modifications to surface water features including:
- Introduction and construction of culverts over the River Dulais tributary;
  - Diversion of River Dulais tributary; and
  - Removal of on-site ditches for development proposals.
- 11.8.15 All proposed modifications would require in-channel working that have the potential to modify flow processes and sediment movement through bank failure, erosion, scouring and modification of geomorphological features. Changes to flow processes and sediment movement have potential for the washing of sediment into the surface water features. Clogging of the surface water features by silt would reduce in-stream habitat quality.
- 11.8.16 The effects of siltation could be long term, as the flow velocities in the tributary may be insufficient to remobilise the silt and flush it downstream.
- 11.8.17 When considering measures set out in the outline CEMP as inherent mitigation, the magnitude of hydromorphological impacts during construction is reduced from Major Adverse to Minor Adverse on the River Dulais tributary and on site ditches. Construction activities are expected to cause a measurable change in attributes and quality but would not affect the integrity of the attribute. As the River Dulais tributaries are considered to be of Medium importance and the on-site ditches are of low importance, the significance of effect is *Slight*



*Adverse* and not significant. As the effects on the features are not significant, no additional mitigation is required.

## Groundwater

### Groundwater Quality

11.8.18 Sources of potential pollutants to groundwater quality include accidental spills (e.g. fuel from vehicle/plant), silt laden waters from excavation activities or from water contaminated during specific activities such as concrete pouring/washing. Potential pathways for these pollutants include the excavations and piling required for the washery area where pollutants can directly infiltrate at source. In the case of spillages, pollutants can infiltrate from the surface water features during periods of low flow. The receptor for these activities is the South Wales Coal Measures Formations (both Middle and Lower) underlying the scheme area.

11.8.19 Mitigation measures included within the outline CEMP will significantly reduce potential impacts. When incorporating the measures, the potential magnitude of the risk of contamination is Negligible. When combined with South Wales Coal Measures Formations (both Middle and Lower) of Medium sensitivity, the significance of effect is *Slight Adverse*. As the effect is not considered to be significant, no additional mitigation is required.

### Groundwater Dependent Terrestrial Ecosystems

11.8.20 There are three SSSI within the study area that contain GWDTE: Nant Llech, Gorsllwyn and Caeau Ton-y-Fildre.

11.8.21 As stated above, groundwater quality is not expected to be significantly impacted during construction hence should not impact GWDTE. The assessment will focus on the impact of potential change in groundwater flows and levels on GWDTE.

11.8.22 Construction activities such as excavations and dewatering have the potential to temporarily influence the groundwater regime. No deep excavations are however required as part of the proposed development. These are likely to comprise only shallow excavations for the construction of buildings foundations or tracks, in a range of 1-2m depth. These works are not anticipated to be deep enough to impact the groundwater levels and influence the groundwater levels of the three GWDTE sites.

11.8.23 These are unlikely to influence groundwater regime and therefore have a negligible impact on GWDTE.

11.8.24 With the sensitivity of all three GWDTE as Very High, the significance of effect is *Slight Adverse*. As the effect is not considered to be significant, no additional mitigation is required.

## Flood Risk

- 11.8.25 Activities such as removal of topsoil and construction of areas of hardstanding during construction have the potential to cause an increase volume and rate of surface run off across the site into the surrounding catchments. The site is not at risk of flooding and incorporating the working practices within the outline CEMP into the assessment, the potential magnitude of effect is Negligible. Therefore, for the existing surrounding communities in the River Tawe, River Pyrddin and River Dulais catchment of High sensitivity, the significance of effect is *Slight Adverse* and not significant. No additional mitigation is considered to be required.

## Climate Change

- 11.8.26 The ES considers effects related to climate change as required by the 2017 EIA Regulations. Construction is expected to commence within the next 5 years, therefore, it is not anticipated that there will be significant changes to precipitation or extreme weather events within this period that would cause difficulties for construction activities. The magnitude of impact is No Change, the sensitivity of receptors varies from Very High to Low but the significance of effect is *Neutral*. The effect is not considered to be significant and additional mitigation is not required.

## Assessment of effects from operation

- 11.8.27 This section considers the potential effects on the water environment during the operation of the proposed development. Similar to the assessment for the construction phase, the significance of effect would depend on the magnitude of impact as well as the sensitivity of the receptor.
- 11.8.28 The potential impacts experienced by receptors that will be considered in this section include:
- Surface water: surface water quality impacts, surface water quantity impacts and hydromorphology;
  - Groundwater: groundwater quality impacts and impacts on GWDTE; and
  - Flood risk: impact of flood risk.

## Surface Water

### Surface Water Quality

- 11.8.29 Surface water quality impacts could arise from elements of the proposed development including the railroad testing track, development roads and car parks and the washery site including a

carriage washing facility and refuelling area as detailed in Section 11.2.

- 11.8.30** Potential operational impacts upon surface waters include the release of pollutants to the wider water environment from accidental and major spills from trains and accidental spills from vehicles on access roads and car park. Surface water run-off from the washery site can become contaminated with pollutants including hydrocarbons, oils, metals and sediment and there is the potential for accidental and major spills.
- 11.8.31** Trains are a potential source of accidental spills and present a source of potential pollutants to surface water quality. The track drainage along the test tracks is unlikely to have means of separating pollutants and will likely consist of a basic collector drain (or multiple) in the cess with a typical outlet into the wider system. The likelihood of spills is low because trains would not be stationed and would always be moving.
- 11.8.32** However, the track drainage system would be designed in accordance with Network Rail standards NR/L2/CIV/005/02 and Environmental Management Plans. Any accidental spills would be collected in the track ballasts and directed into the track drainage system that flows into swales and then into attenuation ponds. The attenuation ponds would reduce pollutant concentrations entering surface waters to an acceptable level and would be agreed through a SAB application. The magnitude of impact on surface water from accidental spills and contaminants from trains is considered to be Negligible.
- 11.8.33** The Camnant and tributaries of the River Nant Llech, Dulais and Tawe have the potential to receive discharges from the attenuation basins on site. The Camnant is considered to be of High sensitivity and the tributaries of the River Nant Llech, River Dulais, River Tawe are considered to be of Medium sensitivity, the significance of effect on these features is considered to be *Slight Adverse* and not significant. As the effects on features is not significant, additional mitigation is not required.
- 11.8.34** Vehicles may be a source of accidental spills as a result of fuel leaks in car parks and development access roads and present a source of potential pollution to surface water quality. Spills could run off into surface water features presenting a pollution pathway. However, spills are expected to be minimal and it is considered that the introduction of the swales and attenuation basins would reduce pollutant concentrations entering surface waters to an acceptable level. Major spills are not anticipated due to the nature of the development. In addition, the quality of water entering surface watercourses would be controlled through a SAB application therefore there is expected to be no change to the surface water quality of the surface watercourses. The magnitude of impact on surface water quality from accidental spills from vehicles is considered to be Negligible. The exact layout of

the car parks and development access roads is not confirmed at this outline stage but it is expected that run-off would enter attenuation basins that discharge to tributaries of the Dulais, Tawe and the Camnant. For the tributaries of the River Dulais and River Nant Llech of Medium sensitivity and the Camnant of High sensitivity, the significance of effect is ***Slight Adverse***. The effect is not considered significant and additional mitigation is not required.

**11.8.35** The individual facilities within the washery site present a potential source of pollution to surface water quality through the hydrocarbons, oils, sediment, detergents and other pollutants washed off the trains or spilt during activities such as refuelling. It is acknowledged that some facilities within the washery site present a greater risk of pollution which would therefore be equipped with a specific drainage system including measures for intercepting contaminants if the effluent was accidentally released. However, there is still a risk of effluent being of unacceptable standards feeding into the wider drainage system and discharging into surface water features, therefore further measures would be required at detailed design.

**11.8.36** Without these measures the magnitude of impact is Moderate Adverse. Effluent from the washery site would discharge into the wider site drainage system that discharges into a tributary of the River Dulais and the Camnant. For the tributary of the River Dulais of Medium sensitivity, the significance of effect is ***Moderate Adverse***. For the Camnant of High sensitivity, the significance of effect is ***Large Adverse***. The effects are significant and further mitigation is required as the project is at outline stage, the measures required have not yet been defined but will be secured at the reserved matters stage and agreed in consultation with NRW, PCC and NPTCBC.

#### Surface Water Quantity

**11.8.37** Operational activities that could impact surface water quantity include changes to the volume of surface run-off through the introduction or removal of development hardstanding. Additional discharges or removal of existing discharges to surface water features could also impact surface water quantity.

**11.8.38** The proposed development will introduce additional hardstanding through the testing track and washery site. The proposed development does not include any additional discharges to surface water features to those existing.

**11.8.39** The drainage design will ensure that any surface water run-off from hardstandings is collected in swales and attenuation ponds. The attenuation ponds will discharge into the Camnant and the tributaries of the River Tawe, River Nant Llech and River Dulais at Greenfield Runoff Rates (GRR). Discharging into surface water features at GRR will ensure that the existing hydrological regime is maintained and there will be no change to surface water quantity. The magnitude of impact on surface water quantity is therefore No Change. For the

Camnant of High sensitivity and the tributaries of the River Tawe, River Nant Llech and River Dulais of Medium sensitivity, the significance of effect is *Neutral*. The effect is not considered significant and additional mitigation is not required.

### Hydromorphology

- 11.8.40 The activities that would involve direct physical modifications to surface water features and impact their hydromorphology include:
- Introduction and construction of culverts over the tributary of the River Dulais;
  - Diversion of the tributary of the River Dulais; and
  - Removal of on site ditches and ponds.
- 11.8.41 New culverts would remove natural channel bed and banks. If designed inappropriately, culverts can cause local scour, prohibit fish passage and impair downstream transport of sediment. However, the proposed culverts would be designed to CIRIA Guide C786 standard to allow the same volume and rate of flow as the existing tributary. Culverts have already been introduced over the tributary so the introduction of an additional culvert is not considered to impact the natural habitat of the tributary. Following introduction of good culvert design, the magnitude of impact is considered to be Minor Adverse. For the tributary of the River Dulais with a Medium sensitivity, the significance of effect is *Slight Adverse*. The effect is not considered significant and additional mitigation is not required.
- 11.8.42 The diversion of the River Dulais tributary in close proximity of the Dulais headwaters causes modification of a natural system and could impact surrounding habitats that are dependent on the existing hydrological regime. The stretch of the River Dulais tributary that is to be diverted shows evidence of previous realignment for the existing railway track to the north. However, the magnitude of impact is considered to be Moderate Adverse as the works will cause permanent loss of part of the feature. For the tributary of the River Dulais with Medium sensitivity, the significance of effect *Moderate Adverse*. Additional mitigation is required.
- 11.8.43 Removal of on site ditches and ponds is required for the introduction of development proposals. The ponds and on site ditches are artificial and expected to have resulted from the mine workings. Based on the guidance, the magnitude of impact is considered to be Major Adverse due to the loss of the attribute. As the sensitivity of ponds and ditches is low, the significance of effect is *Slight Adverse* and not considered significant. No additional mitigation is required. The guidance specifies that the impact could be Slight Adverse or Moderate Adverse. As the ditches and ponds on site are artificial and a result of the mine workings or recently introduced through the restoration plan, Slight Adverse has been chosen.

## Groundwater

### Groundwater Quality

- 11.8.44 Operational activities that could impact groundwater quality include poor surface water quality, accidental spills from trains on the testing track, accidental spills from vehicles on development roads and car parks and run-off from the washery site.
- 11.8.45 Surface water drainage discharges have the potential to impact groundwater quality if discharged into dry surface watercourses or surface watercourses of low flow as discharges will seep into groundwater. The treatment train of SuDS features is considered sufficient to treat the quality of discharges and therefore even if discharged to dry surface watercourses or watercourses of low flow, groundwater quality would not be impacted. The resulting magnitude of impact on groundwater quality through drainage discharges is Negligible. The South Wales Coal Measures Formations (both Middle and Lower) underlying the tributaries on site has Medium sensitivity, the significance of effect on this receptor is therefore ***Slight Adverse***. The effect is not considered to be significant and additional mitigation is not required.
- 11.8.46 Trains are a potential source of accidental spillages that present a source of potential pollutants to groundwater. Potential pathways from train accidental spills or leakages include direct infiltration at source or infiltration from surface water drainage features e.g. swales during periods of low flow. The design currently allows for attenuation ponds being lined with an impermeable layer to allow permanent wet conditions.
- 11.8.47 Accidental spills that could directly infiltrate are considered to be minimal and would be intercepted by the track drainage. The likelihood of spills is low because trains would not be stationed and would always be moving. The track drainage system would be designed in accordance with Network Rail standards NR/L2/CIV/005/02 and Environmental Management Plans. Any accidental spills would be collected in the track ballasts and directed into the track drainage system that flows into swales and then into attenuation ponds. The track drainage along the test tracks is unlikely to have means of separating pollutants and will likely consist of a basic collector drain (or multiple) in the cess with a typical outlet into the wider drainage system leading to attenuation/treatment. Therefore, there is potential for seepage into groundwater at the swales. Considering all of these factors, the potential magnitude of impact is Moderate Adverse. For the South Wales Coal Measures Formations of Medium sensitivity, the significance of effect is ***Moderate adverse***. The effects are considered significant and additional mitigation is required as the project is at outline stage and additional measures to manage impacts have not yet been defined. These measures will be



defined at detailed design, secured through the reserved matters stage and agreed in consultation with NRW, PCC and NPTCBC.

- 11.8.48 Vehicles may be a source of accidental spillage as a result of fuel leaks from car parks and roads within the site boundary presenting a source of potential pollutants to groundwater quality. Major spills are not anticipated due to the nature of the development. Potential pathways from vehicle accidental spills include direct infiltration at source or infiltration from surface water drainage features during periods of low flow. Accidental spills that could directly infiltrate are anticipated to be minimal due to the impermeable development roads and hardstanding. However, there is a potential for infiltration from surface water features when spills are deposited into the swales. Therefore, the potential magnitude of impact is Moderate Adverse. For the South Wales Coal Measures Formations of Medium sensitivity, the significance of effect is *Moderate adverse*. The effect is significant and additional mitigation is required as the project is at outline stage and additional measures to manage impacts have not yet been defined. These measures will be defined at detailed design, secured through the reserved matters stage and agreed in consultation with NRW, PCC and NPTCBC.
- 11.8.49 The individual facilities within the washery site present a potential source of pollution to groundwater quality through hydrocarbons, oils, sediment, detergents and other pollutants washed off the trains or spilt during activities such as refuelling. Potential pathways for pollutants include direct infiltration at source or infiltration from surface water drainage features during periods of low flow. It is acknowledged that some facilities within the washery site present a greater risk of pollution compared to the testing tracks and therefore individual facilities are equipped with a slab track to direct effluent into the facilities' specific drainage system to intercept pollutants. These measures would prevent effluent seepage into groundwater.
- 11.8.50 However, there is still a risk of effluent seeping into groundwater in the areas where track ballasts are present and slab tracks have not been incorporated. Without these slab tracks, the magnitude of impact is Moderate Adverse. For the South Wales Coal Measures Formations of Medium sensitivity, the significance of effect is *Moderate Adverse*. The effect is significant and additional mitigation is required as the project is at outline stage and additional measures to manage impacts have not yet been defined. These measures will be defined at detailed design, secured through the reserved matters stage and agreed in consultation with NRW, PCC and NPTCBC.

#### Groundwater Dependent Terrestrial Ecosystems

- 11.8.51 As previously mentioned there are three SSSIs within the study area that contain GWDTE: Nant Llech, Gorsllwyn and Caeau Ton-y-Fildre.

- 11.8.52 Operational activities such as cuttings drainage required for deep cuttings have the potential to influence the groundwater regime of GWDTE.
- 11.8.53 Although the main groundwater body is located at considerable depth groundwater e.g. associated with sandstone bands or fractured/weathered mudstone, it may be intercepted by the proposed drainage. The proposed testing tracks are located at approximately 250-260mOD and in some locations these are accommodated by cuttings in the ground. The groundwater levels may therefore be locally reduced to these levels. This is higher than the ground elevation of the identified GWDTE, which are located at approximately 200-250mOD (Nant Llech) and at approximately 230-240mOD (Gorsllwyn and Caeau Ton-y-Fildre). Therefore, it is unlikely that the reduced groundwater levels would have an impact on groundwater levels beneath GWDTE areas, which are likely to be at the ground level.
- 11.8.54 Furthermore, the Nant Llech is located on the northern side of the Nant Llech valley. The watercourse creates a natural hydraulic barrier and therefore preventing changes to the groundwater regime. The Caeau Ton-y-Fildre GWDTE is underlaid by alluvium superficial deposits on top of glacial till superficial deposits which are expected to provide the groundwater flows sustaining this GWDTE. The proposed development will not impact these deposits or involve any activities that could draw water away from this area and hence will not influence the groundwater level of this GWDTE. The Gorsllwyn GWDTE is located on peat superficial deposits which are expected to provide the groundwater levels sustaining the GWDTE. The proposed development will not impact these peat deposits or undertake any activity that could draw water away from this area and hence will not influence the groundwater level of Gorsllwyn GWDTE.
- 11.8.55 The impact of the permanent drainage on the GWDTE is anticipated to be Negligible. With the sensitivity of all three GWDTE as Very High, the significance of effect is *Slight Adverse*. As the effect is not significant, no additional mitigation is required.

### Flood Risk

- 11.8.56 The potential operational impacts upon surface water could result from an increase in hardstanding formed as part of the proposed development which would cause an increased volume and rate of surface water run-off across the site into the receiving surface watercourses when compared to the existing situation.
- 11.8.57 As previously mentioned, the proposed surface water drainage system will comprise SuDS features to attenuate surface water run-off. The attenuation features will discharge surface water run off at Greenfield Runoff Rate (GRR) or below Greenfield Runoff Rate, in line with the



existing arrangement on site. Further details can be found in the Drainage Strategy in Appendix 11B.

- 11.8.58 The proposed realignment of a tributary of the River Dulais would require a culvert. The culvert would be designed to allow the same volume and rate of flow as the existing tributary in accordance with CIRIA Guide C786.
- 11.8.59 Based on the information included in the drainage strategy for the site including the introduction of the measures listed, the magnitude of impact upon all existing and proposed receptors is considered to be Negligible. Existing receptors include the existing communities of the River Tawe, River Pyrddin and River Dulais catchment with a High sensitivity. Proposed receptors include the central control building, research and development centre, testing track, carriage washing facility and proposed car park and access roads with a Medium sensitivity. The significance of effect on all existing receptors is *Slight Adverse*. The effect on existing and proposed receptors is not considered to be significant and additional mitigation is not required.

### Climate Change

- 11.8.60 Climate change impacts including increased precipitation and an increased frequency of extreme weather events have the potential to exacerbate impacts already identified in preceding sections of this assessment.
- 11.8.61 Increased precipitation has the potential to exacerbate flood risk on existing and proposed receptors through an increase in surface water runoff. The site is at low risk of flooding and the drainage strategy has been designed to accommodate for potential climate change. Therefore, the magnitude of impact is considered to be No Change.
- 11.8.62 Existing receptors include the existing communities surrounding the River Tawe, River Pyrddin and River Dulais catchment which have a High sensitivity. Future receptors include the central control building, research and development centre, testing track, carriage washing facility and proposed car park and access roads which would have a Medium sensitivity. The significance of effect on all existing and future receptors is *Neutral*. The effect is not significant and additional mitigation is not required.
- 11.8.63 An increase in extreme weather events can cause long periods of dry weather resulting in watercourses with lower flow. Less rainfall can cause pollutants to accumulate and during extreme events (e.g. summer thunderstorms) pollutants can runoff into watercourses where there is little dilution, increasing the effect of pollution. The introduction of SuDS is sufficient to mitigate the risk of drier/drought conditions on surface water quality that could impact underlying strata. The magnitude of impact is No Change. For the South Wales Coal Measures Formations of Medium sensitivity, the significance of

effect is *Negligible*. The effects are considered not significant and additional mitigation is not required.

## 11.9 Mitigation

11.9.1 This section describes the mitigation and enhancement required following the assessment of effects.

### Mitigation of effects from construction

11.9.2 The assessment of effects resulting from construction activities identified that no additional mitigation is required.

### Mitigation of effects from operation

11.9.3 The assessment of effects resulting from operation activities identified that additional mitigation is required for effects on surface water quality, hydromorphology and groundwater quality.

#### Surface Water Quality

11.9.4 The assessment has identified impacts on surface water quality as a result of the polluted effluent anticipated to discharge from the washery site into surface water features. A Moderate Adverse impact was identified for the tributary of the River Dulais and a Large Adverse impact identified for the Camnant.

11.9.5 Separate drainage systems, pollutant interceptors and further measures if required would be incorporated into the washery site to intercept pollutants and detergents at detailed design. These measures would be secured at the reserved matters stage and agreed in consultation with NRW, PCC and NPTCBC. These systems would ensure the effluent leaving the site is of an acceptable quality to be released into the wider site drainage system.

#### Hydromorphology

11.9.6 The assessment has identified a Moderate Adverse impact on hydrology as a result of the diversion of the tributary of the River Dulais. The requirement to realign a section of the River Dulais will be reconsidered during detailed design of the track.

11.9.7 The realignment of the watercourse would impact upon channel morphology and may also impact upon hydrology by limiting the ability of the realigned watercourse to receive water from existing springs.

11.9.8 The following design principles would be implemented during the detailed design of the scheme to mitigate the effects of the realignment upon hydromorphology:

- The detailed design of the realigned watercourse would provide naturalistic features of an equivalent or greater value to that of the existing watercourse;
- The channel design would incorporate bioengineering techniques over traditional hard engineering where feasible;
- The flow regime of the realigned watercourse would be as similar as the existing flow regime as practicable;
- The detailed design would be overseen by an experienced fluvial geomorphologist.

### Groundwater Quality

**11.9.9** The assessment identified a Moderate Adverse impact on groundwater quality from accidental spills from vehicles and trains. There is potential for seepage into groundwater through the surface water drainage feature swales and a more detailed risk assessment to confirm the appropriate treatment and swale design should be undertaken as part of detailed design when more information is available.

**11.9.10** The assessment also identified a Moderate Adverse impact on groundwater quality as a result of polluted effluent anticipated to discharge from the washery site into groundwater receptors. A Moderate Adverse Impact was identified on the South Wales Coal Measures Formations. Slab tracks, separate drainage systems and further measures if required to intercept pollutants and detergents would be incorporated into the washery site at detailed design. These measures would be secured at the reserved matters stage and agreed in consultation with NRW, PCC and NPTCBC. These systems would ensure effluent leaving the site will be isolated and not seep into groundwater receptors before treatment.

## 11.10 Residual effects

### Residual effects from construction

**11.10.1** There has been no additional mitigation or enhancement described therefore the effects remain as specified in the assessment above.

### Residual effects from operation

**11.10.2** Following the introduction of mitigation measures specified in Section 11.9, the following residual impacts are anticipated.

### Surface Water Quality

**11.10.3** Following the introduction of separate drainage systems to intercept pollutants, the magnitude of impact is reduced from Moderate

Adverse to Negligible for both the Camnant and the tributary of the River Dulais. For the Camnant of High sensitivity, the significance of effect is reduced from Large Adverse to *Slight Adverse*. For the tributary of the River Dulais, the significance of effect is reduced from Moderate Adverse to *Slight Adverse*. The effects are not considered significant.

### Hydromorphology

- 11.10.4 The tributary of the River Dulais shows evidence of previous realignment and is not considered to be in its natural form. Should the tributary of the River Dulais require further realignment, mitigation specified will reduce the magnitude of impact from Moderate Adverse to Minor Adverse. For the tributary of the River Dulais with Medium sensitivity, the significance of effect is *Slight Adverse* and not significant.

### Groundwater Quality

- 11.10.5 Following a detailed risk assessment and appropriate treatment and design of swales, the magnitude of impact from vehicle spills is reduced from Moderate Adverse to Minor Adverse. For the South Wales Coal Measures Formations of Medium sensitivity, the significance of effect is *Slight Adverse*.
- 11.10.6 Following the introduction of slab tracks and separate drainage systems to intercept pollutants and detergents, the magnitude of impact on the South Wales Coal Measure Formation reduces from Moderate Adverse to Negligible. For the South Wales Coal Measures Formations of Medium sensitivity, the significance of effect is *Slight Adverse*. For the glacial till deposits and peat deposits of Low sensitivity, the significance of effect is *Slight Adverse*. The effects are not considered significant.

## Assessment summary matrix

Potential Effect	Receptor (s)	Sensitivity of Receptor	Magnitude (prior to mitigation)	Significance (prior to mitigation)	Mitigation	Magnitude (following mitigation)	Significance (following mitigation)
<b>Effects from construction</b>							
Surface water quality impacts	Camnant	High	Negligible	Slight Adverse	N/A	Negligible	Slight Adverse
	Tributaries of River Dulais, Nant Llech and Tawe	Medium	Negligible	Slight Adverse	N/A	Negligible	Slight Adverse
	Ponds, Wetlands, Ditches	Low	Negligible	Slight Adverse	N/A	Negligible	Slight Adverse
Surface water quantity	Camnant	High	Negligible	Slight Adverse	N/A	Negligible	Slight Adverse
	Tributaries of River Dulais, Nant Llech and Tawe	Medium	Negligible	Slight Adverse	N/A	Negligible	Slight Adverse
	Ponds, Wetlands, Ditches	Low	Negligible	Slight Adverse	N/A	Negligible	Slight Adverse
Hydromorphology impacts	Tributary of River Dulais	Medium	Minor Adverse	Slight Adverse	N/A	Minor Adverse	Slight Adverse
	Ditches	Low	Minor Adverse	Slight Adverse	N/A	Minor Adverse	Slight Adverse
Groundwater quality impacts	South Wales Coal Measures Formations (both Middle and Lower)	Medium	Negligible	Slight Adverse	N/A	Negligible	Slight Adverse
GWDTE impacts	Nant Llech Gorsllwyn Caeau Ton-y-Fildre	Very High	Negligible	Slight Adverse	N/A	Negligible	Slight Adverse
Flood risk impacts	Existing communities in River Tawe, River Pyrddin and River Dulais catchment	High	Negligible	Slight Adverse	N/A	Negligible	Slight Adverse

Climate Change	All receptors	Very High - Low	No Change	Negligible	N/A	No Change	Negligible
Effects from operation							
Surface water quality (train accidental spills)	Camnant	High	Negligible	Slight Adverse	N/A	Negligible	Slight Adverse
	Tributaries of River Dulais, Nant Lech and Tawe	Medium	Negligible	Slight Adverse	N/A	Negligible	Slight Adverse
Surface water quality (vehicle spills)	Camnant	High	Negligible	Slight Adverse	N/A	Negligible	Slight Adverse
	Tributaries of River Dulais and River Nant Lech	Medium	Negligible	Slight Adverse	N/A	Negligible	Slight Adverse
Surface water quality (individual facilities in the washery site)	Camnant	High	Moderate	Large Adverse	Measures to intercept pollutants	Negligible	Slight Adverse
	Tributary of River Dulais	Medium	Moderate	Moderate Adverse	Measures to intercept pollutants	Negligible	Slight Adverse
Surface water quantity	Camnant	High	No Change	Neutral	N/A	No Change	Neutral
	Tributaries of River Dulais and River Nant Lech	Medium	No Change	Neutral	N/A	No Change	Neutral
Hydromorphology	Tributary of River Dulais	Medium	Minor Adverse	Slight Adverse	N/A	Minor Adverse	Slight Adverse
	Diversion of River Dulais	Medium	Moderate Adverse	Moderate Adverse	Match or exceed the form and habitat value of the channel	Minor Adverse	Slight Adverse
	Ponds and ditches	Low	Major Adverse	Slight Adverse	N/A	Major Adverse	Slight Adverse

Groundwater (surface water drainage discharges)	South Wales Coal Measures Formations	Medium	Negligible	Slight Adverse	N/A	Negligible	Slight Adverse
Groundwater quality (vehicle spills)	South Wales Coal Measures Formations	Medium	Moderate	Moderate Adverse	Detailed risk assessment to inform treatment and design	Minor Adverse	Slight Adverse
Groundwater quality (individual facilities in the washery site)	South Wales Coal Measures Formations	Medium	Moderate Adverse	Moderate Adverse	Slab tracks and any additional mitigation to intercept pollutants	Negligible	Slight Adverse
GWDTE	Nant Llech Gorsllwyn Caeau Ton-y-Fildre	Very High	Negligible	Slight Adverse	N/A	Negligible	Slight Adverse
Flood Risk	Existing communities in River Tawe, River Pyrddin and River Dulais catchment	High	Negligible	Slight Adverse	N/A	Negligible	Slight Adverse
	Central control building Research and development centre Testing track Carriage washing facility Proposed car park Access roads	Medium	Negligible	Slight Adverse	N/A	Negligible	Slight Adverse

Climate Change (flooding)	Existing communities in River Tawe, River Pyrddin and River Dulais catchment	High	No Change	Neutral	N/A	No Change	Negligible
	Central control building Research and development centre Testing track Carriage washing facility Proposed car park Access roads	Medium	No Change	Neutral	N/A	No Change	Negligible
Climate Change (pollution)	Camnant	High	No Change	Neutral	N/A	No Change	Negligible
	Tributaries of River Dulais and River Nant Lech	Medium	No Change	Neutral	N/A	No Change	Negligible



