Appendix 20: Water resources report

WATER ENVIROMENT IMPACT ASSESSMENT

Prepared for: WEPA UK Limited

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1.0 Introduction

SLR Consulting Ltd (SLR) has been appointed on behalf of WEPA UK Limited to prepare this Water Environment Impact Assessment in support of plans for the extension of their existing papermill site in Bridgend.

This report considers the impact of the proposed development on water resources (including both groundwater and surface water), flood risk and drainage at the site of the proposed development and in the surrounding area. It seeks to identify possible hydrogeological and hydrological impacts associated with the scheme during both the construction and operational phases, including impacts associated with the required changes in the abstraction and discharge regime.

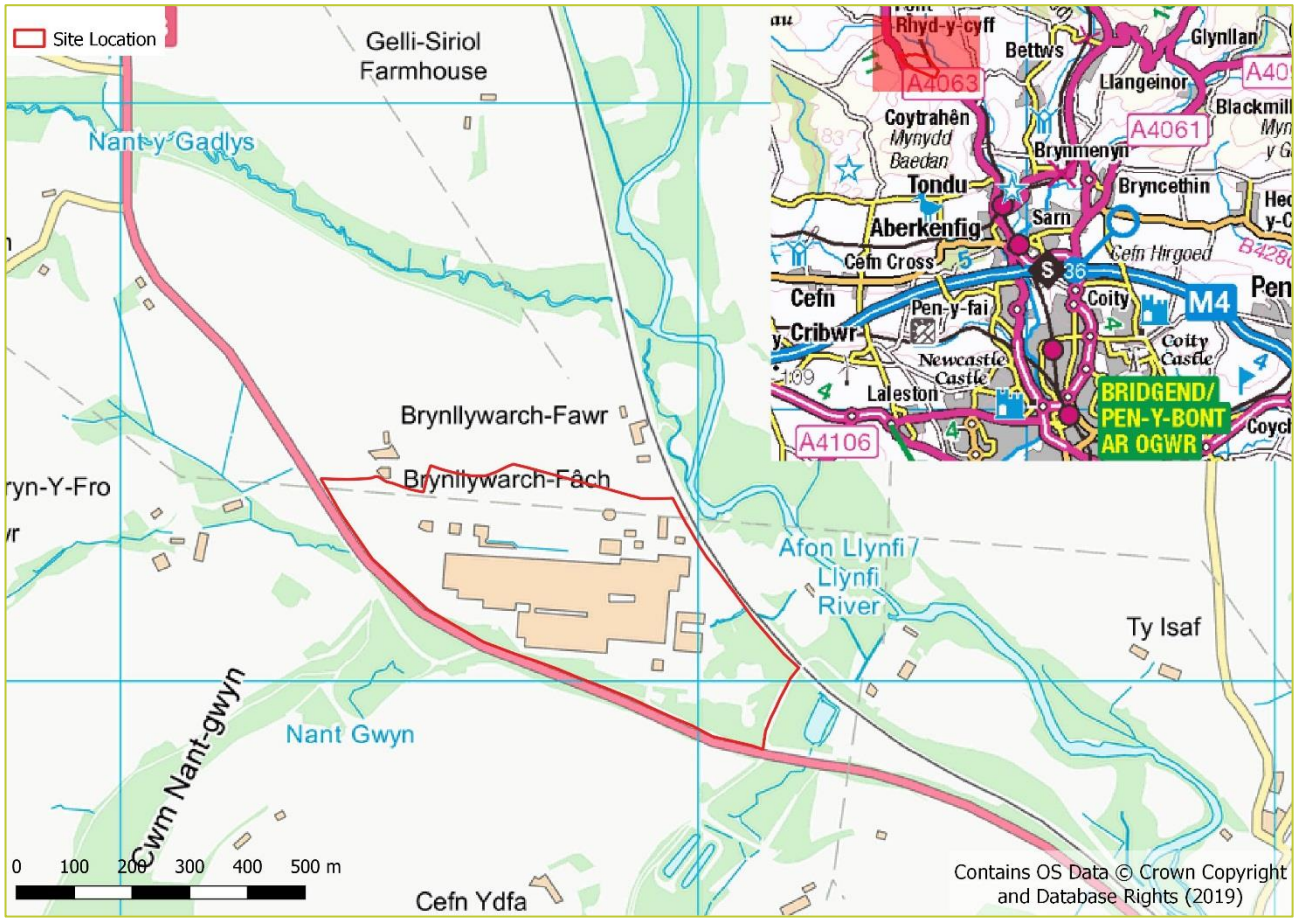
It should be noted that, as an impact assessment, this report does not explicitly consider the risk of flooding to the proposed development but does consider how the proposals may alter flood risk at the site and elsewhere.

The flood risk to the proposed development is considered separately in a Flood Consequence Assessment (FCA) which is enclosed as Appendix 01.

1.1 Existing Site

The proposed development site shown in Figure 1-1 is located on the site of the existing Bridgend mill site approximately 5 km to the north of Bridgend town centre, in an area bound to the south and to the west by the A4063, to the east by the River Llynfi, and to the north by open farmland. The site is orientated along its long axis in an approximate west to east direction and it is accessed via the A 4063 (Bridgend Road) between Maesteg and Coytrahen, with traffic generally proceeding south towards the M4.

Figure 1-1
Site Location



1.2 Development Proposals

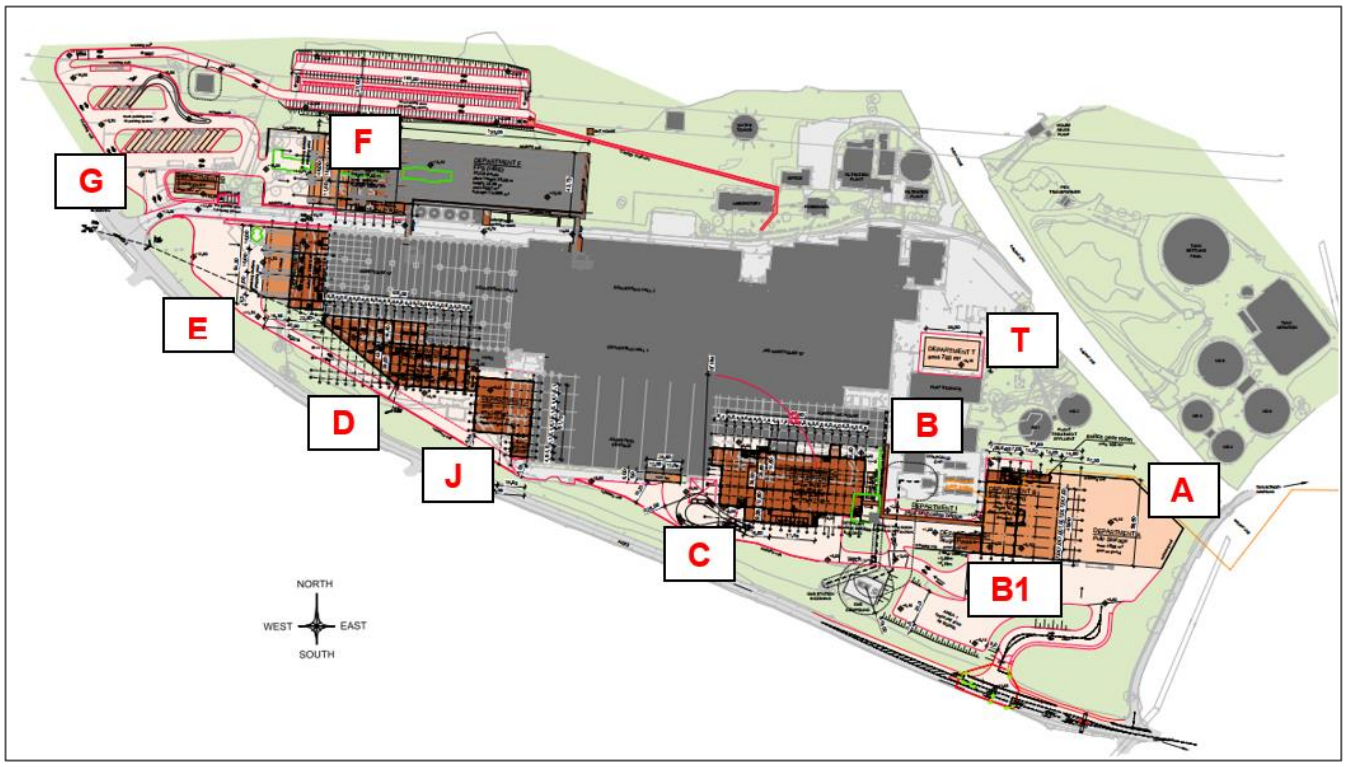
A range of site layouts had been examined before culminating in the final design of the Project. Alternative design options for the Project are limited due to the existing physical site layout as well as the confined conditions of the WEPA premises. The proposed development will include the buildings and areas as listed below and shown in Figure 1-2:

- A - Pulp Storage (south-east)
- B - Bale Handling (south-east)
- B1 - Sludge Press building (south-east)
- I - Pipe Bridge (south-east)
- C - Paper Machine Building (south)
- D - Converting Building (south-west)
- J – New Jumbo Reel Storage (south-west)
- E - Shipping Area (north-west)
- F - Finished Product Storage (north)

- G - Gate House (west)
- T - Storage Area

The existing site has a single point access at the western end of the site which, through the redevelopment of this site, will be upgraded. A new secondary vehicle access is proposed to the south-eastern end of the development site.

Figure 1-2
Site Overview



2.0 Methodology

2.1 Legislation and Planning Policy

Reference has been made to relevant legislation, planning policy, technical guidance and other codes of best practice in the design of the proposed development to limit,

- the potential for contamination of ground and surface waters,
- the potential for flooding to be caused or exacerbated by the proposed development, and
- other potential impacts on the water environment.

The proposed development would therefore be in accordance with the following legislation, guidance and planning policies.

2.1.1 Legislation

Water within the local area of the proposed development is currently regulated according to the following key European Commission (EC) Directives and the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017. These legislations will remain extant and applicable within Wales despite Brexit until they are either superseded by national legislation by the UK government or devolved assembly.

2.1.2 Water Framework Directive

The Water Framework Directive (2000/60/EC) (the "WFD") provides the foundation for the protection of the UK's water environment. The WFD seeks to protect all elements of the water cycle and to enhance the quality of groundwater, surface waters, estuaries and coastal waters. The Directive is transposed and implemented within England and Wales through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017.

2.1.3 Groundwater Directive

The Groundwater Directive (2006/118/EC, including amendments to Annex II detailed under Directive 2014/80/EU) (the "GWD") is designed to combat groundwater pollution and sets out procedures for assessing quality of groundwater. Aspects of the GWD are transposed and implemented through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017, the Environmental Permitting (England and Wales) Regulations 2016 and the Groundwater (England and Wales) Regulations 2009;

2.1.4 Floods Directive

The Floods Directive (2007/60/EC) which requires assessment of all watercourses and coastlines to determine risk of flooding and action to take adequate and coordinated measures to reduce this flood risk. The Flood Risk Regulations 2009 transpose the EU Floods Directive into law in England and Wales;

The Flood and Water Management Act 2010, which largely devolved powers in relation to flood risk management in Wales to Welsh Ministers.

2.1.5 Freshwater Fish Directive

The Freshwater Fish Directive (78/659/EEC) (recodified 2006/44/EC) was originally adopted on 18th July 1978 but consolidated in 2006. The Directive seeks to protect fresh water bodies identified as waters suitable for sustaining fish populations. For those waters identified, physical and chemical water quality objectives are set for salmonid waters and cyprinid waters. Waters protected under the Directive are formally designated through the issue of a notice. In Wales the notice is issued by the Department for Environment, Food and Rural Affairs

(DEFRA) and it places an obligation on the Natural Resources Wales (NRW) to ensure that designated waters meet their objectives.

2.1.6 Nitrates Directive

The Nitrates Directive (91/676/EEC) aims to reduce water pollution by nitrate from agricultural sources and to prevent such pollution occurring in the future. The directive requires DEFRA and the Welsh Assembly Government to identify surface or groundwaters that are, or could be, high in nitrate from agricultural sources. Nitrogen is one of the nutrients that can affect plant growth. Surface waters also have to be identified if too much nitrogen has caused a change in plant growth which affects existing plants and animals and the use of the water. Once a water body has been identified, all land draining to that water is designated as a Nitrate Vulnerable Zone.

2.1.7 Planning Policy

Planning Policy Wales

Planning Policy Wales (PPW) sets out the Government's planning policies for Wales and how they are expected to be applied. PPW, Technical Advice Notes (TAN's), circulars and policy clarification letters comprise national planning policy. The PPW states that:

- Planning policies, decisions and proposals should promote resource-efficient and climate change resilient settlement patterns that minimise land-take (and especially extensions to the area of impermeable surfaces) and urban sprawl, especially through preference for the re-use of suitable previously developed land and buildings, wherever possible avoiding development on greenfield sites;
- When drawing up policies and proposals for their area local planning authorities must acknowledge that government resources for flood and coastal defence projects are directed at protecting 'existing' developments and are not available to provide defences in anticipation of future development. A sustainable approach to flooding will therefore involve the avoidance of development in flood hazard areas and, where possible or practical, the encouragement of managed retreat, the creation of wash-lands and flood plain restoration;
- Development plans should take water-related issues into account from an early stage in the process of identifying land for development and redevelopment. New development should be located, and its implementation planned in such a way as to allow for sustainable provision of water services, in particular minimising vulnerability to the impacts of climate change. Design approaches and techniques that improve water efficiency and minimise adverse impacts on water resources, surface water quality, the ecology of rivers and groundwater should be encouraged;
- Development proposals should also include features that provide effective adaptation to, and resilience against, the current and predicted future effects of climate change, for example by incorporating green space to provide shading and sustainable drainage systems to reduce run-off, and are designed to prevent overheating and to avoid the need for artificial cooling of buildings;
- The adequacy of water supply and the sewage infrastructure are material in considering planning applications and appeals. The need to balance the growing demand for water with the needs of the environment is crucial;
- Even where there is theoretical capacity, timely investment in infrastructure is required to ensure that new development does not adversely affect water supplies, water quality or sewerage. These issues require early identification when locating future development. Local planning authorities should therefore encourage the use of sites where existing water supply and/or drainage provision problems can be solved and seek to avoid the use of sites where adequate water supply and/or drainage provision is unlikely to be achieved;

- Development proposals in sewered areas must connect to the main sewer, and it will be necessary for developers to demonstrate to local planning authorities that their proposal site can connect to the nearest main sewer. To ensure consistency of design and facilitate long-term maintenance, sewers should be built to an adoptable standard, and developers should consult sewerage undertakers in the early stages of design and planning.

Technical Advice Note – TAN 15

Technical Advice Note (TAN) 15 provides technical guidance which supplements the policy set out in Planning Policy Wales in relation to development and flooding.

National Assembly for Wales produced the 'Technical Advice Note (TAN15)' in July 2004. An update to TAN15 was published as a consultation draft in October 2019. The consultation period will end in January 2020. Included with the proposed work is a new Wales Flood Map/

Currently the majority of the site is located within Flood Zone A (lowest flood risk), however a n area of the site is indicated to lie within Flood Zone B as defined by the Development Advice Maps [1].

In relation to new development within Zone B, it states that:

> *"When considering allocations in Zone B, local planning authorities should consult the Environment Agency to ascertain whether flooding raises a significant constraint in terms of land use. It is not expected that an assessment of the consequences be undertaken at the plan preparation stage but should flooding be considered an issue then policies outlining the appropriate requirements should be included in the plan, in accordance with Sections 6 and 7, and Appendix 1."*

TAN15 also requires new developments to reduce the causes and impacts of surface water flooding by implementing the Sustainable Drainage System (SuDS).

With respect to surface water run off from new development, TAN15 states that:

> *"SuDS can perform an important role in managing run-off from a site and should be implemented, wherever they will be effective, in all new development proposals, irrespective of the zone in which they are located.*
>
> *Development in one part of a catchment may increase run-off and hence flood risk elsewhere, therefore, the aim should be for new development not to create additional run-off when compared with the undeveloped situation, and for redevelopment to reduce run-off where possible. It is accepted that there may be practical difficulties in achieving this aim."*

National Strategy for Flood and Coastal Erosion Risk Management in Wales

In accordance with the Flood and Water Management Act, 2010, the Welsh Government has prepared the 'National Strategy for Flood and Coastal Erosion Risk Management in Wales' in November 2011.

In relation to flood risk management, it states that:

> *"Drainage and defence still have a place within a flood and coastal erosion system based on the principals of risk management, but we also need to considered other options that could reduce both the likelihood of an event occurring and the consequence of those events".*

Examples of other options that could be used include:

- Deploying sustainable drainage systems more widely;
- Incorporating greater resilience into the design of developments;

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[1] Natural Resources Wales, Development Advice Map (Accessed June 2019) https://naturalresources.wales/evidence-and-data/maps/long-term-flood-risk/?lang=en

- Ensuring wider awareness of individual risk to increase levels of preparedness and planning for flood events.

It is also required that Development of Local Development Plans to include adequate provisions in respect of flood and coastal erosion risk in compliance with the requirements of Planning Policy Wales and relevant Technical Advice Note (TAN15).

Strategic Flood Consequence Assessment

A Strategic Flood Consequence Assessment (SFCA) for Bridgend County Borough was carried out by Capita Symonds in October 2010. The aim of the SFCA was to inform a range of activities, including land use planning, emergency planning, development control and the development of specific flood risk management policy. The SFCA has been developed at a Strategic Scale to support the (existing) Local Development (LDP).

Bridgend County Borough Local Development Plan (LDP)

The existing Bridgend Local Development Plan (2006-2021) was adopted by Bridgend County Borough Council on 18th September 2013.

In relation to protecting and enhancing the environment, the following are included within the objectives of the LDP:

- "OBJ 2a: To promote, conserve, and enhance the natural, historic and built environment of the County Borough.
- OBJ 2b: To safeguard the quality of water, air and soil and tackle or sources of pollution.
- OBJ2c: To manage development in order to avoid or minimise the risk and fear of flooding and enable and improve the functionality of floodplains."

The policies to achieve these objectives are:

- *"Policy PLA4: Climate Change and Peak Oil*
  - *All development proposals will be required to make a positive contribution towards tackling the causes of and adapting to the impacts of Climate Change and Peak Oil issues. Mean of achieving this may include:…*

    6) Using resources more efficiently, and minimising waste water use and pollution;

    7) Avoiding or minimising the risk from flooding and/or adapting to the increased risk of flooding, coastal erosion and warmer annual mean temperature; and

    8) Promoting sustainable building methods and drainage systems where appropriate."
- "Policy ENV7: Natural Resource Protection and Public Health
  - *Development proposals will only be permitted where it can be demonstrated that they would not cause a new, or exacerbate an existing, unacceptable risk of harm to health, biodiversity and / or local amenity due to: …*
  - *6) Water (including groundwater) pollution;*
  - *7) Any other identified risk to public health or safety.*
  - *Development in areas currently subject to the above will need to demonstrate mitigation measures to reduce the risk of harm to public health, biodiversity and/or local amenity to an acceptable level."*

Supplementary Planning Guidance

There are no current Supplementary Planning Guidance documents adopted by Bridgend County Borough Council which are of relevance to this Water Resources chapter.

2.1.8 Guidance

Relevant UK guidance on good practice for construction projects is detailed is detailed in the following documents:

- Control of Water Pollution from Construction Site (C532), Construction Industry Research and Information Association (CIRIA) 2001;
- Environmental Good Practice on Site (C741), CIRIA 2015;
- NRW have adopted the Environment Agency's approach to protecting groundwater set out in their guidance note; Protect Groundwater and Prevent Groundwater Pollution2, EA 2017.
- The SuDS Manual (C753), CIRIA 2015.

The CIRIA guidance provides help on environmental good practice for the control of water pollution arising from construction activities. It focuses on the potential sources of water pollution arising from construction activities and the effective methods of preventing its occurrence.

The EA guidance is part of a wider suite of documents and guidance relating to groundwater protection which sets out principles for assessing risk, protecting groundwater and permitting of abstractions and discharges from groundwater.

The SUDS Manual incorporates the latest research, industry practice and guidance for design, delivery and maintenance of Sustainable Drainage Systems (SuDS).

2.2 Information Sources

Detailed desk studies and site surveys were undertaken to determine the baseline conditions of the site using the following sources:

- British Geological Survey (BGS) Onshore GeoIndex online maps for details of geology and borehole logs (http://mapapps2.bgs.ac.uk/geoindex/home.html);
- Lle Geoportal for details on aquifer classification, source protection zones, groundwater vulnerability, flood risk and Water Framework Directive classifications for groundwater and rivers;
- The Swansea Bay Abstraction Licensing Strategy, by Natural Resources Wales;
- NRW information provided in response to an information request by SLR;
- Information provided in response to an information request by SLR to Bridgend County Borough Council and Vale of Glamorgan Council;
- Strategic Flood Consequence Assessment of Bridgend County Borough Council, Volume I, User Guide, October 2010
- Previous ES chapters written for the development proposal at or close to the site (ARUP, December 2002) and the neighbouring site (Sustainable Direction Limited, January 2011);
- Appendix 7-1 – Flood Consequence Assessment3, prepared by Quorum Consulting Engineers; and
- Aerial Imagery available on Google Earth and observations from a site walkover undertaken in December 2019.

2 https://www.gov.uk/government/publications/protect-groundwater-and-prevent-groundwater-pollution/protect-groundwater-and-prevent-groundwater-pollution

3 Quorum Consulting Engineers, WEPA UK Ltd Llangynwyd, Bridgend, Flood Risk Assessment, August 2019

2.3 Scoping Opinion

A Scoping Opinion was sought from Bridgend County Borough Council by way of a Scoping Request Report submitted on 2nd September 2019.

The response from council outlined the requirement for the inclusion of appropriate pollution control measures given the location of the site close to Afon LLynfi. The response also confirms that a Flood Consequence Assessment (provided in Technical Appendix 7-1) is required.

2.4 Additional Consultation

Flood risk data has been obtained by a data request to NRW and Bridgend County Council. The information received is considered in the baseline section of this chapter.

2.5 Assessment Methodology

The assessment has involved the following:

- Detailed desk study to establish current baseline hydrological and hydrogeological conditions;
- Site visit completed 28th November 2019;
- Identification of potential adverse changes (impacts) resulting from the proposed construction and operation of the development;
- Specification of proposed measures to avoid or mitigate these adverse impacts; and
- Evaluation of the residual significance of these adverse impacts following mitigation.

The desk study and site visit were undertaken to:

- Describe the hydrological and hydrogeological setting;
- Describe any surface water hydrology within and adjacent to the site;
- Describe existing drainage arrangements on and around the site;
- Identify flooding risk; and
- Identify sensitive hydrogeological and hydrological features which may potentially be impacted by the proposed development.

The extent of the desk study and site visits was based on professional judgment and is based on both proximity and the direction of flow pathways leading to and from the proposed development.

2.5.1 Study Area

The study area encompasses the site of the proposed development and immediate environs. All water features have been screened and those relevant have been considered.

2.5.2 Predicting Effects

A qualitative risk assessment methodology has been used to assess the significance of the potential effects associated with the proposed development. Two factors have been considered using this approach: the sensitivity of the receiving environment and the potential magnitude of impact, should that potential impact occur.

This approach provides a mechanism for identifying the areas where site specific mitigation measures are required and for considering the effectiveness of mitigation measures proposed to manage the risk presented

by the proposed development. This approach also allows effort to be focused on reducing risk where the greatest benefit may result.

2.5.3 Sensitivity of Receptor

Criteria for determining the significance of effects relates primarily to the importance of the hydrological receptor. Definitions are provided in Table 2-1.

Table 2-1
Value / sensitivity assessment

Sensitivity	Definition
High	• International importance. • Receptor with a high quality and rarity, regional or national scale and limited potential for substitution / replacement.
Medium	• National importance. • Receptor with a high quality, local scale and limited potential for substitution / replacement; or • Receptor with a medium quality and rarity, regional or national scale and limited potential for substitution / replacement.
Low	• Regional importance. • Receptor with a medium quality and rarity, local scale and limited potential for substitution / replacement; or • Receptor with a low quality and rarity, regional or national scale and limited potential for substitution / replacement.
Negligible	• Local importance. • Receptor with a low quality and rarity, local scale. • Environmental equilibrium is stable and is resilient to changes that are greater than natural fluctuations, without detriment to its present character.

2.5.4 Magnitude of Change (Impact)

The criteria that have been used to assess the magnitude of potential impacts (i.e. the potential scale of change) to the hydrological and hydrogeological environment will be based on professional judgement. Examples are however provided in Table 2-2.

Table 2-2
Magnitude of change (impact)

Magnitude	Criteria	Definition
High	Results in loss of attribute	Fundamental (long term or permanent) changes to hydrology, hydrogeology or water quality, such as: • Wholesale changes to watercourse channel, route, hydrology or hydrodynamics.

Magnitude	Criteria	Definition
		• Changes to the application site resulting in an increase in runoff with flood potential and also significant changes to erosion and sedimentation patterns. • Major changes to the water chemistry or hydro-ecology. • Major changes to groundwater levels, flow regime and risk of groundwater flooding.
Medium	Results in impact on integrity of attribute or loss of part of attribute	Material but non-fundamental and short to medium term changes to hydrology, hydrogeology or water quality, such as: • Some measurable changes to watercourses, hydrology or hydrodynamics. Changes to land cover within the application site resulting in an increase in runoff within system capacity. • Moderate changes to erosion and sedimentation patterns. • Moderate changes to the water chemistry of surface runoff and groundwater. • Moderate changes to groundwater levels, flow regime and risk of groundwater flooding.
Low	Results in minor impact on attribute	Detectable but non-material and transitory changes to hydrology, hydrogeology or water quality, such as: • Minor or slight changes to the watercourse, hydrology or hydrodynamics. • Changes to application site resulting in slight increase in runoff well within the drainage system capacity. • Minor changes to erosion and sedimentation patterns. • Minor changes to the water chemistry of surface runoff and groundwater. • Minor changes to groundwater levels, flow regime and risk of groundwater flooding.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect the use/integrity.	No perceptible changes to geology, hydrology, hydrogeology or water quality, such as: • No impact or alteration to existing important geological environs. • No alteration or very minor changes with no impact to watercourses, hydrology, hydrodynamics, erosion and sedimentation patterns. • No pollution or change in water chemistry to either groundwater or surface water. • No alterations to groundwater recharge or flow mechanisms.

It should be noted that many potential hydrological and hydrogeological impacts are probabilistic in nature. This type of impact (i.e. an impact relate to a severe storm or flood event) is clearly different from one that will definitely occur (i.e. changes process effluent discharge quality or volumes). As such, where appropriate and with justification, professional judgement would be used to adjust the stated magnitude of an impact for low probability impacts.

2.5.5 Significance of Effect

The sensitivity of the receiving environment together with the magnitude of the impact defines the significance of the potential effect, as identified within Effects of 'major' and 'moderate' significance are considered to be 'significant' in terms of the EIA Regulations.

Table 2-3
Significance of Effect

		Sensitivity of Receptor			
		High	**Medium**	**Low**	**Negligible**
Magnitude of Effect	**High**	Substantial / Major	Substantial / Major	Moderate	Neutral / Negligible
	Medium	Substantial / Major	Moderate	Minor	Neutral / Negligible
	Low	Moderate	Minor	Minor	Neutral / Negligible
	Negligible	Neutral / Negligible	Neutral / Negligible	Neutral / Negligible	Neutral / Negligible

The characteristics of the impacts are described in terms of direct / indirect, secondary, cumulative, transboundary, temporary (reversible) / permanent (irreversible), together with timescales (Short, medium, long term).

2.5.6 Mitigation Hierarchy

Flooding

The general approach of the Planning Policy for Wales, supported by TAN15, is to advise caution in respect of new development in areas at high risk of flooding by setting out a precautionary framework to guide planning decision. The overarching aim of the precautionary framework is, in order of preference to:

- Direct new development away from those areas which are at high risk of flooding;
- Where development has to be considered in high risk areas only those developments which can be justified on the basis of the Justification Tests set out in TAN 15 will be permitted

Drainage

Current best practice guidance, The SuDS Manual (CIRIA Report C753), promotes sustainable water management (SuDS) as a means of mitigating the impact of development. The SuDS Manual identifies a hierarchy of SuDS for managing runoff, commonly referred to as a 'management train', which summarised below:

- **Prevention** – the use of good site design and housekeeping measures on individual sites to prevent runoff and pollution (e.g. minimise areas of hard standing).
- **Source Control** – control of runoff at or very near its source (such as the use of rainwater harvesting).
- **Site Control** – management of water from several sub-catchments (including routing water from roofs and car parks to one/several large soakaways for the whole site).
- **Regional Control** – management of runoff from several sites, typically in a retention pond or wetland.

2.5.7 Effects Not Requiring Further Assessment

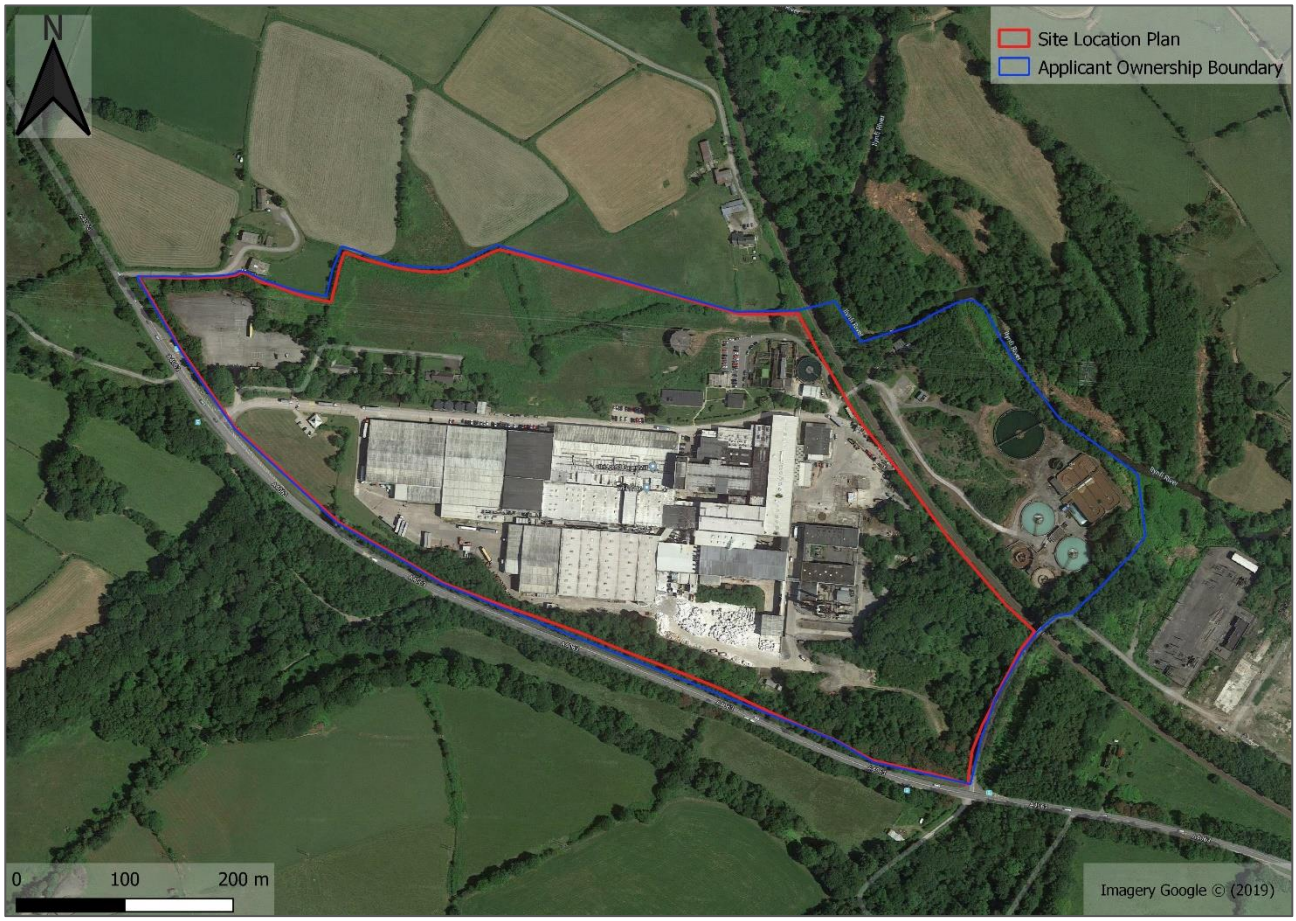
There are no effects highlighted as requiring further assessment in the Scoping Opinion Report relating to Water Resources contained.

3.0 Existing and Proposed Development Overview

3.1 Existing

The existing site is a paper mill set within a series of large buildings with associated hardstanding. An aerial picture is shown in Figure 3-1.

Figure 3-1
Aerial View of the Site



The site is located in the Afon Llynfi Valley, the applicant ownership boundary extending to the river in the north east. The site consists of the area to the south east of the railway, which separates the treatment plant from the rest of the factory.

The existing mill buildings and associated hardstanding cover around two thirds of the land broadly to the south and centre of the application site. The north of the site is currently predominantly grass fields and the eastern part of the site, which is raised, is an area of wood and scrubland.

While the northern part of the site is currently predominantly grass fields it also contains an office, laboratory, and personnel room located in the north east corner. Also, in this area, is a small car park, a water tower, and a filtration plant.

The A4063 forms the southwestern a boundary of the site. Access onto the site is provided off of the A4063 via a small road that passes along the northern side of the main mill building area.

An unnamed private road bounds the application site to the southeast. This is the access road for the effluent treatment plant and substation for the paper mill which are located outside and to the east of the application site but within the wider area that is owned and operated by the applicant. A watercourse called the Afon Llynfi flows through this land from the northwest to the southeast.

The existing site abstracts water from Afon Llynfi and passes it through sand and gravel filters for use as process water. Effluent from operations is routed towards the effluent treatment plant and either recycled or treated for discharge to the river depending on demand. The effluent treatment plant consists of six primary effluent settlement tanks and secondary biological treatment using "activated sludge".

The abstractions and discharges are permitted by NRW under environmental permit EPR/EP3738NG.

3.2 Proposed

The proposed development consists of several additional buildings surrounding the existing buildings. These will be located around the western half of the main existing building area as well as an additional area to the south east. The hardstanding will also be updated at the mill including constructing a new car parking area with 208 car parking spaces.

The proposal will increase the demand for water at the site and the amount of effluent that is generated. This will however be managed to a large extant through recycling and reuse of treated effluent. The existing abstraction and effluent treatment plants have capacity for the additional water requirements associated with the proposed extension without any changes and no changes to the permitted rates and volumes of abstraction and discharge will be required to facilitate the development proposals.

4.0 Baseline Conditions

The following hydrogeological and hydrological regime is considered below:

- regional and local geology;
- aquifer characteristics;
- recharge mechanisms;
- groundwater levels and flow;
- water abstraction and use;
- groundwater quality;
- surface water features and connections;
- surface water quality; and
- flood risk.

The hydrogeological and hydrological data have been used to develop a conceptual site model.

4.1 Topography

The site is located within the Llynfi Valley with elevations falling across the site towards the north east where the Afon Llynfi is situated. The area to the south east where the new warehouse building is proposed, is raised circa 6m above the existing yard and access road. Areas of higher elevation are located both to the south east and north east of the site.

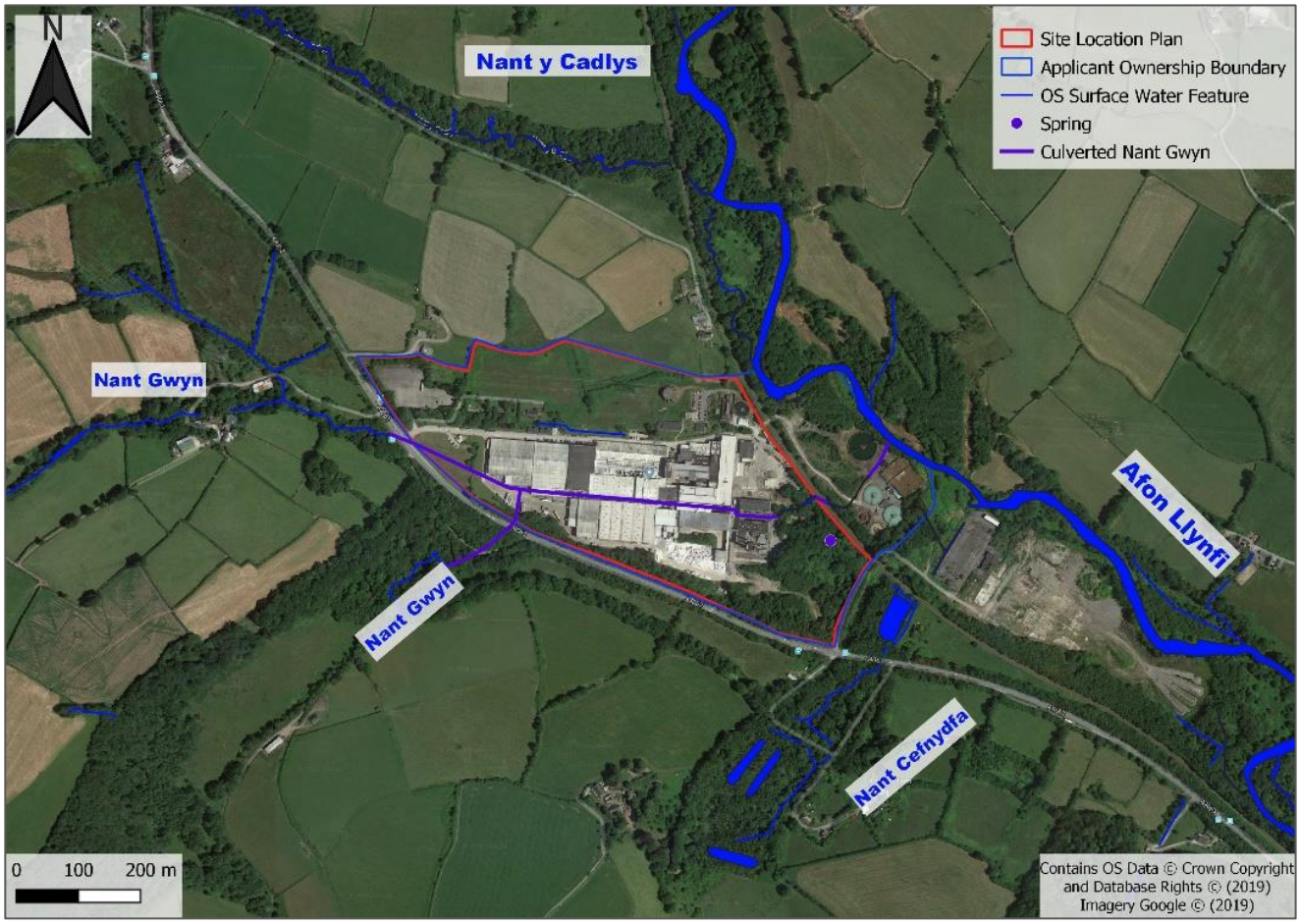
Elevations across the site range between 72.7m above Ordnance Datum (aOD) in the east of the site and 105.0maOD in the north of the site.

4.2 Catchment Overview

4.2.1 Hydrology

An overview of mapped surface water features near the site is presented in Figure 4-1

Figure 4-1
Local Hydrology



The site is located within the Llynfi Valley with all surface water (runoff and watercourses) naturally proceeding towards the Afon Llynfi which is located to the north east of the application site. The Afon Llynfi flows from west to east past the site and has an upstream catchment[4] of circa 39.2km^2. Upstream of the site the river passes through the urban area of Maesteg as well as some rural agricultural land.

Afon Llynfi is monitored under the Water Framework Directive WFD and is assigned a status for hydromorphological, ecological, chemical criteria. An overall status (moderate) is also assigned. A summary of the cycle 2 (2016) status is presented in Table 4-1.

The Swansea Bay Abstraction Licensing strategy[5] states that the Afon Llynfi has water available for licensing meaning that there is more water than required to meet the needs of the environment even under low flow conditions. This is based on monitoring at Coytrahen gauging station located circa 2.5km downstream of the site. This assessment is undertaken by Natural Resources Wales to provide a guide as to whether new abstraction licence applications should be approved and is based on a modelled scenario where all existing licensed abstractions (including the abstraction for this site) are fully utilised.

4 Flood Estimation Handbook Webservice, https://fehweb.ceh.ac.uk/GB/map, Accessed December 2019
5 Natural Resources Wales, The Swansea Bay Abstraction Licensing Strategy, May 2014

Table 4-1
WFD Summary Data (2016 Cycle 2) for potential receptors

Waterbody	Afon Llynfi
WFD Waterbody name	Llynfi - Lletty Brongu STW to conf with Ogmore
WFD ID	GB110058026332
Type	River
Hydro morphological designation	Supports Good
Ecological Status	Moderate
Chemical Status	Good
Overall Status	Moderate

The Nant-Gwyn, a tributary of the Llynfi passes through the site. The section of the Nant-Gwyn through the application site (i.e. to the west of the railway line) is culverted and consists of two branches. One approaches the site from the south and one which approaches from the west. The southern branch has an upstream catchment of circa 1.27km^2 and the western branch has an upstream catchment of circa 0.98km^2. Both enter culverts on the opposite side of the A4063 to the site. The two branches converge in the south west of the site in an area that is currently a yard. The Nant-Gwyn has a short section of open channel immediately west of the railway line and is open channel to the east of the railway line past the treatment works.

The Nant-Gwyn receives runoff from roofs within the application site. While runoff from yard area on the site do not drain to Nant-Gwn, undeveloped areas of the site do still drain to this watercourse via surface and shallow sub surface pathways. It is also possible that small amounts of flow from the operational site (at ground level) could drain to this stream via misdirected drainage connections or damaged / cracked pipework and hardstanding.

Another tributary of the Afon Llynfi, the Nant Cefnydfa, flows north past the site circa 80m to the east of the site. The upstream catchment is circa 0.95km^2. Based on a review of local topography no flows from the site will enter this watercourse and therefore this potential receptor is scoped out of this assessment

The site is located in a rural area and the catchments for the streams are agricultural and woodland land uses.

There is a spring feature located in the east of the site which is associated with steep topographic gradient in this area. Flows discharging from the spring drain into Nant-Gwyn.

4.3 Abstractions and Discharges (Site)

The existing paper mill is self-reliant in terms of water resources for processing purposes and has an abstraction licence (21/58/41/0015) with the main water intake from the Afon Llynfi and a second abstraction point from the Nant-Gwyn. The licence allows for the abstraction of up to 12,000 m^3/day at an instantaneous rate not exceeding 167l/s. The abstracted water is pumped under the railway line into the operational site and then processed through a filtration plant before being used in processes within the factory.

Although a paper mill unavoidably has a high water demand much of the water is recycled within the site. This significantly reduces the amount of water that needs to be abstracted and the amount of discharge. Water recycling is used as a way of managing water within the mill and provides a degree of resilience for site operations in the event that abstraction was not possible for a period.

The paper mill has its own effluent treatment plant with a two stage treatment system. The treated water is either sent back to the mill for reuse or discharged into Afon Llynfi. The maximum daily flow volume of the discharge under the environmental permit (EPR/EP3738NG) is 17,500m^3/day.

Foul water (sewerage) is also processed at the site passing initially into a settlement tank before discharging into the site effluent going to the main treatment plant.

Surface water runoff from the roofing areas is currently discharged directly into the Nant-Gwyn with no treatment or attenuation. Surface water runoff from the yard areas, which have potential for contamination with pulp or processing chemicals, is discharged into the effluent drainage and therefore drains to the treatment plant.

4.4 Abstractions and Discharges (Offsite)

There is one record of another abstraction permit held by NRW within 2km of the site from the Nant Cwm-du, a tributary if Afon Llynfi. This is located 1.86km north of the site and 2.66km upstream of the site.

Records provided by NRW indicate there are three permitted discharges within 2km of the site[6]. These are summarised in Table 4-2 below:

Table 4-2
Summary of Permitted Discharges into Controlled Water (NRW)

Map ID	Licence Holder	Discharge Type	Distance	Direction
1	Dwr Cyru Cyfyngedig	Sewage Disposal Works	750m	North
2	Dwr Cyru Cyfyngedig	Sewage Disposal Works	1000m	North
3	Dwr Cyru Cyfyngedig	Sewage Disposal Works	1125m	East

No records of private water supplies were supplied by either Bridgend County Council or Vale of Glamorgan Council in response to an information request.

4.5 Flood Risk

The development site is predominantly located within Flood Zone A. An area along the Nant-Gwyn is indicated to lie within Flood Zone B, which is associated with historical alluvium deposits.

A Flood Consequence Assessment (FCA) has been completed at the site in accordance with Technical Advice Note 15: Development and Flood Risk (TAN15). This report is included as Technical Appendix 01.

The FCA assessed the risk of flooding from fluvial, tidal, surface water, sewers, groundwater, artificial sources, and from the construction and operational activities and concluded that there was only a low risk of flooding.

6 Natural Resources Wales, Consented Discharges to Controlled Water with Conditions, http://lle.gov.wales/catalogue/item/ConsentedDischargesToControlledWatersWithConditions/?lang=en , October 2019

4.6 Hydrogeology

4.6.1 Aquifer Characteristics

BGS mapping indicates that the southeast of the site is underlain by bedrock with "*Brithdir Member – Sandstone".* Adjacent to this is *"Mudstone, Siltstone and Sandstone*" part of the Brithdir Member. The north of the site is underlain by the "*Hughes Member – Mudstone, siltstone and sandstone"* and *"Hughes Members – Sandstone".*

The bedrock across the site is designated by NRW as a *Secondary A aquifer*, which is defined as layers with moderate permeability capable of supporting water supplies at a local rather than strategic scale. These aquifers can be an important source of base flow to rivers.

BGS mapping indicates that there are superficial till deposits which are described across diamicton the centre of the site. These are overlain by alluvial deposits adjacent to the historical course of the Nant-Gwyn. The till deposits are designated as *Secondary (undifferentiated)* while the alluvium *Secondary A aquifer*.

Borehole logs for the site indicate there is are superficial glacial till deposits consisting of stiff grey brown sandy silty clay with coarse gravel and occasional cobbles. This is underlain by sandstone with occasional thin (less than 1m) layers of coal. This supports the geological mapping,

The nearest Source Protection Zone (SPZ) is located circa 7.3km south east of site. The site is unlikely to be in hydraulic connectivity with this abstraction.

The geoportal for Water Framework Directive summarises the regional qualitative and quantitative quality of the groundwater. This indicates the site lies within the Swansea Carboniferous Coal Measures (Waterbody ID – GB41002G201000) and it is therefore assumed that the Birthdir Member and Hughes Member form part of this regional aquifer. The groundwater in 2015 (Cycle 2) was classified as:

- Overall Status: Poor
- Quantitative Status: Good
- Chemical Status: Poor

The poor chemical status is due to the following factors being identified as being at risk:

- Groundwater quality;
- Surface water chemistry and ecology; and
- Terrestrial Ecosystems (wetlands).

4.6.2 Groundwater Quality

Groundwater quality for a range of determinands is measured at the site as part of the ongoing environmental monitoring. The majority of the analysed determinands are below the limit of detection.

In June 2018 the following determinands were detected (i.e. above the limit of detection) within the groundwater:

- Arsenic at the spring – the concentration was half of the environmental quality standard (EQS) for freshwater.
- Iron in boreholes BH1, BH3, BH5 and Spring – BH1 and BH3 exceed the EQS value. These are located either side of the existing papermill building.
- Biological and Chemical Oxygen Demands (BOD and COD) were recorded in BH1, BH3 and at the Spring.

In November 2018 the following determinands were detected (i.e. above the limit of detection) within the groundwater:

- Sodium at BH3 – there is no EQS for sodium in freshwater, however it does not exceed UK drinking water standards and therefore is not considered significant.
- Iron in BH1, BH3, BH4, and Spring – only BH3 exceeds the EQS value;
- Increased levels of BOD were recorded in BH3, BH4, and at the Spring. The Spring was also recorded has having high COD.

4.6.3 Groundwater Levels and Flow

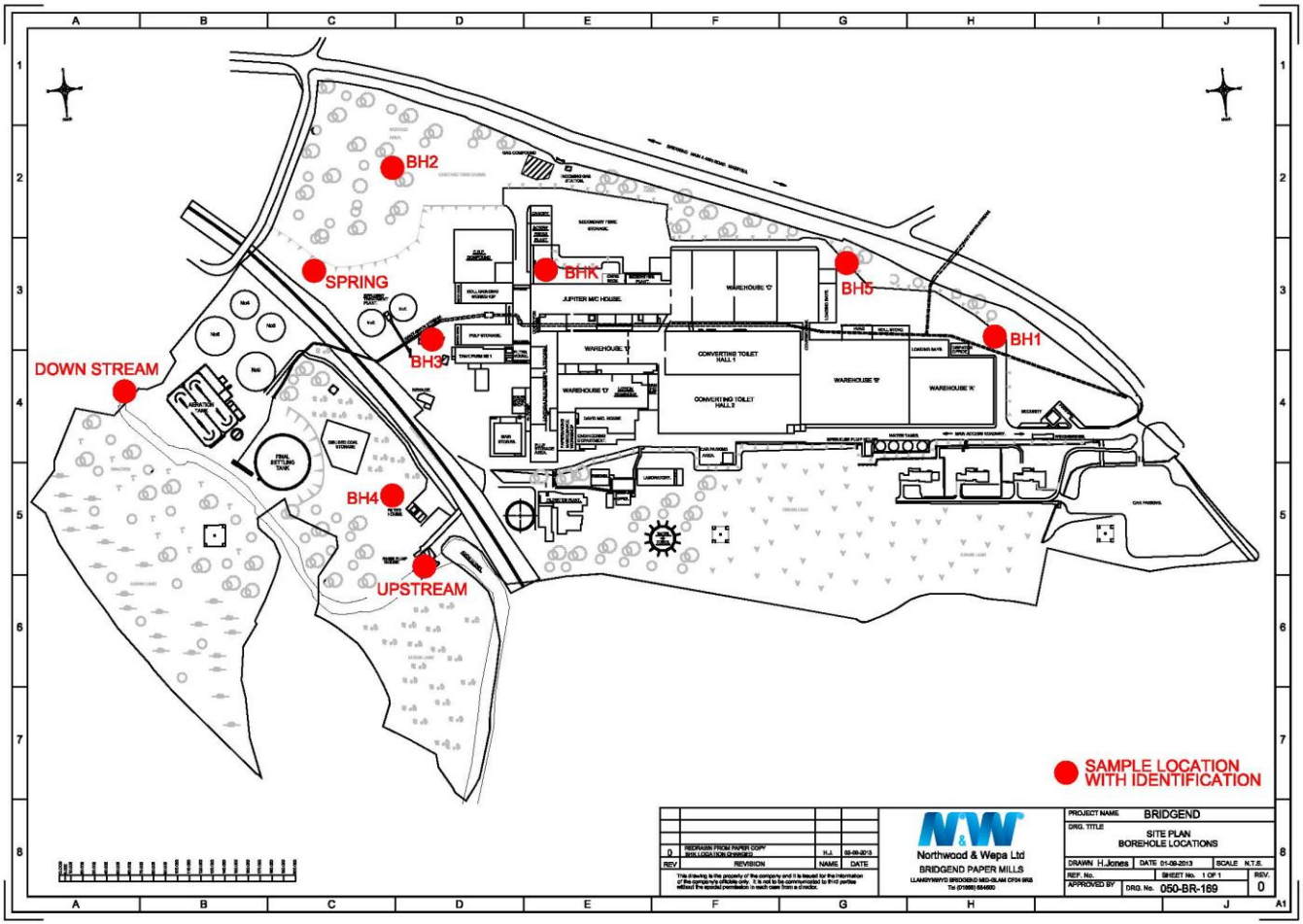
Groundwater levels are measured at the site as part of the environmental monitoring. The levels from the June and November 2018 monitoring have been provided to inform this assessment and are presented in Table 4-3. A borehole location plan is presented in Figure 4-2.

The data indicates a large amount of spatial variability in ground water depths (and levels) with no clear trend across the site. This suggest that the geology is largely impermeable with little or no groundwater flow and a potential for water logging in areas with poor surface drainage.

Table 4-3
Groundwater Levels from 2018 Monitoring

Borehole	Groundwater Level June 2018 (mbgl)	Groundwater Level November 2018 (mbgl)
BH1	0.00	0.00
BH2	5.10	3.80
BH3	3.60	2.80
BH4	5.95	5.60
BH5	4.30	4.30
BHK	0.00	2.10

Figure 4-2
Borehole Location Plan



4.6.4 Recharge Mechanisms

Met Office data indicates that the average annual rainfall in Wales since 1910 is 1396mm. The Flood Estimation Handbook (FEH) states that the Standard Average Annual Rainfall is 1544mm.

Estimates for the potential and actual evaporation rates for the UK are included in the UK Hydrological Review, which is published by the Centre for Ecology & Hydrology and British Geological Survey each year. Review of the reports between 1999 and 2010 indicate that the actual evaporation often and typically fell within the range of 530-569mm. Evaporation was indicated to be greater than 510mm in all years and less than 609mm in all years.

Due to the position of the site (adjacent to several watercourses), the high proportion of impermeable surfaces and the impermeable geology, rainfall at the site will not significantly contribute to recharge into the underlying aquifers. Instead excess rainfall will pass into the Afon Llynfi and flow away from the site. Rain falling on building roof areas are directed into a surface water drainage system that discharges to Nant-Gwyn. Rain falling on all other impermeable areas of the site is routed into the effluent drainage network that discharges to the Afon Llynfi directly (following treatment).

5.0 Proposed Development

WEPA UK Limited are proposing to operate a second tissue paper machine at the site. This will require a number of new areas of development including:

- Pulp storage for bales (virgin fibre) – Phase 1;
- Bale handling area – Phase 1;
- New sludge press building – Phase 1,
- Paper machine building for a further production line – Phase 1;
- Converting extension – Phase 2;
- Auxiliary material storage including shipping area – Phase 2;
- Jumbo reel storage (Phase 2)
- High bay warehouse - (Future) Phase 3 and;
- Shipping area for finished products – (Future) Phase 3.

The largest area of new development will be located in the south east of the site. This area is raised circa 8m above the area to the north and circa 3m higher than the area immediately to the west of it.

The 'Neptune' (the paper machine) building will be located to the south of the existing building. Proposals also included extending the building towards the west in order to extend the converting and shipping areas.

A plan of the proposed scheme is provided in Figure 5-1.

Figure 5-1
Proposed Development Plan

6.0 Assessment of Effects

This sub-section identifies the potential impacts of the proposed development on the hydrogeological and hydrological environments prior to mitigation during both the construction and operation of the proposed development. It also assesses the magnitude of each identified impact. The results of this assessment are summarised in Table 6-2. It should be noted that the magnitude of the potential impacts has been assessed as described in Table 2-2. The significance of any potential effect has then been assessed (based on the sensitivity of the receptor) as described in Table 2-3.

The proposed design and operation of the application site incorporates measures to mitigate potential impacts on the water environment. Except where detailed in the development description above these measures are not included in the initial assessment of impacts so that their effect can be explicitly stated in the mitigation section of this chapter.

In this assessment the sensitivity of the potential receptors is designated as follow:

- Afon Llynfi – Medium Sensitivity - because it is a designated by NRW as a main river which is classified as moderate in line with the WFD with good chemical status. Afon Llynfi also provides connection to the large urban area of Bridgend to the south of the site.
- Nant-Gwyn – Low Sensitivity - due to the potential impacted reaches of the watercourse being entirely within WEPA's site boundary, it being predominantly culverted and only locally important. However, the Nant-Gwyn enters Afon Llynfi and represents a significant potential pathway for impacts to this receptor and downstream urban areas including Bridgend to the south of the site.
- Groundwater – Low Sensitivity - the underlying geology is designated as either a Secondary A aquifer or a Secondary undifferentiated aquifer which indicates that it could have local importance as for base flow. Records provided by local authorities did not indicate that there were local abstractions of groundwater.
- Existing Papermill Site – Medium Sensitivity (for flood risk and effluent treatment) – the ground level of the existing site is served by the effluent drainage network. The operation of the site is reliant on the function of these systems and impacts could therefore impact the operation of the existing site.

6.1 Demolition and Construction Phase

During the demolition of existing buildings and the construction of the new buildings for the extension of the paper mill, there is potential for adverse impacts on surface water environment and groundwater quality associated with

- the use and storage of oil and chemicals associated with construction activities;
- high level of suspended solids arising from earthworks and the use of plant on the site,
- the use and storage of cementitious material associated with construction activities; and
- physical disturbance to the Nant-Gwyn culvert.

6.1.1 Groundwater and Surface Water Quality

Spilled oils and fuels from site vehicles and / or equipment on the site, if unmitigated could enter surface water runoff from the site. This could enter shallow groundwater or flow over land following topographic gradients entering the Nant-Gwyn, or the operational site drainage systems.

Oils and fuels entering the operational site drainage system would pass to the effluent treatment plant, which would normally effectively treat flows prior to discharge. If a spill was large this could however overload the plant

causing a contaminated discharge to Afon Llynfi or resulting in damage from the plant. The magnitude of this potential impact is therefore assessed to be **'Medium'**.

As noted above spills of fuels and oil in the areas of the site that are not already developed could drain into one of the branches of Nant-Gwyn. The Afon Llynfi is also a secondary receptor via the Nant-Gwyn. The magnitude of the potential impact from spilled oils and fuels entering the Nant-Gwyn is assessed to be **'Medium'**.

There is no direct flow pathway for spills from the construction site to enter the Afon Llynfi and therefore all potential impacts have been discussed in the previous pathways.

The magnitude of the impact of oil and fuels entering the groundwater as a result of spill in undeveloped areas is considered **'Medium'**.

Based on the above the significance of the potential effect is assessed to be Moderate for the Afon Llynfi and the Existing Operational Papermill Site and Minor for Nant-Gwyn and Groundwater.

6.1.2 Elevated level of Suspended Solids

Without the incorporation of formalised mitigation measures, the construction of the new buildings has potential to generated turbid runoff from the following potential sources:

- Storm runoff across ground churned up construction traffic;
- Intense rainfall onto exposed earth surface and / or spoil heaps;
- Dewatering of excavations for foundations; and
- Tracking of soil by plant onto adjacent roads and hardstanding and mobilisation from there into storm drainage network.

Due to the topography in the south east area of the site, there is a steep preferential flow path (down the existing access road to the site). The presence and gradient of this flow route increases the potential for turbid runoff in two ways:

- Higher velocities mean that the runoff has a higher load capacity therefore transports more sediments etc.;
- Surface water runoff could travel further distances without infiltrating to ground / mixing with other surface water sources.

Review of potential surface water flow routes from the south east area indicates that turbid runoff from this area could enter both the effluent drainage network of the existing site and Nant-Gynn.

The increased sediment loading could result in blockage of the effluent drainage network. Resulting surcharges could result in flooding of the yard areas with potentially mildly contaminated water (potentially containing paper fibres – bleaching chemicals are highly controlled and therefore unlikely to be in this effluent water). High sediment loading could also overload the effluent treatment plant potentially causing damage to the treatment plant or contaminated discharge to the Afon Llynfi. The magnitude of unmitigated of this potential impact is assessed to be **'High'**.

The sediment loaded surface water could passes directly into the Nant-Gwyn via the section of open channels or into the culvert through cracks or damaged manholes. The magnitude of the potential impact on the Nant-Gwyn is considered **'High'.**

The Nant-Gwyn flows into the Afon Llynfi, however due to the distance downstream (and settlement along the channel) as well as the higher dilution capacity, the magnitude of the potential impact on the Afon Llynfi would be lower and is assessed as **'Medium'**.

The topography of the other areas of development (adjacent to existing building) are relatively flat and the potential for turbid surface water runoff to be generated is therefore smaller. The magnitude of the impacts from construction activity in these areas, if unmitigated, is assessed to be **'Medium'**.

The significance of the potential effect is relating to pollution from high levels of suspended solids is summarised in Table 6-1:

Table 6-1
Unmitigated significance of increased turbidity of surface water

Receptor	Significance of Effect South East	Significance of Effect Rest of Construction
Afon Llynfi	Moderate	Moderate
Nant-Gwyn	Moderate	Minor
Papermill Drainage Systems	Major	Moderate

6.1.3 Cementitious Material

Spillage or accidental discharge of cementitious material during groundworks of construction and spillages of raw building material throughout construction could enter the surface water runoff from the site. This could enter shallow groundwater or flow over land following topographic gradients entering the Nant-Gwyn, or the operational site effluent drainage networks.

The Nant-Gwyn flows into the Afon Llynfi and therefore cementitious materials could be conveyed to this receptor either via this pathway or via the effluent treatment plant if this was not working or was overwhelmed. The magnitude of the potential impact taking into account the probability of a major spill is assessed to be **'Medium'**.

The significance of the potential effect is therefore **'Moderate'** for the Afon Llynfi and the existing papermill site and **'Minor'** for the Nant-Gwyn and underlying groundwater.

6.1.4 Disturbance to Nant-Gwyn Culvert

Plant required for the construction phase of the development will have to pass over the culvert for the Nant-Gwyn. This could result in damage or collapse of the culvert. The magnitude of this impact is **'High'** as it could result to flooding. This could also have an impact of sediment from the collapse being transported into the Afon Llynfi however the magnitude of the impact on Afon Llynfi is considered only **'Low'** due to the dilution effects.

The significance of disturbance to the Nant-Gwyn Culvert if unmitigated is considered to be **'Moderate'** for the Nant-Gwyn and **'Minor'** for the Afon Llynfi.

6.2 Operational Phase

The proposed development involves an extension of an operational papermill, and, unless otherwise stated in the application, the mill will continue to be operated in the same manner. The existing water abstraction, processing, recycling, treatment and discharge will be maintained.

Without the incorporation of formalised mitigation measures, the construction of the new buildings has potential to generated turbid runoff from the following potential sources:

- Accidental emissions impacting groundwater and surface water quality;
- Changes in groundwater recharge;
- Changes in abstraction and discharge impacting water resources; and
- Changes to flood risk and drainage.

6.2.1 Groundwater and Surface Water Quality – Accidental Emissions

If unmitigated, the operational extension to the papermill could result in contamination of surface water runoff from paper fibres, pulp etc. However, the construction of the site inherently mitigates against the impact of this by connecting all yard areas into the effluent drainage network which is routed via the existing treatment plant.

Fracturing of piping, rupturing or overfilling of containment vessels could potentially result in accidental emissions of chemicals and / or fibres. All new pipework and storage areas will be constructed in accordance with Best Available Techniques. Due to the position of the proposed development the probability of an accidental emission from this source is not altered as a result of the development and therefore the magnitude of the impact is **'Negligible'.** The significance of the impact is therefore **'Negligible'**.

The proposed development will result in an increase in yard area. The development includes provision of surface water attenuation tanks and these have been designed to reduce runoff rates from the new areas of the site and prevent the capacity of the effluent network and treatment plant being exceeded. In the event of surcharging of the system in a storm that is larger than design event mildly contaminated water would flood the yard areas and could enter the Nant-Gwyn via any cracks or manholes. However due to the inherent dilution and low probability of this occurring the magnitude of the potential impact is considered **'Low'** and the significance is therefore **'Minor'**.

Unloading of chemicals is the highest risk activity for a potential accidental spillage. This could enter the effluent drainage system in significantly higher concentrations than the system has been designed for and overwhelm the treatment plant. This could result in surface water quality impacts to the discharge into Afon Llynfi. However, there is storage in the effluent treatment network upgradient of the treatment plant, which would be used to held flows back in the event of a major spill and prevent neat produce entering the plant. As per existing operations spill kits will also be located adjacent to the areas of chemical unloading. The magnitude of the potential impact taking into account the low probability of a major spill is assessed to be **'Low'** and the significance of this impact would therefore be **'Minor'** for the Afon Llynfi.

Spilled oils and fuels from site vehicles and / or equipment on the site, if unmitigated would enter effluent runoff from the site, which could, if the volumes were very high, overwhelm the effluent treatment plant. This would result in contaminated discharge to Afon Llynfi or failure of the treatment plant. The magnitude of the potential impact taking into account the very low probability of a major spill is assessed to be **'Low'**. The significance of the impact is therefore **'Minor'.** There is no pathway to any other receptor and therefore the magnitude of potential impact and significance of effect for those is assessed to be **'Negligible'**.

Temperature gauges are placed on both the abstraction point and effluent discharges. Discharge from the site is halted if there is greater than a 5 degrees centigrade temperature variation between the two or in the event that one of the monitored parameters (BOD, COD, nutrients) exceeds the compliance limits. These existing controls will be maintained and therefore the magnitude of potential impact and significance of effect on water quality associated with normal operational discharge from the site is **'Negligible'**.

6.2.2 Groundwater Recharge

Due to the increase of impermeable coverage as a result of the development there will be a very small reduction in the potential for rainfall to infiltrate into the ground. However, due to the limited increase in impermeable

area relative to the catchment of the aquifer and the nature as *Secondary Aquifer*, the magnitude of the potential impact is **'Negligible'** and therefore the significance of effect is **'Negligible'**.

6.2.3 Water Resources

As for existing operations, following development only a small proportion of the water abstracted will be consumed by operations (e.g. evaporative losses and export from site within the pulp sludge waste) with the remainder forming an effluent stream. Once the final effluent has been treated it will be discharged from the site back into the Afon LLynfi and therefore the net abstraction volume for operations on site will remain small

The operation of the extension area will however increase the water requirements of the mill relative to present day usage. However, due to the improvements in water efficiencies at the mill including the installation of a water recycling system, water abstraction will remain smaller than the mill has historically abstracted and will remain less than the total licence amount of 12,000m^3/day.

The Catchment Abstraction Management Strategy states that the Afon Llynfi has a status of 'water available' for abstraction (over what is required for the environment) even under low flow conditions. This assessment assumes that all abstraction licences, including the one for the site, are fully utilised.

The magnitude of the additional potential impact on the Afon Llynfi from the small uplift in abstraction volumes (which is within the terms of the existing abstraction licence) is therefore considered **'Negligible'**. The significance of effect is therefore also **'Negligible'.**

The effluent treatment plant was designed when there four paper machines functioning at the mill. Since this time, not only has there been a reduction in the number of the machines, but the production systems in the factory have become more water efficient. Furthermore, a water recycling system has been installed which allows for all the effluent to be recycled rather than discharged. As such there is a large capacity for both storage and reuse of effluent in the event that the effluent treatment plant ever needed to be shut down for short periods for maintenance.

Despite this the changes do mean that there will be a small uplift in the volume of discharge from the site partly associated with storm water runoff from the additional yard area. Peak discharge volumes will however remain significantly lower the permitted under the discharge liscence. The high level of treatment and the resilience of the system means that the magnitude of potential impact on the flows within Afon Llynfi from the projected changes in discharge is '**Negligible'** and the significance of effect is also assessed to be **'Negligible'**.

6.2.4 Flood Risk and Drainage

The development will result in an increase in the impermeable coverage at the site and therefore will increase the surface water runoff volumes. However, the increase in impermeable coverage is small relative to entire catchments of both the Nant-Gwyn and Afon Llynfi.

Runoff from the building roofs will be routed into the surface water drainage network which drains to the Nant-Gwyn and thereby recreates the drainage regime. Attenuation storage will be created along this system to ensure that peak rates of discharge to the stream are not increased as a result of the development.

As already discussed, runoff from the yard areas will drain to the effluent drainage system. Storage exists upstream of the effluent treatment plant to accommodate excess flows and peak rates of discharge into the Afon Llynfi are governed by the capacity of the treatment plant and not the small changes in the source areas draining to the plant.

A Flood Consequence Assessment has been completed in the site and has concluded that the risk of flooding as a result of the development is low. The magnitude of impact associated with the increase in impermeable coverage on flood risk is assessed to be **'Low'** and therefore the significance of the impact is **'Minor'**.

Summary of Unmitigated Potential Impacts

Table 6-2 presents a summary of potential impacts associated with the proposed development and identifies where migration measures are required to reduce potential impacts to acceptable levels.

Table 6-2
Summary of Unmitigated of Potential Impacts

Potential Impact	Receptor	Spatial and Temporal Impact	Magnitude of Impact	Sensitivity of Receptor	Significance of Potential Effect	Mitigation Required?
Construction Phase						
Groundwater and Surface Water Quality						
Spilled pollutants, oils, fuels etc. contamination	Afon Llynfi	Regional, Short Term (Adverse)	Medium	Medium	Moderate	Yes
Spilled pollutants, oils, fuels etc. contamination	Nant-Gwyn	Local, Short Term (Adverse)	Medium	Low	Minor	No
Spilled pollutants, oils, fuels etc. contamination	Groundwater	Local, Short Term (Adverse)	Medium	Low	Minor	No
Turbid Surface Water Runoff – South-East Area	Afon Llynfi	Regional, Short Term (Adverse)	Medium	Medium	Moderate	Yes
Turbid Surface Water Runoff – South-East Area	Nant-Gwyn	Local, Short Term (Adverse)	High	Low	Moderate	Yes
Turbid Surface Water Runoff – South-East Area	Existing Papermill Site - Flooding	Local, Short Term (Adverse)	High	Medium	Major	Yes

Potential Impact	Receptor	Spatial and Temporal Impact	Magnitude of Impact	Sensitivity of Receptor	Significance of Potential Effect	Mitigation Required?
Turbid Surface Water Runoff	Afon Llynfi	Regional, Short Term (Adverse)	Medium	Medium	Moderate	Yes
Turbid Surface Water Runoff	Nant-Gwyn	Local, Short Term (Adverse)	Medium	Low	Minor	No
Turbid Surface Water Runoff	Existing Papermill Site - Flooding	Local, Short Term (Adverse)	Medium	Medium	Moderate	Yes
Cementitious material spillage	Afon Llynfi	Regional, Short Term (Adverse)	Medium	Medium	Moderate	Yes
Cementitious material spillage	Nant-Gwyn	Local, Short Term (Adverse)	Medium	Low	Minor	No
Cementitious material spillage	Groundwater	Local, Short Term (Adverse)	Medium	Low	Minor	No
Disturbance of Nant-Gwyn Culvert	Nant-Gwyn	Local, Medium Term (Adverse)	High	Low	Moderate	Yes
Disturbance of Nant-Gwyn Culvert	Afon Llynfi	Local, Medium Term (Adverse)	Low	Medium	Minor	No

Potential Impact	Receptor	Spatial and Temporal Impact	Magnitude of Impact	Sensitivity of Receptor	Significance of Potential Effect	Mitigation Required?
Operational Phase						
Groundwater and Surface Water Quality						
Fracturing of piping, rupturing or overfilling of containment vessels	Afon Llynfi	Regional, Medium Term (Adverse)	Negligible	Medium	Negligible	No
Fracturing of piping, rupturing or overfilling of containment vessels	Nant-Gwyn	Local, Medium Term (Adverse)	Negligible	Low	Negligible	No
Fracturing of piping, rupturing or overfilling of containment vessels	Groundwater	Local, Medium Term (Adverse)	Negligible	Low	Negligible	No
Increased Runoff from Yard Area	Existing Papermill Site	Local, Short Term (Adverse)	Low	Low	Minor	No
Spillage of Chemicals during Unloading	Afon Llynfi	Regional, Medium Term (Adverse)	Low	Medium	Minor	No
Spillage of Oils and Fuels from Site Vehicles	Afon Llynfi	Regional, Medium Term (Adverse)	Low	Medium	Minor	No
Groundwater Recharge						
Reduction in Recharge due to increases in impermeable cover	Groundwater	Local, Long Term (Adverse)	Negligible	Low	Negligible	No
Water Resources						

Potential Impact	Receptor	Spatial and Temporal Impact	Magnitude of Impact	Sensitivity of Receptor	Significance of Potential Effect	Mitigation Required?
Increases in Water Abstraction	Afon Llynfi	Regional, Long Term (Adverse)	Negligible	Medium	Negligible	No
Increases in Discharge	Afon Llynfi	Regional, Long Term (Adverse)	Negligible	Medium	Negligible	No
Flood Risk and Drainage						
Increase in flood risk due to changes in impermeable cover	Afon Llynfi	Regional, Long Term (Adverse)	Negligible	Medium	Negligible	No

7.0 Proposed Mitigation Measures

Mitigation measures to address potential significant effects detailed in Table 6-2 are described below. These measures reduce the magnitude of potential impact. It should be noted that several of the mitigation measures proposed below would result in a positive change on more than one potential impact.

A number of operational mitigation measures and best available techniques have been incorporated into the procedures already used at the existing operational site. These have been considered as incorporate mitigation within the initial assessment as the proposed development will continue to operate in the same manner.

7.1 Construction Phase

7.1.1 Groundwater and Surface Water Quality

The construction of the extension at Bridgend Papermill would be undertaken in line with relevant technical guidance and codes of best practice, to limit the potential for contamination of both ground and surface waters.

Best practice techniques would be incorporated within the management procedures for construction and operation activities onsite in order to protect the water environment from pollution incidents. This would involve the preparation of detailed 'construction - site water management plan' which would be completed and agreed with NRW prior to work commencing at the application site. This document would set out:

- Roles and responsibilities for environmental management during the works;
- Detailed methodology for managing any imported materials;
- Details of site drainage and water management during works;
- Details of what other material would be required during the works and where and how these would be stored, and
- Measures for identifying and addressing any pollution incidents should these occur.

The following standard good practice measures would be incorporated and expanded upon within the plan:

- The use and storage of potentially polluting materials on site, including oils and fuel, would be minimised as far as is reasonably possible;
- All on-site fuel, and chemical storage would be above ground and would be lined and bunded;
- Emergency spill response kit would be provided and maintained on site and site personnel would be trained in their use; and
- A vehicle management system including strict speed limits and road markings would be put in place wherever possible to reduce the potential conflicts between vehicles and thereby reduce the risk of collision;
- Direct discharge of sediment laden water to adjacent surface water bodies would be forbidden;
- Spoil heaps should be minimised and kept covered as far as possible; and
- Wheel cleaning should be carried out on exit to the site to minimise tracking of sediment onto adjacent roads.

A detailed inventory of potential pollutant sources and specific high-risk activities (such as refuelling) that are on site through the construction process will be made and kept on site. As already noted, appropriate storage facilities for these materials would be provided and these facilities.

The natural topography of the south-east area, which essentially funnels surface water runoff towards the existing site down the access "track" will be altered to route surface water into a depression(s) which will act as a temporary settlement pond to reduce the turbidity of the surface water.

7.1.2 Operational

The extension areas of the papermill will be operated in the same way as the existing papermill site and within the requirements of the environmental permit.

Spillage kits will be located adjacent to chemical storage and loading areas and only staff trained in the use will be responsible for the unloading of chemicals.

The initial assessment concluded that given the incorporated mitigation inherent within the design of the scheme all other operational impacts relating to water resources, flood risk and drainage were minor or negligible and as such no further mitigation or management measures are required.

8.0 Residual Effect

A summary of the significance of the potential effects of the development after consideration of mitigation measures is given in Table 8-1. This demonstrates that the implementation of appropriate preventative measures and mitigation significantly and appropriately limits the identified hazards to surface water and groundwater from the proposed site activities to acceptable levels.

Overall, it is concluded that, with respect to groundwater and surface water, there would be no significant residual effects of the proposed development after inclusion of the identified mitigation measures.

Table 8-1
Summary of the Residual Potential Impact after Mitigation

Potential Impact	Receptor	Spatial and Temporal Impact	Magnitude of Impact	Significance of Potential Effect	Mitigated Magnitude of Impact	Significance of Potential Effect after Mitigation
Construction Phase						
Groundwater and Surface Water Quality						
Spilled pollutants, oils, fuels etc. contamination	Afon Llynfi	Regional, Short Term (Adverse)	Medium	Moderate	Low	Minor
Spilled pollutants, oils, fuels etc. contamination	Nant-Gwyn	Local, Short Term (Adverse)	Medium	Minor	Low	Minor
Spilled pollutants, oils, fuels etc. contamination	Groundwater	Local, Short Term (Adverse)	Medium	Minor	Low	Minor
Turbid Surface Water Runoff – South-East Area	Afon Llynfi	Regional, Short Term (Adverse)	Medium	Moderate	Low	Minor
Turbid Surface Water Runoff – South-East Area	Nant-Gwyn	Local, Short Term (Adverse)	High	Moderate	Low	Minor
Turbid Surface Water Runoff – South-East Area	Groundwater	Local, Short Term (Adverse)	High	Moderate	Low	Minor

Potential Impact	Receptor	Spatial and Temporal Impact	Magnitude of Impact	Significance of Potential Effect	Mitigated Magnitude of Impact	Significance of Potential Effect after Mitigation
Turbid Surface Water Runoff – South-East Area	Existing Papermill Site - Flooding	Local, Short Term (Adverse)	High	Major	Low	Minor
Turbid Surface Water Runoff	Afon Llynfi	Regional, Short Term (Adverse)	Medium	Moderate	Negligible	Negligible
Turbid Surface Water Runoff	Nant-Gwyn	Local, Short Term (Adverse)	Medium	Minor	Negligible	Negligible
Turbid Surface Water Runoff	Groundwater	Local, Short Term (Adverse)	Medium	Minor	Negligible	Negligible
Turbid Surface Water Runoff	Existing Papermill Site - Flooding	Local, Short Term (Adverse)	Medium	Moderate	Negligible	Negligible
Cementous material spillage	Afon Llynfi	Regional, Short Term (Adverse)	Medium	Moderate	Negligible	Negligible
Cementous material spillage	Nant-Gwyn	Local, Short Term (Adverse)	Medium	Minor	Negligible	Negligible
Cementous material spillage	Groundwater	Local, Short Term (Adverse)	Medium	Minor	Negligible	Negligible
Cementous material spillage	Existing Papermill Site - Flooding	Local, Short Term (Adverse)	Medium	Moderate	Negligible	Negligible
Operational Phase						
Groundwater and Surface Water Quality						

Potential Impact	Receptor	Spatial and Temporal Impact	Magnitude of Impact	Significance of Potential Effect	Mitigated Magnitude of Impact	Significance of Potential Effect after Mitigation
Fracturing of piping, rupturingor overfilling of containment vessels	Afon Llynfi	Regional, Medium Term (Adverse)	Negligible	Negligible	Negligible	Negligible
Fracturing of piping, rupturingor overfilling of containment vessels	Nant-Gwyn	Local, Medium Term (Adverse)	Negligible	Negligible	Negligible	Negligible
Fracturing of piping, rupturingor overfilling of containment vessels	Groundwater	Local, Medium Term (Adverse)	Negligible	Negligible	Negligible	Negligible
Spillage of Chemicals during Unloading	Afon Llynfi	Regional, Medium Term (Adverse)	Low	Minor	Low	Minor
Spillage of Oils and Fuels from Site Vehicles	Afon Llynfi	Regional, Medium Term (Adverse)	Low	Minor	Negligible	Negligible
Spillage of Oils and Fuels from Site Vehicles	Nant-Gwyn	Local, Medium Term (Adverse)	Low	Minor	Negligible	Negligible

Potential Impact	Receptor	Spatial and Temporal Impact	Magnitude of Impact	Significance of Potential Effect	Mitigated Magnitude of Impact	Significance of Potential Effect after Mitigation
Spillage of Oils and Fuels from Site Vehicles	Groundwater	Local, Medium Term (Adverse)	Low	Minor	Negligible	Negligible
Groundwater Recharge						
Reduction in Recharge due to increases in impermeable cover	Groundwater	Local, Long Term (Adverse)	Negligible	Negligible	Negligible	Negligible
Water Resources						
Increases in Water Abstraction	Afon Llynfi	Regional, Long Term (Adverse)	Negligible	Negligible	Negligible	Negligible
Increases in Discharge	Afon Llynfi	Regional, Long Term (Adverse)	Negligible	Negligible	Negligible	Negligible
Flood Risk and Drainage						
Increase in flood risk due to changes in impermeable cover	Afon Llynfi	Regional, Long Term (Adverse)	Negligible	Negligible	Negligible	Negligible

9.0 Cumulative Effects

This development has been considered in the context of any potential cumulative effects on the Water Environment, and specifically on the Afon Llynfi.

The site is located in a relatively remote location. Review of Bridgend Council Planning Application search for the area of LLangynwyd Middle Community Council (in which the site is located) indicates that there are no planning applications within the last five years for any industrial developments that would result in cumulative effects with the proposed papermill extension.

10.0 Conclusions

The surface water and groundwater regimes at the application site have been assessed with reference to information held by the BGS, Natural Resources Wales, Local Authority, and by the consideration of site-specific investigation and reports relating to the application site. Key potential receptors identified are the:

- Afon Llynfi, from which water is abstracted and discharged and which is adjacent to the site;
- Nant-Gwyn, a culverted watercourse through the main operational area and open channel passed the effluent treatment. Nant-Gwyn flows into the Afon Llynfi adjacent to the site;
- Groundwater within some of the superficial deposits and bedrock geology;
- Bridgend Papermill Effluent and Surface Water Drainage networks.

The potential impacts of the proposed development upon the hydrological and hydrogeological environment have been identified and assessed. Key potential impacts relate to the management of pollution during the construction of the site and the provision, management and disposal of water used in the operational processes within the mill.

Where appropriate, mitigation measures will be implemented during construction and have also been accommodated into the design of the proposed development and ongoing operations. Critically the construction of the extension to the papermill will be undertaken in line with current technical guidance and relevant codes of best practice to limit the potential for contamination of both ground and surface waters. Best practice techniques, including the treatment and controlled release of all process water, will be incorporated within the management procedures for construction and operation activities onsite in order to protect the water environment from both regular discharges and any pollution incidents.

This assessment has found that there would be no significant residual effects on the water environment. It is therefore also concluded that the proposals would not have a significant impact on the objectives of the Water Framework Directive.

Assessment of the residual effects of the development proposals on the water environment alongside other approved developments within the area has also been undertaken. This assessment has also identified no significant effects of multiple developments being carried out within the same sub-catchment (draining to Afon Llynfi).

Overall, it is concluded that, with respect to groundwater and surface water, there would be no significant residual or cumulative effects of the proposed development after inclusion of the identified mitigation measures.

APPENDIX 01

Flood Consequence Assessment

WEPA UK Ltd

Llangynwyd, Bridgend

Flood Risk Assessment

August 2019

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Contents

Appendices

Appendix A	Location Plan
Appendix B	Topographical Survey
Appendix C	Borehole Logs
Appendix D	Existing Site Drainage Plan
Appendix E	British Geology Survey Map

1. INTRODUCTION

This Flood Risk Assessment (FRA) has been prepared by Phoenix Design Partnership Limited on behalf of Quorum Consulting Engineers and BHM Ingenieure / WEPA UK Ltd to support a planning application for the new proposed paper machine, warehouse, dispatch area and ancillary infrastructure to be constructed at the existing WEPA UK Ltd site.

The Flood Risk Assessment is in accordance with current planning policy and complies with the requirements of Technical Advice Note 15: Development and Flood Risk (TAN 15). An assessment has been made of the risks posed to the new development from a range of sources such as fluvial, groundwater, surface water and sewers. All available information at the time of writing the report has been reviewed such as geology, topography and hydrology.

This scheme will need to comply with the Statutory Standards for Sustainable Drainage Systems produced by Welsh Government and the CIRIA SuDS Manual (C753).

1.1. *Location*

The WEPA UK Ltd site is located off the A4063 in Llangynwyd, Bridgend. A national grid reference for the site is SS 87755 87128 (287755mE ,187128mN).

The A4063 runs along the Southern and Western boundaries with existing fields to the North and the River Llynfi to the East.

A site location plan is included within Appendix A.

1.2. *Current Land Use*

The site is currently occupied by WEPA UK Ltd. The company produce hygiene paper products such as toilet paper, kitchen roll and napkins for the UK retail sector.

1.3. *Site Topography*

A topographical survey is currently being undertaken by Alpine Land Surveyors Ltd (August 2019). Although not fully complete the current survey information can be seen in Appendix B.

Access to the site is via a single access off the A4063 with a gradient of between 1 in 30-40.

Overall the site sits in a valley with levels falling into the site from the North, West and South. Levels range from approx. 105mAOD to 72.50mAOD at the Railway line. The levels continue to fall away to the East into the Llynfi River.

To the West of the site near the entrance there is a large area of parking, three bungalows and a security hut. The main building / series of buildings and plant sits in the centre of the site. The loading bays and storage yards are located along the South of the site. There is a wastewater treatment facility located over the rail line next to the river however this

is not being considered as part of this report as no works are located further than the railway line.

1.4. *Site Geology*

The site has had an array of ground investigation carried out both recently and historically with further information to be published shortly. Works have been carried out by Golder Associates, Ove Arup and Integral Geotechnique to name a few. A plan showing where boreholes and trial pits have been carried out can be seen in Appendix C along with samples of boreholes taken across the site to give an overall idea of the ground conditions.

The British Geology Survey maps indicate the bedrock across the site to be a sequence of sandstones, siltstones and mudstones. The superficial deposits comprise of alluvium where the valley was historically located (now culverted watercourse) and glacial till surrounding this to the North and South.

Groundwater has been recorded at varying depths across the site along with seepages at shallow depth. To the West Golder Associates recorded ground water at depths of 7-9m Bgl, Ove Arup recorded ground water at 4m Bgl in the same area. To the East Ove Arup have recorded ground water from approx. 3m Bgl which did rise in two of the boreholes. It has been noted by Quorum that during foundation installation for some of the existing buildings ground water was struck 1m down from surface level.

The bedrock is classified as a Secondary A aquifer and the overlying superficial soils are classified as either a Secondary A or a Secondary – undifferentiated aquifer.

The site is not underlain by a principle aquifer and is not located within a source protection zone.

1.5. *Existing Drainage*

Dwr Cymru Welsh Water (DCWW) plans were not available at the time of writing the report however it is not believed any of the onsite systems are adopted.

The site has an extensive network of existing foul and surface water drainage. Surface water flows are discharged un-attenuated into the culverted (1200dia) Nant Gwyn watercourse which is culverted throughout the site until it discharges into the Llynfi River. Foul flows are directed to the onsite treatment works before being discharged into the Llynfi River.

The existing 1200dia culverted watercourse also has a second inlet near the site entrance from an unnamed watercourse to the North West.

An existing on-site drainage plan can be seen in Appendix D.

2. FLOOD RISK ASSESSMENT REQUIREMENTS

2.1. *Requirements for a Flood Risk Assessment*

Flood Risk Assessments are required depending on the location of developments relative to Natural Resources Wales (NRW) flood mapping zones or where the development is more than 1 hectare.

The flood risk zones are normally classified as follows;

- Zone 1 – areas that have a low probability of flooding i.e. less than 1 in 1000 annual probability of river or sea flooding.
- Zone 2 – areas that have a medium probability of flooding i.e. between a 1 in 100 and 1 in 1000 annual probability of river flooding; or between a 1 in 200 and 1 in 1000 annual probability of sea flooding.
- Zone 3a – areas that have a high probability of flooding i.e. 1 in 100 or greater annual probability of river flooding or 1 in 200 or greater annual probability of sea flooding.
- Zone 3b – areas classed as functional flood plains where water has to flow or be stored in times of flood.

Although the NRW flood maps show the above flood zones for planning purposes TAN 15 which is still relevant in Wales classifies these zones slightly different to this with zones from A to C. These are explained below;

- Zone A – Considered to be at little or no risk of fluvial or tidal/coastal flooding.
- Zone B – Areas known to have been flooded in the past evidenced by sedimentary deposits.
- Zone C – Based on the extreme flood outline, equal to or greater than 0.1% (river, tidal or coastal).
    - Zone C1 – Areas of the floodplain which are developed and served by significant infrastructure, including flood defences.
    - Zone C2 – Areas of the floodplain without significant flood defence infrastructure.

3. FLOOD RISK ASSESSMENT

This section explores the potential flood risk from a range of sources.

3.1. *Fluvial Flooding*

The nearest main river to the application site is the Llynfi river located along the Eastern boundary of the site on the opposite side of the railway line.

The NRW flood map for planning below shows that the proposed development site is located mainly in Zone A but with a section through the centre of the site falling under Zone B. Ordinarily this zone would be assessed based on levels compared to flood level data for the river however as this zone is based on the underlying geology it is believed to no longer be relevant as the existing site has been developed, levels have been raised and the watercourse has been culverted, please refer to British Geology Survey Map in Appendix E which shows exactly the same shape for the superficial alluvium deposits as the NRW flood Zone B. It is recommended that this principle is agreed with the local drainage officer at detailed design stage.

The site is therefore considered at this stage to be at little or no risk of fluvial flooding.

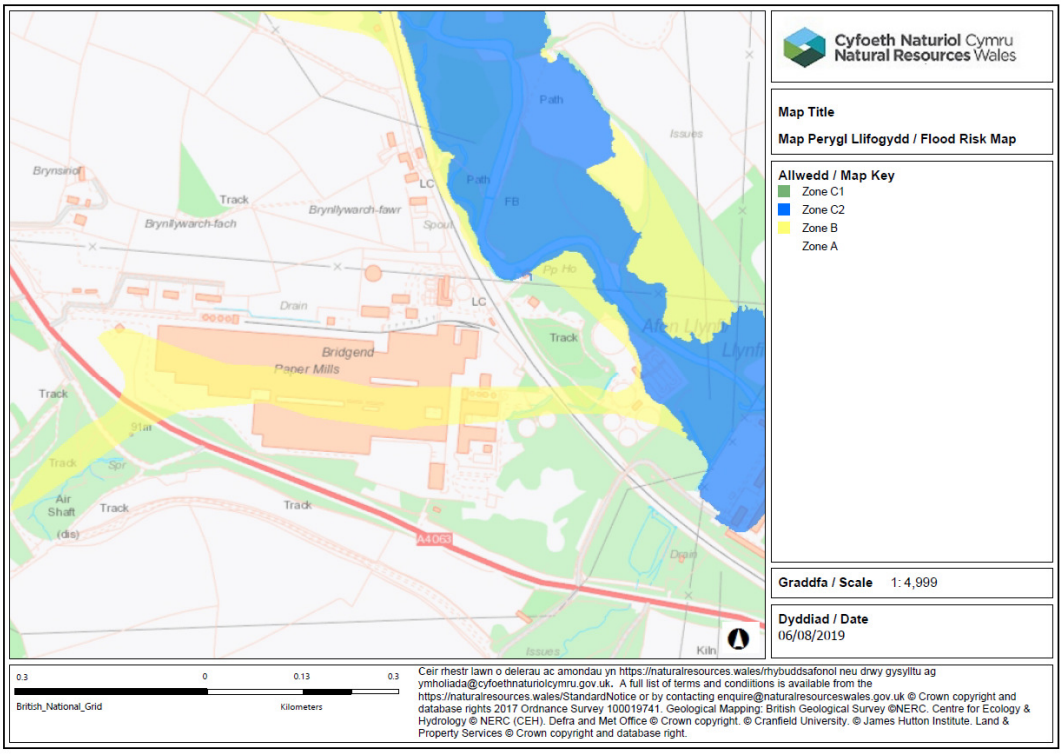


Figure 1 - NRW Flood map for planning

3.2. *Tidal Flooding*

The site is not influenced by Tidal flooding.

3.3. *Surface Water (Overland) Flooding*

Intense periods of rainfall over a short duration can often lead to overland flow and flooding as rainwater is unable to infiltrate into the ground or enter drainage systems. It is made worse when soils are saturated so that they cannot accept any more water.

The NRW surface water flood map below has been generated by simulating rainfall events over the site to determine where surface flows and collects based on Lidar survey information.

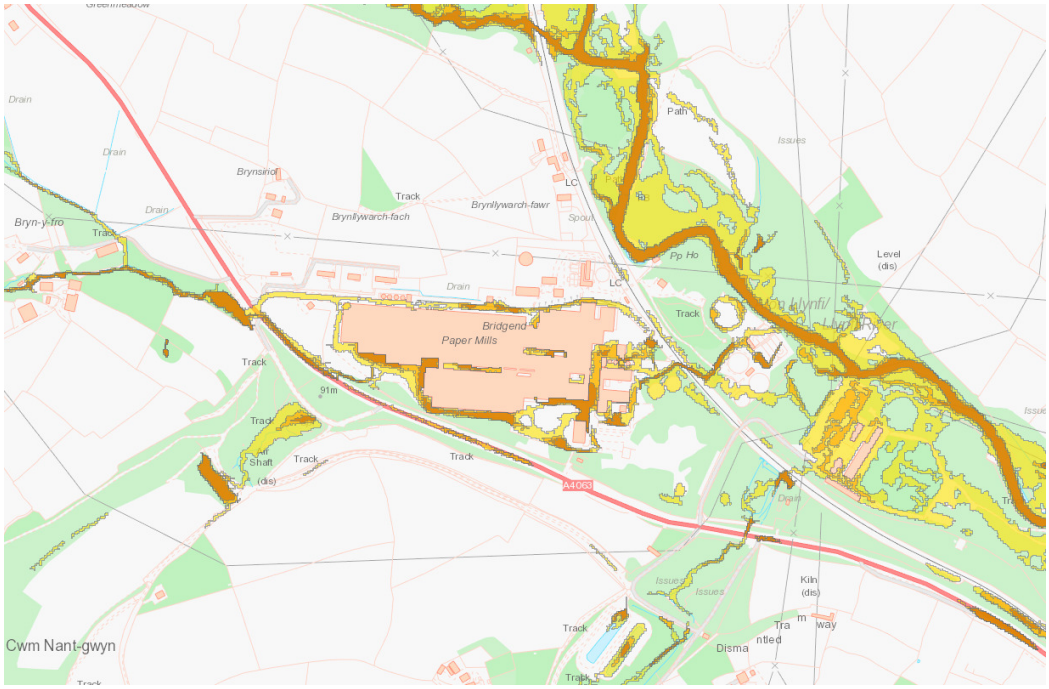


Figure 2 - NRW Surface water flood map

The map shows that the hardstanding areas surrounding the main buildings are at low to high risk from surface water flooding.

As mentioned much of this is based on rainfall simulation and lidar data which does not take into account the existing on-site drainage systems.

For the existing scenario there is a large system of gullies and drainage channels which intercept the surface water flows and therefore prevents surface water flooding to the buildings.

In the proposed scenario some of the areas of risk highlighted will now be replaced with additional buildings or external hardstanding and under Schedule 3 of the Flood and

Water Management Act 2010 these will be subject to having a sustainable drainage scheme designed and approved by the local Sustainable Drainage Approval Body (SAB).

It is considered that the existing site drainage plus the new sustainable drainage systems will mitigate the risks posed by surface water runoff.

3.4. *Flooding from Sewers*

There is no evidence to suggest there are any capacity issues with the onsite drainage systems. No CCTV reports of the condition of the on-site sewers were available at the time of writing the report.

The culverted watercourse has been noted as causing flooding on two occasions in the past. The most recent event which was approximately 2 years ago was caused by a partial collapse near the site entrance. The second event was approximately 10 years ago and was caused by a blockage of the culvert. In both scenarios remedial works were carried out.

There are no known issues with capacity in the culvert at the time of writing the report.

It is therefore considered at this time that there is little to no risk of flooding from sewer systems.

3.5. *Flooding from Groundwater*

There are no known springs within the site. As mentioned earlier in the report ground water has been encountered in boreholes across the site at varying depths but has not been recorded as rising to the surface or above, therefore it is considered that there is a low risk of flooding from groundwater which will need to be considered with any foundation design or design of the new sustainable drainage systems.

3.6. *Flooding from Artificial Sources*

There are no artificial bodies of water located within or near the proposed application area and as a result is is not considered that flooding from artificial sources is a risk to the development.

3.7. *Flooding from Construction Activities*

Construction activy is known to increase flow rates into drainage systems and off site usually through the stripping of surface vegetation. It is also known for clogging up existing systems through siltation and washing away of rubble etc. As part of the SAB approval process a detailed construction surface water management plan will be required to be submitted and approved highlighting how run off will be restricted and how contaminants will be prevent from entering the river. As it will be the SAB that approves these proposals the risk does not need to be considered as part of this report.

3.8. *Flooding from Operation of the site*

Operation and maintenance of the existing drainage systems will remain the responsibility of the site owners and regular maintenance and inspection regimes should be followed. In regard to the new proposed systems these will be approved by the council SAB team before construction can commence and then maintenance will again fall to the site owner. The risk from the future operation of the site is therefore considered to be low so long as maintenance and inspection regimes are followed.

Suitable flow restriction into the culverted watercourse will be required for any of the proposed systems so as not to increase flood risk on site or downstream, this will either follow greenfield rates for each rainfall event or be restricted to Qbar in line with the current Welsh Government guidance.

4. SCHEDULE 3 – SAB APPLICATION

Under Schedule 3 all developments in Wales over 100m² now require surface water drainage to be designed in accordance with the statutory standards for sustainable drainage systems produced by Welsh Government. It is the job of each councils SAB team to assess and approve the design proposals which are reviewed against these standards.

The standards aim to mimic the natural drainage characteristics of a site to help control the volume and rate of run off from the proposed development. This is achieved by managing the runoff at or close to the surface and as close to the sources as possible while also providing additional benefits such as biodiversity and amenity.

There are six standards that need to be met as follows;

- S1 – Surface Water runoff destination
- S2 – Surface Water runoff hydraulic control
- S3 – Water Quality
- S4 – Amenity
- S5 – Biodiversity
- S6 – Design of drainage for construction, operation and maintenance

It is recommended that a pre-application submission is made and conversations with the council begin early in order to avoid the full submissions being refused.

5. CONCLUSIONS / SUMMARY

- Majority of the site is located in Flood Zone A, and partially within Flood Zone B. Flood Zone B extent is likely in relation to the underlying geology as shown on the British Geology Survey Maps.
- Site lies in a valley with levels falling into the site from the West, North and South.
- The river Llynfi lies to the East of the site and the Nant Gwyn watercourse is culverted through the site before discharging into the river Llynfi.
- The site bedrock geology consists of sandstones, siltstones and mudstones. The superficial deposits comprise of alluvium and made ground.
- Groundwater has been encountered at a range of depths from 1mBgl.
- No Dwr Cymru Welsh Water assets are located with the site, all existing drainage is considered to be private.
- The development can be considered to be at low to no risk from the majority of sources. Surface water flooding mitigation will be provided by existing and proposed drainage systems.
- Under Schedule 3 of the Flood and Water Management Act 2010 the surface water proposals will need to be reviewed and approved by Bridgend County Borough Council SAB team.
- All systems need be designed for the 1 in 100 year + 30% climate change event.
- On the basis of the findings of this report there are no grounds for objecting to the proposed development due to flood risk.

Appendix A

Location Plan


Site Boundary
Site Boundary
Site Boundary
Overhead Electricity Cables
400Kv cables
Pylon
Pylon
400Kv cables
Water Tank
A4063
To Maesteg
Glan Nant
Cae Glas
Tir - iarll
Site Entrance
Bridgend Paper Mill
Site Boundary
Site Boundary
A4063
From Coytrahen
Site Boundary
North
A4063

Appendix B

Topographical Survey

TO MAESTEG

A4063

RAILWAY LINE

RAILWAY LINE

RAILWAY LINE

TO ELECTRICITY COMPOUND

RAILWAY LINE

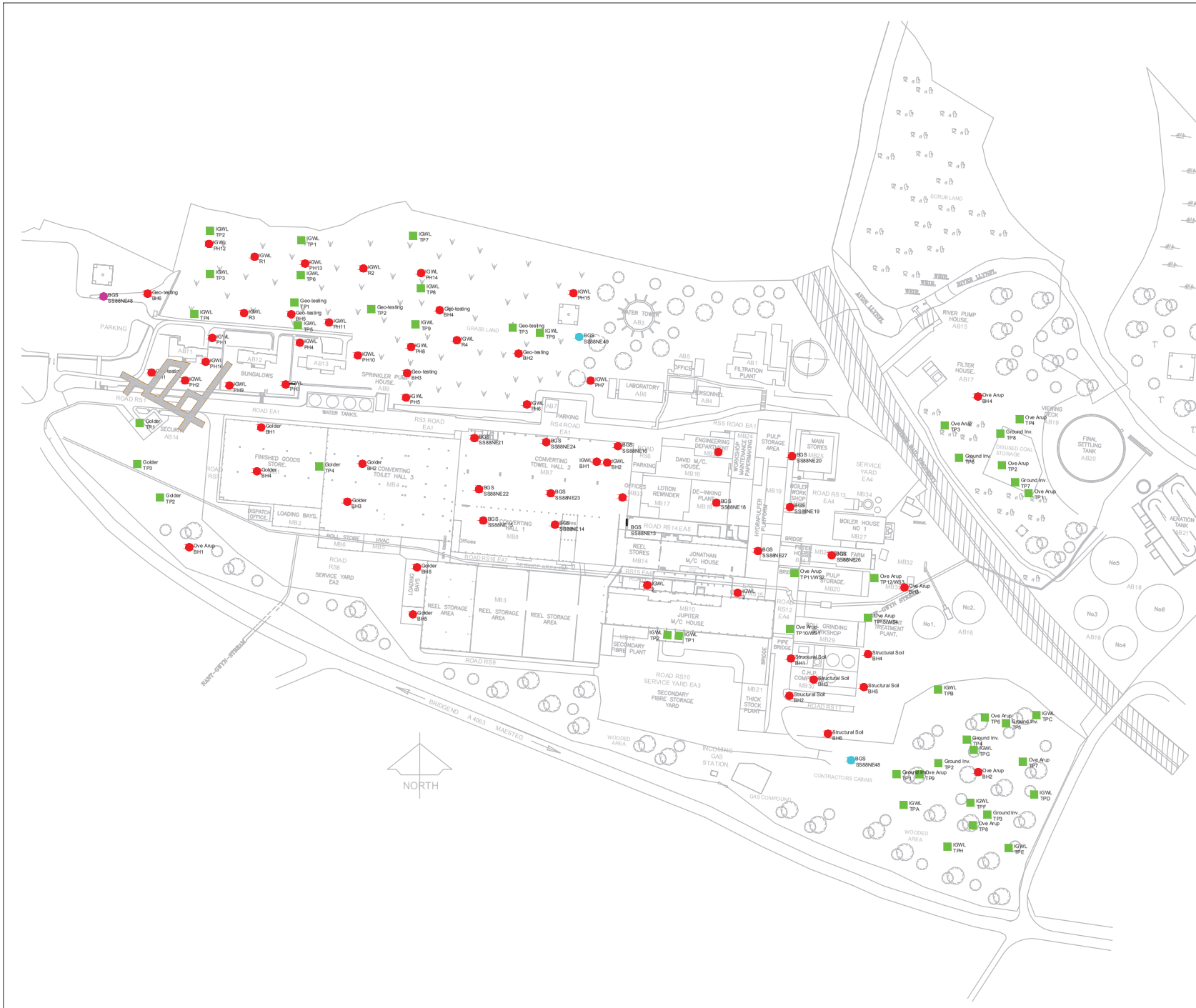
RAILWAY LINE

A4063

TO BRIDGEND

Appendix C

Borehole Logs



General Notes
Do not scale from this drawing
Dimensions must be checked on site
All works to comply with current Building Regulations
All site works must be to the current drawing revision
Drawing is copyright of Quorum Project Management Ltd

Al levels to be verified by contractor on site. Any concerns by the contractor to be raised with the engineer prior to any instillation/fabrication works.

The drawing information must be read in conjunction with all relevant scheme drawings, specification and/or schedules referred to or not. The contractor is responsible to insure that all work is in compliance with current Building Regulations and or other relevant legislation

Dimensions on this drawing are not to be used for Construction purposes

Rev	Date	Description
-	--.--.--	-

Project No. PM800/19

Project
WEPA BRIDGEND
PROJECT NEPTUNE

Drawing
BOREHOLES AND TRIAL PITS
PLAN

Drawing No.	Revision
QPM-DR-S-SK01	-

Scale	Date	Drawn by	Chkd by
1:2500 @ A3	JUN 2019	JM	

Quorum CONSULTING ENGINEERS
89, Eastgate, Cowbridge, Vale of Glamorgan CF71AA Tel. 01446 774493
2 Crown Road, St. Margaret's Middlesex, TW1 3EE Tel. 0208 892 9293

Drawing Status
PRELIMINARY

Sampling					Strata		
Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)	Description	Depth	Level
			09.01.01		MADEGROUND: Dark grey silty fine sand sized pulverised fuel ash with occasional subrounded fine to medium gravel of sandstone.		
1.00	BD						
2.00	BD						
3.00	BD						
4.00	BD						
5.00	BD						
						5.60	
6.00	B				Stiff grey brown sandy silty CLAY with some subrounded to subangular fine to coarse gravel of sandstone, mudstone and occasional coal. Occasional cobbles. Mottled orange brown at top of stratum. (Glacial Till)		
7.00	B						
7.00							
		7.00	10.01.01				
					... continued from 10.00m on page 2 of 2.		

Equipment: Cable Tool Percussion	Groundwater:	Ground Level:	81.50 m OD
Borehole Dia (mm)	Possible seepage at 5.60m and below 8.50m,	Coordinates:	288083 mE
200 to 11.00m.	behaviour masked by added water.		186974 mN
		Logged by: D.M.	Checked by: D.M.

Remarks: Chiselled on hard srata 8.20 - 8.50m (0.75 hr), 9.20 - 9.40m (0.50 hr).
50 mm HDPE standpipe installed, slotted with pea gravel surround 8.50-11.00m, plain pipe with bentonite surround 0.00-8.50m.
Flush protective steel cover concreted over instrument.

BOREHOLE RECORD	Project: Fort James, Bridgend Paper Mills Ground Investigation	Contract:	SGT 609
SOUTHERN GROUND TESTING		Borehole:	2 (1 of 2)

Sampling					Strata		
Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)	Description	Depth	Level
						10.40	
10.40 - 11.00	B				Grey flat angular coarse GRAVEL sized fragments of mudstone with a little stiff clay matrix.		
11.00		11.00			(Probable weathered mudstone)	11.00	
					End of borehole at 11.00m.		

Equipment: Cable Tool Percussion	Groundwater:	Ground Level:	81.50 m OD
Borehole Dia (mm)		Coordinates:	288083 mE
200 to 11.00m.			186974 mN
		Logged by: D.M.	Checked by: D.M.

Remarks:

BOREHOLE RECORD	Project: Fort James, Bridgend Paper Mills Ground Investigation	Contract:	SGT 609
SOUTHERN GROUND TESTING		Borehole:	2 (2 of 2)

Sampling					Strata		
Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)	Description	Depth	Level
			10.01.01		MADEGROUND: Brick, concrete and masonry rubble with some brown sandy fine to coarse gravel of sandstone and burnt shale.		
0.50	BD						
1.00	BD					1.00	
					Brown slightly silty fine to coarse SAND with some pockets of dark brown fibrous peat. (Alluvium)		
2.00	BD						
						2.50	
					Grey and brown slighlty clayey silty sandy subrounded fine to coarse GRAVEL of sandstone. (Fluvoglacial)		
3.00	BD					3.00	
					Brown sandy subrounded fine to coarse GRAVEL of sandstone with some cobbles. (Fluvoglacial)		
4.00	BD						
						4.70	
5.00	BD				Stiff grey brown sandy silty CLAY with some subrounded to subangular fine to coarse gravel of sandstone, mudstone and occasional coal. Occasional cobbles. (Glacial Till)		
5.00						5.00	
					End of Borehole at 5.00m.		

Equipment: Cable Tool Percussion	Groundwater:	Ground Level:	75.03 m OD
Borehole Dia (mm)	Struck at 3.10m, rose to 2.80m in 20 mins	Coordinates:	288030 mE
200 to 5.00m.			187113 mN
		Logged by: D.M.	Checked by: D.M.

Remarks:

50 mm HDPE standpipe installed, slotted with pea gravel surround 2.50-5.00m, plain pipe with bentonite surround 0.00-2.50m. Flush protective steel cover concreted over instrument.

BOREHOLE RECORD	Project: Fort James, Bridgend Paper Mills Ground Investigation	Contract: SGT 609
SOUTHERN GROUND TESTING		Borehole: 3

MACHINE	DANDO 150	CLIENT	FERSON CONTRACTORS LTD	GROUND LEVEL	2
DIAMETER	200mm				SHEET 1 OF 1

PROGRESS	WATER	'N' VALUE	SAMPLE OR TEST TYPE	SAMPLE OR TEST DEPTH (M)	DESCRIPTION OF STRATA	THICKNESS (M)	DEPTH TO BASE (M)	SECTION OF STRATA	REDUCED LEVEL
			D	0.00	TOPSOIL	0.25	0.25		
				0.50					
			B	0.50	Friable brown and yellow becoming very sandy CLAY with sandstone fragments up to coarse gravel size fragments becoming larger and more frequent with depth.				
		50	B	1.00					
	for	200mm	Ic	1.00					
			B	1.50					
			B	2.00					
			B	2.50					
		50	Ic	3.00					
	for	160mm	B	3.10		3.55	3.80		
			D	4.00	Moderately strong grey SANDSTONE (possibly large boulders)	4.30	4.30		
					BOREHOLE TERMINATED				

KEY

● D	disturbed sample	Is	standard penetration test
● B	bulk sample	Ic	cone penetration test
U	undisturbed sample		water encountered
▲ W	water sample		water standing level
═	casing depth	—	borehole depth

REMARKS

No water encountered during boring.

B. H. LOGGED BY: GL/SJB

GEO-TESTING SERVICES LTD

SCALE : 1 : 50

MACHINE	DANDO 150	CLIENT	FERSON CONTRACTORS LTD	GROUND LEVEL	0
DIAMETER	200mm				SHEET 1 OF 1

PROGRESS	WATER	'N' VALUE	SAMPLE OR TEST TYPE	SAMPLE OR TEST DEPTH (M)	DESCRIPTION OF STRATA	THICKNESS (M)	DEPTH TO BASE (M)	SECTION OF STRATA	REDUCED LEVEL
	▼▼ 0.20		●D	0.00 - 0.40	Soft brown sandy TOPSOIL	0.40	0.40		
			●B ●B	0.40 1.00	Friable brown and yellow and brown very sandy CLAY with coarse gravel and cobble size fragments of grey sandstone	1.00	1.40		
			●D U ●D	1.40 1.60 2.10	Firm to stiff becoming stiff dark brown and grey CLAY with some medium to coarse gravel.	1.80	3.20		
		50 for 170mm 50 for 100mm 50 for 100mm	Ic ●D Ic ●D Ic ●D	3.00 3.20 4.00 4.10 5.00 5.20	Stiff to hard dark brown and grey CLAY with medium to coarse gravel	2.60	5.80		
			●D	5.90	Moderately strong grey SANDSTONE (probably boulder)	0.20	6.00		
					BOREHOLE TERMINATED				

KEY

- ● D disturbed sample
- ● B bulk sample
- U undisturbed sample
- ▲ W water sample
- casing depth
- Is standard penetration test
- Ic cone penetration test
- water encountered
- ▼ water standing level
- borehole depth

REMARKS

PROJECT: British Tissues, Maesteg

CLIENT: James & Nicholas

CONTRACTOR: W.J. and Sons

BOREHOLE No: 1

SHEET 1 OF 2

RIG TYPE: Dando 150
HOLE DIAMETER,mm: 200
CASING DEPTH,m: 10.00

LOCATION: See Site Plan
GROUND SURFACE ELEV,m:
FINAL DEPTH,m: 11.35

DRILLED BY: AJ
LOGGED BY: AWJ
DRAWN BY: AWJ

DATE STARTED: 30/1/92
DATE COMPLTD: 3/2/92

DOWNHOLE DEPTH m	BORING PROGRESS	DEPTH TO WATER m	SAMPLES/TESTS DEPTH,m FROM	TO	No	TYPE	SYMBOLIC LOG	ELEVATION m O D / DEPTH m	GEOLOGICAL DESCRIPTION	PIEZOMETER DETAILS
0	30/1		0.50	1.00	1	B		0.00	Medium dense dark greyish brown orange and red in places silty very clayey SAND with much fine to coarse subrounded and angular gravel (MADE GROUND)	
1			1.00	1.45	2	S(21)		1.00	Soft to firm greyish orange brown silty very sandy CLAY with much fine to medium subangular and angular gravel (MADE GROUND)	
			1.50	2.00	3	B				
2			2.00	2.45	4	S(16)				
			2.50	3.00	5	B				
			2.80		6	W		2.80	Medium dense greyish brown slightly coarse sandy fine to coarse subrounded to angular GRAVEL with occasional cobbles (ALLUVIUM)	
3	30/1 31/1	2.00 1.50	3.00	3.45	7	C(13)				
			3.50	4.00	8	B		3.20	Soft to firm dark greyish brown orange in places slightly sandy silty CLAY with much fine to coarse subangular and angular gravel with occasional cobbles and rare boulders (WEATHERED BOULDER CLAY)	
4			4.00	4.45	9	S(10)				
			4.50	5.00	10	B				
5			5.00	5.45	11	S(15)				
								5.35	Firm to stiff dark bluish grey slightly sandy very silty CLAY with some fine to coarse subangular and angular gravel and rare cobbles (BOULDER CLAY)	
6			6.00	6.50	12	B				
			6.50	7.10	13	U				
			6.80		14	W				
7			7.50	8.00	15	B				
8			8.00	8.45	16	S(50)*		8.00	Dense light and dark grey medium to coarse angular GRAVEL with rare cobbles with pockets of soft light blue very silty clay with much angular fine to medium gravel lithorelicts of mudstone	
9			9.00	9.50	17	B				
			9.50	9.55	18	S(50)*				
10	31/1	2.20								

REMARKS : Water strikes encountered at 2.80 and 6.80m.
Water level rising from 2.80 to 1.95 and from 6.80 to 5.80m in 20 mins.
First water strike cased off at 5.85m.

SCALE: 1 IN 50 | Golder Associates | BOREHOLE LOG | PROJECT No: 9253009

PROJECT: British Tissues, Maesteg		**BOREHOLE No: 1** SHEET 2 OF 2
CLIENT: James & Nicholas	CONTRACTOR: W.J. and Sons	
RIG TYPE: Dando 150 HOLE DIAMETER,mm: 200 CASING DEPTH,m: 10.00	LOCATION: See Site Plan GROUND SURFACE ELEV,m: FINAL DEPTH,m: 11.35	DRILLED BY: AJ LOGGED BY: AWJ DRAWN BY: AWJ DATE STARTED: 30/1/92 DATE COMPLTD: 3/2/92

DOWNHOLE DEPTH m	BORING PROGRESS	DEPTH TO WATER m	SAMPLES/TESTS DEPTH,m FROM	TO	No	TYPE	SYMBOLIC LOG	ELEVATION m O D / DEPTH m	GEOLOGICAL DESCRIPTION	PIEZOMETER DETAILS
10	31/1 3/2	2.20 0.6								
			10.50	11.00	19	B				
11			11.00	11.50	20	B(50)*				
								11.35		
12										
13										
14										
15										
16										
17										
18										
19										
20										

REMARKS : Water strikes encountered at 2.60 and 6.60m.
Water level rising from 2.60 to 1.95 and from 6.60 to 5.60m in 20 mins.
First water strike cased off at 5.85m.

SCALE: 1 IN 50	Golder Associates	BOREHOLE LOG	PROJECT No: 9253009

PROJECT: British Tissues, Maesteg

CLIENT: James & Nicholas

CONTRACTOR: W.J. and Sons

TRIAL PIT No: 1

SHEET 1 OF 1

MACHINE:
DIMENSION:
DATE:

LOCATION: See Site Plan
GROUND SURFACE ELEV,m:
FINAL DEPTH,m: 4.45

LOGGED BY: AWJ
DRAWN BY: AWJ

DOWNHOLE DEPTH m	SAMPLES/TESTS DEPTH,m FROM	SAMPLES/TESTS DEPTH,m TO	SAMPLES/TESTS No	SAMPLES/TESTS TYPE	SYMBOLIC LOG	ELEVATION m O D / DEPTH m	GEOLOGICAL DESCRIPTION
0						0.00	Dense to very dense brown slightly clayey silty sandy fine to coarse angular gravel with much fine to coarse angular cobbles (MADE GROUND)
	0.40	0.60	1	B		0.30	Firm soft in places greyish black yellow and red in places slightly sandy clayey SILT with much fine to coarse angular gravel and cobbles (MADE GROUND)
1							
2	2.00	2.20	2	B		2.00	Soft to firm light grey mottled orange very sandy CLAY with much subrounded to angular gravel and cobbles (ALLUVIUM)
						2.50	Firm to stiff dark greenish grey brown slightly sandy very silty clay with much subangular and angular fine to coarse gravel and cobbles (GLACIAL DRIFT)
3							
4						3.60	Firm dark grey mottled orange slightly sandy silty clay with much subangular and angular fine to coarse gravel and rare cobbles (GLACIAL DRIFT)
						4.60	Firm to stiff slightly sandy silty CLAY with much fine to medium subangular and angular gravels of core sandstone siltstone and mudstone (GLACIAL DRIFT)
5						4.95	
6							
7							
8							
9							
10							

REMARKS : No seepages recorded.
Pit walls stable.

SCALE: 1 IN 50 | Golder Associates | TRIAL PIT LOG | PROJECT No: 9253009

PROBEHOLE NO. 10

Site: Bridgend Paper Mills **Job No:** 7261/C

Depth (m)			Brief Stratum Description
GL	-	1.80	Clayey SAND
1.80	-	5.80	SAND with boulders
5.80	-	9.70	MUDSTONE
9.70	-	12.00	MUDSTONE with sandstone bands
12.00	-	17.00	SANDSTONE
17.00	-	21.50	MUDSTONE with sandstone bands
21.50	-	22.20	**COAL**
22.20	-	23.00	MUDSTONE
23.00	-	23.30	**COAL**
23.30	-	25.50	MUDSTONE
25.50	-	30.00	SANDSTONE

Notes:

1. **Equipment:** Gryphon rotary drilling rig
2. **Flushing Medium:** Compressed air
3. **Casing:** GL to 6.00m
4. **Probehole Diameter:** GL to 6.00m - 150mm
   6.00m to 30.00m - 119mm
5. **Groundwater:** Wet below 17.50m
6. Description of strata based on air flush returns and drillers logs.

Integral Geotechnique

RECORD OF BOREHOLE R2 (Sheet 1 of 2)

JOB NO.	7261/C
MADE BY	D.P.D.
DATE MADE	21.11.97

DAILY PROGRESS	DEPTH TO WATER m	DEPTH OF CASING m	SAMPLES DEPTH FROM m	SAMPLES DEPTH TO m	SAMPLES TYPE	TCR%	LEGEND	DEPTH m	REDUCED LEVEL m O.D.	DESCRIPTION OF STRATA
										GROUND LEVEL
										Sandy boulder CLAY (Driller's Description)
						O/H				
								3.10		Weathered SANDSTONE (Driller's Description)
			4.00					4.00		
			4.00	5.50		100				Pale grey fine to medium SANDSTONE, strong, weathered orange along bedding and joint fractures, generally closely spaced sub-horizontal fractures, moderately and widely spaced oblique and sub-vertical factures
			5.50	7.00		100				
			7.00	8.50		100				
			8.50	10.00		100				
			9.00					10.00		

REMARKS

1. Equipment: Gryphon rotary drilling rig
2. Core recoveries: See attached sheet
3. No groundwater encountered
4. Piezometer installed to 15.00m, response zone 10.00 to 15.00m

TYPE OF BORING

Rotary Drilling GL to 4.00m
Cored Drilling 4.00m - 10.00m
Rotary Drilling 10.00m to 15.00m

DIAMETER OF BORING

GL to 15.00m - 118mm

CASING TUBES

PROJECT: JAMONT

BOREHOLE R2

STRUCTURAL SOILS

BOREHOLE LOG

Contract	Client	Borehole No
Bridgend	National Power	4

Job No	Date	Ground Level (m AOD)	Co-Ordinates	Sheet
30604	22/04/93	26.32		1 of 2

Samples and In-situ Tests				Water	Instrumentation	Description of Strata	Depth (Thickness)	Legend
Depth	No	Type	Blows					
0.00-1.00	1	D				MADE GROUND: Loose to medium dense red brown sand and gravel of moderately strong laminated siltstone	(2.00)	
1.00-1.45	2	SPT	7					
1.45-2.00	3	D						
2.00-2.45	4	SPT	23				2.00	
2.45-3.00	5	B				Medium dense grey and yellow brown very silty clayey fine SAND with some gravel and clay pockets (Glacial Sand and Gravel)	(0.45) 2.45	
3.00-3.45	6	SPT	38			Dense yellow brown zoned grey silty SAND and GRAVEL with some gravel, clay pockets and fine coal fragments (Glacial Sand and Gravel)	(4.00)	
3.45-4.50	7	B						
4.00	19	W						
4.60-5.05	8	SPT	32					
5.05-5.80	9	B						
6.00-6.45	10	SPT	31				6.45	
6.45-7.60	11	D				Stiff grey/brown very silty sandy CLAY with occasional to some subrounded sandstone, coal, and shale gravel and cobbles with depth (Boulder Clay)		
7.60-8.05	12	SPT	30					
8.05-9.00	13	D					(3.45)	

Boring Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Casing Diameter	Water Depth
21.4.93		3.45	3.00	150	0.90
22.4.93		11.95	0.0	150	0.70

Chiselling

From	To	Hours
6.50	10.0	0.5

General Remarks

Hand dig service pit to 1.0m depth (1 hr). Methane monitoring standpipe installed to 7.5m depth. Water sample no. 19 collected above boulder clay. Water sample no. 20 collected from below boulder clay.

All dimensions in metres	Method	Logged By	Checked By
1:50	Cable Percussion	SJM	

Integral Geotechnique

RECORD OF BOREHOLE R2 (Sheet 2 of 2)

JOB NO.	7261/C
MADE BY	D.P.D.
DATE MADE	21.11.97

DAILY PROGRESS	DEPTH TO WATER m	DEPTH OF CASING m	SAMPLES DEPTH FROM m	SAMPLES DEPTH TO m	SAMPLES TYPE	TCR%	LEGEND	DEPTH m	REDUCED LEVEL m O.D.	DESCRIPTION OF STRATA
										GROUND LEVEL
						O/H				SANDSTONE (Driller's Description)
6.11.97								15.00		
										END OF BOREHOLE

REMARKS

See Sheet 1 of 2

TYPE OF BORING

See Sheet 1 of 2

DIAMETER OF BORING

See Sheet 1 of 2

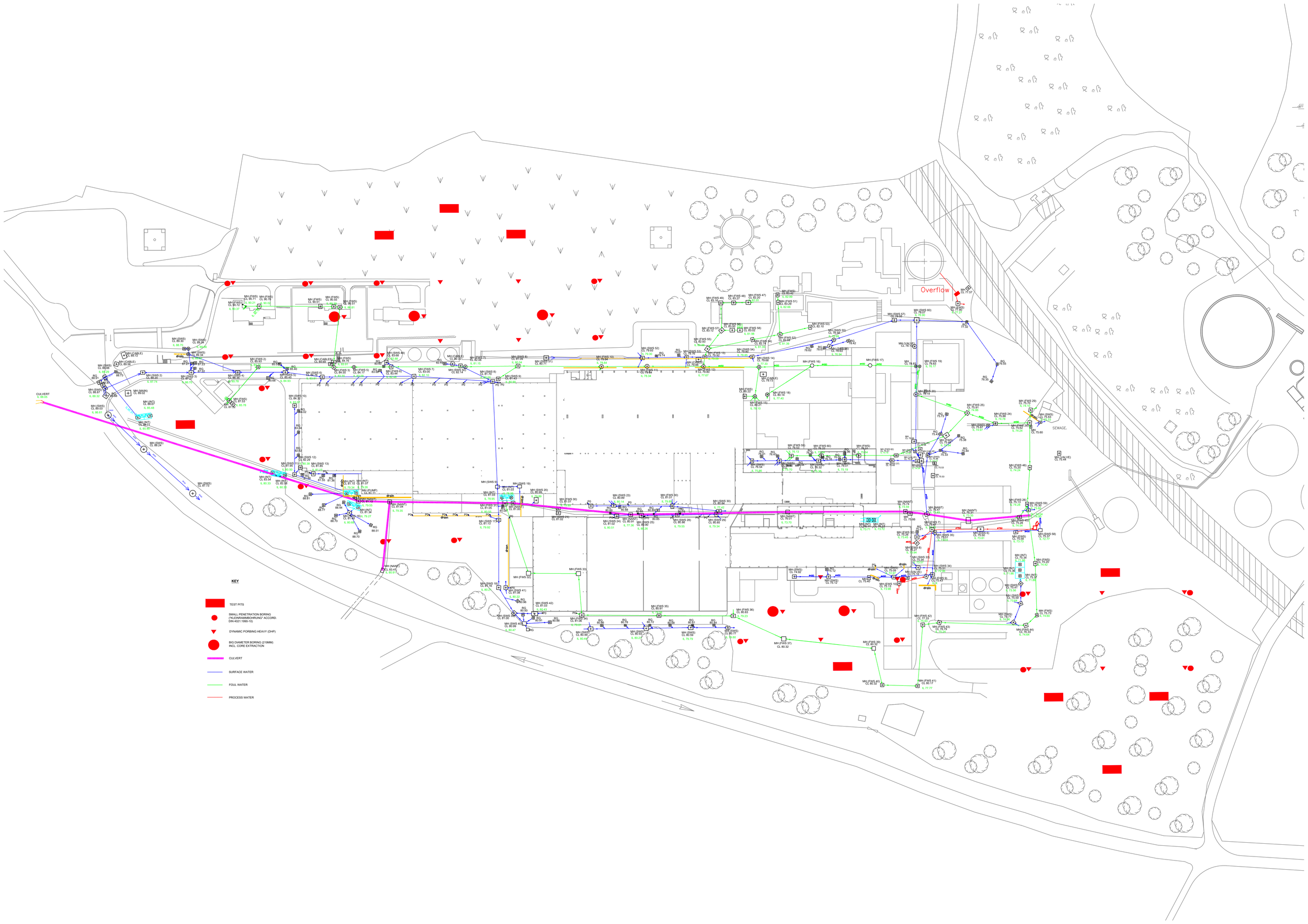
CASING TUBES

PROJECT: JAMONT

BOREHOLE **R2**

Appendix D

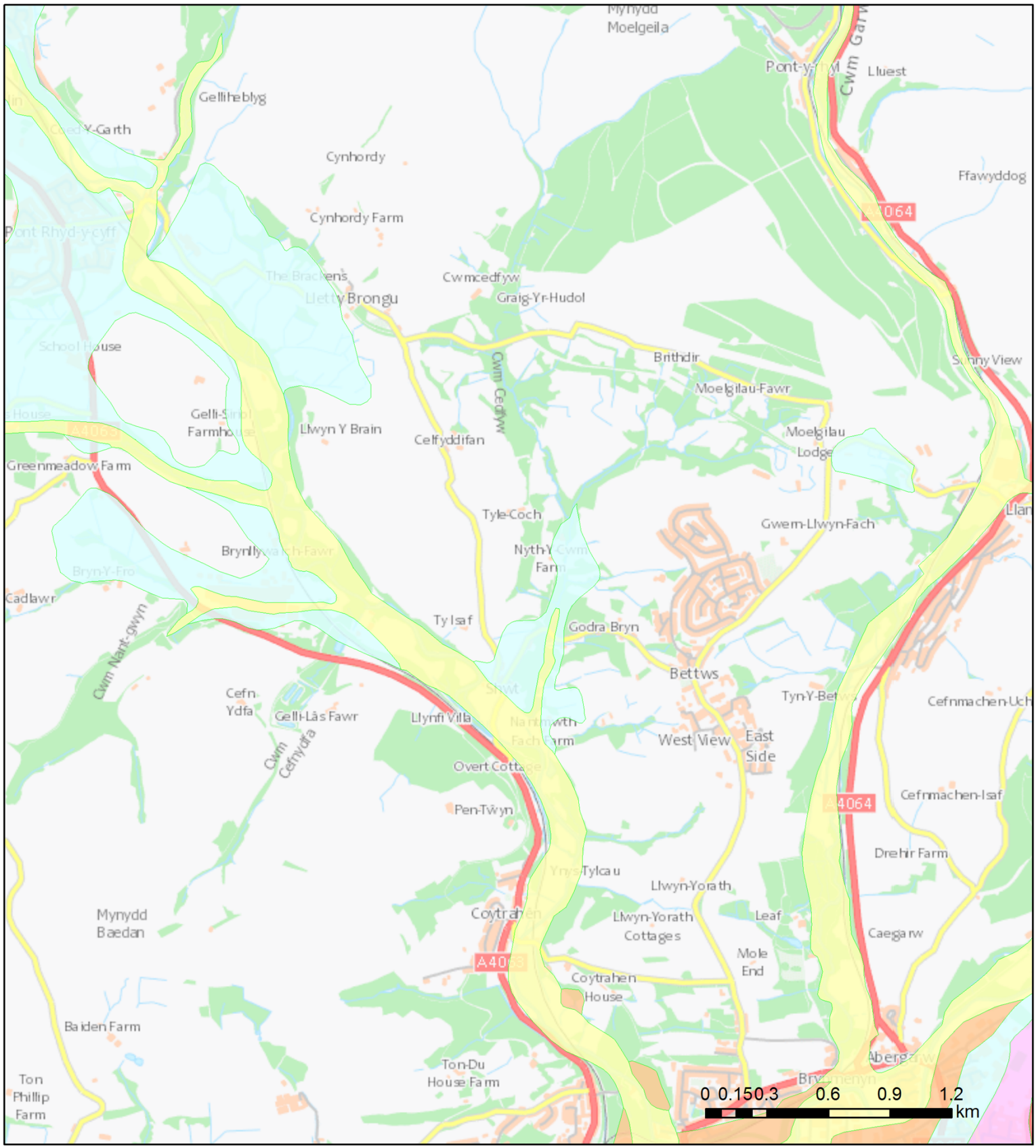
Existing Site Drainage Plan


Overflow
SEWAGE
CULVERT
KEY
TEST PITS
SMALL PENETRATION BORING ("KLEINRAMMBOHRUNG" ACCORD. DIN 4021:1990-10)
DYNAMIC PORBING HEAVY (DHP)
BIG DIAMETER BORING (219MM) INCL. CORE EXTRACTION
CULVERT
SURFACE WATER
FOUL WATER
PROCESS WATER

Appendix E

British Geology Survey Map

GeoIndex Report



GeoIndex Onshore Data Sources: NERC, Natural England, English Heritage and Ordnance Survey

Map Key

Superficial deposits 1:50,000 scale

- GLACIOFLUVIAL DEPOSITS, DEVENSIAN - SAND AND GRAVEL
- TILL, DEVENSIAN - DIAMICTON
- GLACIOLACUSTRINE DEPOSITS, DEVENSIAN - CLAY AND SILT
- ALLUVIUM - CLAY, SILT, SAND AND GRAVEL
- RIVER TERRACE DEPOSITS, 1 - SAND AND GRAVEL
- ALLUVIAL FAN DEPOSITS - SAND AND GRAVEL
- PEAT - PEAT

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