



10.0 Water Resources and Flood Risk

10.1 Introduction

10.1.1 This chapter provides an assessment of the potential impact of the Scheme on drainage and flood risk within the study area. The impact of the proposed development on drainage and flood risk within the Site and surrounding areas will be assessed by considering the following surface water receptors.

- Flood risk within the Site generally;
- Flood risk to areas adjacent and downstream of the Site;
- Quality impacts on watercourses and water bodies.

10.1.2 The significance of any impacts (beneficial or adverse) will be assessed by consideration of both the sensitivity of the receptor to flooding or contamination, and the magnitude of the impact.

10.1.3 The nearest main river to the Site is the River Nant-y-Fendrod, which flows adjacent the eastern boundary at a distance of approximately 20m.

10.1.4 The proposed development involves the extension of an existing industrial building and the installation of new plant within an existing depot. The existing Site is almost entirely surfaced with impermeable roof and hardstanding areas.

10.1.5 A topographical and utility survey have been undertaken and the survey drawing shows that the Site is generally flat with ground levels ranging between 9.0 and 9.5 m AOD.

10.1.6 The utility survey shows a number of private foul and surface water drains serving the existing compound Site. Foul drains range in size from 100mm to 150mm and receive flows from the buildings in the west of the Site. The foul drains leave the Site at the north east boundary at a depth of 2.9m, flowing into an adjacent industrial plot. Surface water drains range in size from 100mm to 300mm and receive flows from the existing buildings and hard standings. The surface water drains leave the Site part way along the eastern boundary, flowing towards the Nant-Y-Fendrod. The drawing indicates that all surface water from the Site passes through an interceptor prior to discharge.

10.1.7 The survey did not identify any public sewers within Clarion Close, however a number of gullies are present receiving run-off from the highway surface.

10.1.8 According to the Development Advice Map provided by Natural Resources Wales, the Site is entirely located within Flood Zone C1; where the risk of flooding from a major river is greater than 1 in 1000 years (0.1% AEP) in any one year but the area is developed and served by significant infrastructure including flood defences.

10.2 Methodology and Scope

Policy Background

10.2.1 The Assessment has been undertaken, taking into account the context of Planning Policy Wales. Key policies are outlined within TAN 15: Development and Flood Risk (2004). The key elements relevant to the assessment are detailed below:

- Guiding development to locations at little or no risk from river, tidal or coastal flooding or from run off arising from development in any location;
- Bearing in mind that government resources for flood and coastal defence are directed at reducing risks for existing development and are not available to provide defences in anticipation of future development;
- Managing the consequences of flooding where development can be justified and the consequences are considered acceptable (section 7 and appendix 1 of TAN 15);
- Making provision for future changes in flood risk, for example taking account of climate change, where they can be anticipated;
- Bearing in mind measures within Catchment Flood Management Plans or Shoreline Management Plans to restore substantial functionality and/or natural heritage benefits of flood plains through the removal of inappropriate existing built development.

Key Legislation

10.2.2 The EU Water Framework Directive (WFD) (2000/60/EC) was transposed into law in England and Wales by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 and needs to be taken into account in the planning of all new activities in, or potentially affecting, the water environment.

Scoping Assessment Stage

10.2.3 A Scoping Report was submitted to City and County of Swansea Council (CCSC) in January 2018. CCSC provided their formal scoping opinion on 1st March 2018. A pre-application advice meeting was held with Natural Resources Wales (NRW) on 19th April 2018 to discuss the proposed development in relation to flood risk, and to discuss how the consequences of flooding can be mitigated / managed.

Assessment Methodology

Collection of Baseline Data

10.2.4 Baseline conditions pertaining to the Site's hydrology have been compiled from a review of readily available published information from the following key sources:

- Natural Resources Wales Development Advice Map;
- Flood Consequences Assessment (WYG, June 2018) (see Appendix 10.1).

Environmental Impact Assessment Approach

10.2.5 The EIA Regulations require a description of the likely effects of the development and whether they are significant or not. Therefore, environmental effects are described as:

- Adverse or beneficial;
- Direct or indirect;
- Temporary and reversible, or permanent and irreversible;



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- Short, medium or long term; and
- Cumulative.

10.2.6 The reader should note that WYG makes a distinction between an 'impact' and an 'effect' and to help the reader understand the matrix approach different terminology is used. **Impact magnitudes** are termed 'substantial', 'moderate', 'minor' and 'negligible'. In some cases, 'no impact' is stated which is not included in the matrix as there is no resulting effect. **Effects** are termed 'major', 'intermediate', 'slight' and 'neutral'. Furthermore, distinction is made with valency terminology whereby impact magnitude is either 'negative' or 'positive', and significance of effect is 'adverse' or 'beneficial'. Adverse describes effects which are undesirable and beneficial describes effects which are desirable.

10.2.7 Each effect will have a source originating from the development, a pathway and a receptor. Effects which operate this direct way are regarded as direct effects in this chapter. Effects on other receptors via subsequent pathways are regarded as indirect effects (surface water to groundwater for example).

10.2.8 Table 10.1 defines the relative terms used in describing impact duration.

Table 10.1 Impact Duration

Duration Terminology	Criteria
Short term	Impact is measurable up to 1 year.
Medium term	Impact is measurable between 1 year and up to 10 years time
Long term	Impact is measurable over 10 years time

10.2.9 Effects which are temporary are those which normally cause a change to the baseline for a limited period of time and are reversible, either from the source of the effect ceasing or from mitigation such as direct restoration or replacement of the affected receptor. However, in some cases it is possible to have temporary effects which operate at different intensities or peak periods over the medium or long term, e.g. with phased developments over the long term.

10.2.10 Permanent effects are long term, which result in irreversible changes to the baseline which may be only partially offset by compensation of the receptor lost.

Receptor Sensitivity

10.2.11 The value of the receptor has been undertaken based on professional judgement and a review of the key receptors as part of the initial review process and is set out within Table 10.2 below.

Table 10.2 Criteria for Assessing Valuation of Receptors

Sensitivity	Criteria	Example Criteria
Very High	Attribute has a high quality and rarity on a	Water Framework Directive (WFD) Class 'High'.

Sensitivity	Criteria	Example Criteria
	regional or national scale	Site protected/designated under EC or UK habitat legislation (Special Area of Conservation (SAC), Special Protection Area (SPA), Site of Special Scientific Interest (SSSI), Drinking Water Protection Zone (DWPZ), Ramsar site, and Freshwater Fishery/Shellfish Water) Flood Zone C2 (Areas of the floodplain without significant flood defence infrastructure). Site uses categorised as 'Emergency Services' (TAN 15).
High	Attribute has a high quality and rarity on a local scale	Water Framework Directive (WFD) Class 'Good'. Main river >10m wide. Watercourse that supports species protected under EC or UK habitat legislation but is not a designated site. Flood Zone C1 (Areas of the floodplain which are developed and served by significant infrastructure, including flood defences). Site uses categorised as 'Highly Vulnerable' (TAN 15).
Medium	Attribute has a medium quality and rarity on local scale	Water Framework Directive (WFD) Class 'Moderate'. Main river <10m wide. Ordinary watercourse >5m wide. Flood Zone B (Areas known to have been flooded in the past evidenced by sedimentary deposits). Site uses categorised as 'Less Vulnerable' (TAN 15).
Low	Attribute has a low quality and rarity on local scale.	WFD Class 'Poor'. Unclassified field drain which is therefore likely to be <5m wide. Flood Zone A (Considered to be at little or no risk of fluvial or tidal/coastal flooding). Site uses compatible with water (marinas, nature conservation, POS etc).

Assessing the Magnitude of change on Flood Risk and Drainage, Surface Water Quality and Water Demand

10.2.12 The magnitude of change is judged on the consequences of the impact, in terms of size and the assessment of the potential magnitude of impacts has been made broadly in accordance with Table 10.3.



Table 10.3 Criteria for Assessing Magnitude of Change

Impact magnitude	Example Criteria
Substantial negative	A pollution incident or release during construction or operation of a development likely to result in a major pollution incident. Building 'vulnerable development' in Flood Zone 3b on the site. Direct loss of Flood Zone 3b on site and indirect increase in flood risk elsewhere. Significant increase in surface water runoff rate and volume (increase of >10x). Increased vulnerability of site use in flood zone C2.
Moderate negative	A pollution incident or release during construction or operation of a development likely to result in a moderate or minor pollution incident. Building 'vulnerable development' in Flood Zone 3a on the site. Direct loss of Flood Zone 3a on site and indirect increase in flood risk elsewhere. Moderate increase in surface water runoff rate and volume (increase of 2x to 10x). Increased vulnerability of site use in flood zone C1.
Slight negative	Small reduction in water quality. Building 'vulnerable development' in Flood Zone 2 on the site. Direct loss of Flood Zone 2 on site and indirect increase in flood risk elsewhere. Slight increase in surface water runoff rate and volume (increase of <2x). Increased vulnerability of site use in flood zone B.
Negligible	Very low levels of pollution from discharges insufficient to significantly affect water quality. Very low risk of pollution from accidental spillages. No discernible loss of flood zone (i.e. this would involve only land take/structures within Flood Zone 1). No change in surface water runoff rate and volume. Increased vulnerability of site use in flood zone A.
Slight positive	Small improvement in water quality. Direct net gain of Flood Zone 2 on site and indirect decrease in flood risk elsewhere. Slight reduction in surface water runoff rate and volume (decrease of <2x). Decreased vulnerability of site use in flood zone B.
Moderate positive	Moderate change (improvement) in water quality. Direct net gain of Flood Zone 3a on site and indirect decrease in flood risk elsewhere.

Impact magnitude	Example Criteria
	Moderate reduction in surface water runoff rate and volume (decrease of 2x to 10x). Decreased vulnerability of site use in flood zone C1.
Substantial positive	Substantial change (improvement) in the water quality. Direct net gain of Flood Zone 3b on site and indirect decrease in flood risk elsewhere. Significant reduction in surface water runoff rate and volume (decrease of >10x). Decreased vulnerability of site use in flood zone C2.

Effect Significance

- 10.2.13 Descriptions of the four significance categories are provided in Table 10.5 are based largely on those provided in Highways Agency (2008) as modified by WYG.
- 10.2.14 In terms of this assessment for flood risk and drainage impacts, a level of significance of intermediate significance or greater is defined as being significant.
- 10.2.15 The level of significance of each impact is determined by combining the impact magnitude with the sensitivity of the receptor and the effect is identified as shown within Table 10.4 below:



Table 10.4 Estimating the Significance of Potential Effects

		Magnitude of Impact			
		Substantial magnitude	Moderate magnitude	Slight magnitude	Negligible magnitude
Sensitivity of Receptor	Very High	Major	Major	Intermediate	Neutral
	High	Major	Intermediate	Intermediate	Neutral
	Medium	Major	Intermediate	Minor	Neutral
	Low	Intermediate	Minor	Neutral	Neutral

Table 10.5 Significance Criteria Descriptions

Significance of effect descriptor	Definition
Major	These effects will represent the <i>critical factors in the decision-making process</i> (along with other topic effects in a similar category). These effects are generally associated with sites or features that are of high quality and rarity on a regional or national scale that are likely to suffer a most damaging impact and loss of resource integrity. These effects are generally associated with potential for either major impact magnitude on features of very high, high or medium importance; or moderate impact magnitude on features of very high or high importance. This is where the proposal would result in degradation of the water environment because it results in predicted significant adverse effect on at least one attribute. Major effects can potentially arise due to a number of less significant effects resulting in a larger cumulative effect. These effects are <i>significant effects</i> in the terms of the EIA Regulations.
Intermediate	Due to the scale of the change predicted on features these effects can be considered to be <i>important and material in the decision-making process</i> , but are not likely to be <i>critical or very important</i> decision-making factors. These effects are generally associated with potential for major impact magnitudes on features of low importance; or moderate impact magnitude on features of high or medium importance. This is generally where the proposal may result in the degradation of the water environment because it results in predicted moderate adverse effect on at least one attribute. Moderate effects can potentially arise due to a number of less significant effects resulting in a larger cumulative effect. These effects are <i>significant effects</i> in the terms of the EIA Regulations.
Minor	Effects at this level are <i>limited importance and immaterial in the decision-making process</i> . Where the proposal may result in a degradation of the water environment because it results in a predicted slight effect on one or more attributes. These effects are <i>not significant</i> in the terms of the EIA Regulations.
Neutral	No change in the baseline condition. This means effects are beneath levels of scientific detection or human concern/perception, or are detectable / perceived within the normal bounds of natural variation. Where the impact of the proposal is neutral, because it results in no appreciable effect, either positive or negative, on the identified attribute. Neutral effects can arise where consented discharges operate within consented parameters. These effects are <i>not significant</i> in the terms of the EIA Regulations.



Limitations of the Assessment

10.2.16 Natural Resources Wales (NRW) has confirmed that existing flood risk mapping, generated by hydraulic modelling of the Rivers Tawe and Nant-Y-Fendrod, is based on a 20% allowance for climate change. Guidance on climate change has been updated since the modelling work was undertaken and NRW has requested that the models be re run to assess the impact of the updated climate change scenario. The hydraulic modelling work is currently being undertaken, however is not available at this time. It is not anticipated that this will result in a significant impact, however a further update will be required to confirm the outcome of the modelling.

10.3 Baseline Environment

Existing baseline

- 10.3.1 The application Site is considered a brownfield site in flood risk terms and is currently used as an industrial site comprised of hardstanding and existing buildings. The existing Site is almost entirely surfaced with impermeable roof and hardstanding areas.
- 10.3.2 The nearest main river to the Site is the River Nant-y-Fendrod, which flows adjacent the eastern boundary at a distance of approximately 20 m. The River Nant-y-Fendrod flows to the south past the application Site, eventually discharging into the River Tawe approximately 2km to the southwest. The River Tawe flows approximately 750 m to the west of the application Site, at its nearest point. The River Tawe flows in a southerly direction through Swansea and eventually discharging into the sea approximately 7km south of the Site.
- 10.3.3 According to the Development Advice Map provided by Natural Resources Wales, the Site is entirely located within Flood Zone C1; where the risk of flooding from a major river is greater than 1 in 1000 years (0.1% AEP) in any one year but the area is developed and served by significant infrastructure including flood defences.
- 10.3.4 NRW hydraulic modelling shows that the Nant-Y-Fendrod adjacent the Site does not flood for storm events up to the 1 in 1000 year return period (0.1% AEP). The River Tawe is the source of flooding shown on NRW flood mapping.
- 10.3.5 The Site lies within an area which benefits from a flood defence scheme on the River Tawe, which was completed in 2013. The flood defences are understood to be in good condition and are maintained by NRW. According to NRW the defences provide a 1 in 100 year standard of protection, however it is also known that river modelling has shown that the defences can provide protection during a 1 in 100 year and 20 % allowance for climate change.
- 10.3.6 There remains a residual risk of flooding at the Site in the event of a flood defence breach or overtopping during the extreme event. The consequence of an extreme flood event which exceeds the design capability of the flood defences is predicted to be significant flooding in excess of 1m deep. Flood modelling predicts that in one of these extreme scenarios the Site will be inundated within 3-4 hrs from the start of river overtopping.
- 10.3.7 According the Flood Consequences Assessment for the Site, WYG June 2018, the Site is at low risk of flooding from surface water, groundwater, sewers, reservoir and overland flow sources.
- 10.3.8 According to NRW Management Catchment Summary for the River Tawe the overall WFD classification for the river is Moderate.

- 10.3.9 The current arrangements for collection of commercial waste in Swansea initially involve transportation of waste to the Council waste transfer station for bulking. The Council waste transfer station is located adjacent to the River Tawe, and in Flood Zone C1. From the waste transfer station the waste is taken to landfill.
- 10.3.10 The Site is located within Flood Zone C1, having an annual risk of fluvial flooding greater than 0.1% from the main River Tawe. The River Tawe and associated flood plain is considered to have a **High Sensitivity** to increased runoff and loss of flood plain.
- 10.3.11 The receiving watercourse adjacent the Site is the main river Nant-Y-Fendrod. The Nant-Y-Fendrod is considered to have a **Medium sensitivity** to contamination.
- 10.3.12 The proposed development is for the construction of an energy recovery facility which will involve the incineration of commercial waste. This land use is categorised as 'highly vulnerable development' under TAN 15 and therefore the developed Site is considered to have a **High Sensitivity** in respect to flood risk.

Future baseline

- 10.3.13 Hydraulic modelling is currently being undertaken to assess the extent, depth and velocity of flooding within the development area if peak river flows increase by 30% as a consequence of climate change. Model results are not available at the time of writing.



10.4 Mitigation within the Submitted Design

10.4.1 A number of mitigation measures are identified within the Flood Consequences Assessment (FCA) and are summarised below.

Design

10.4.2 All waste will be stored within the building and will be stored in bunkers constructed of reinforced concrete on three sides. In normal operation these bunkers are open on the fourth side to allow waste to be deposited and collected. It is proposed that the concrete walls will be slotted to receive stop logs up to 1m high. The stop logs can be fitted in the event of a severe flood warning to contain waste and prevent any contamination of flood water.

10.4.3 A Flood Evacuation Protocol has been produced for residents and businesses within the Swansea Vale Enterprise Park. The FCA sets out flood management procedures for the developed site based on the recommendations of the Swansea Council Evacuation Protocol.

10.4.4 The recommended procedures require that throughout operation of the site, flood warnings will be monitored. The site flood management plan sets out actions to be taken for the different levels of flood warning. Most significantly, in the event of a severe flood warning the operation of the site will be shut down; stop logs will be installed on waste bunkers; staff will be evacuated via a pre arranged route and deliveries will be diverted.

Construction

10.4.5 In addition to the normal best practice construction techniques, the flood warning and evacuation plan would apply throughout construction at the site.

10.5 Likely Significant Environmental Effects of the Scheme

10.5.1 Please note this is the assessment of the Proposed Development (which includes mitigation measures within submitted Design)

Construction /Decommissioning Phase Effects

10.5.2 It is considered that construction and decommissioning effect will be similar and therefore have not been assessed separately.

Flooding

10.5.3 The development is being constructed in Flood Zone C1, however the land is protected by existing flood defences up to the 1 in 100 year event. Therefore, there is no loss of floodplain as a result of the construction of the development. It should also be noted that the footprint of the works is relatively small.

10.5.4 Construction drainage calculations have not been undertaken for the development at this stage. However, it is unlikely that the construction phase will generate additional volume over the existing discharge volume since the site currently comprises almost entirely of hard standings which are understood to drain to the Nant-Y-Fendrod via existing on-site drainage.

10.5.5 It is expected that the disposal of site water under the Construction Drainage Plan would not exceed existing discharge rates of run-off and would be agreed in advance with the Lead Local Flood Authority. This therefore would not result in an increase in flood risk to the receiving watercourses

during construction. As a result the impact of construction site water disposal is expected to be of **negligible** magnitude. The impact is short term because it is anticipated at this stage that the construction phase of the development will occur over a number of months, the impact is therefore considered **temporary and reversible**. The sensitivity of the receiving watercourses (Nant-Y-Fendrod and Tawe) in flood risk terms is **high** (main river flood zone C1). Therefore, the resulting unmitigated significance of the effect of increased flood risk from construction site run-off is **neutral**. This is a not a significant environmental effect.

Water Quality

10.5.6 Key pressures most relevant to the proposed development's potential construction phase impact on water quality are identified as:

- Site drainage containing a variety of pollutants, such as sediment and chemical pollution from construction sites.
- Site drainage containing mobilised contamination leachate from the disturbance and mobilisation of contaminated land.

10.5.7 The following section provides an overview of the expected impacts and effects that could arise during all project phase key activities including site clearance and associated temporary works, creation of temporary and permanent access, temporary/permanent drainage system modification/installation and construction compound set up and other general construction activities.

Suspended Sediment

10.5.8 The consented discharges from any construction works site drainage system (assumed to be discharged in accordance with the Construction Drainage Plan with basic settlement provided) are unlikely to result in an impact magnitude that results in significant effects. Normal turbidity levels in the watercourses are assumed variable; depending upon the time of year and frequency of rainfall events (data has not been collected or identified in desk based searches undertaken).

10.5.9 However, any unintended discharges or those outside consented parameters could potentially be visually noticeable and measurable in the watercourses and extend into Nant-Y-Fendrod for a short distance downstream.

Hydrocarbons and chemicals

10.5.10 Minor accidental spillages and leaks of oils and hydraulic materials or diesel/petrol from refuelling, or from construction excavators or dumpers poses a high risk to the water environment due to their toxicity, persistence, large dispersion area / zone of impact, and difficulty in clean up, and therefore they are a key construction material risk. The site is surfaced with hardstanding and is drained by a positive drainage system which discharges via an oil interceptor which provides some mitigation of this risk.

Cement and Concrete

10.5.11 No concrete batching activity is expected to be undertaken on site. However, a key risk arises in the use of cement based materials, which may be stored in the compound or at works locations across the site, hand mixed, and hand applied, poured from a mixer lorry or a mini mixer machine, or sprayed at the point of use. Concrete requirements will be delivered in mixing lorries and poured at foundation sites. Washing out of concrete mixing vehicles will not occur on site, but back at the concrete vehicles' maintenance depots. However, even with these measures in place, there is a risk that third party mobile concrete wagon operators clean in and around their vehicle's delivery chute



using each wagon's own water tank and hose, after delivering concrete. This is likely to enter excavations directly or wash off the construction works areas and drain into the surrounding groundwater or watercourses. Therefore, construction chemicals and materials may accidentally fall into, spill or be disposed of into the drainage system and may contaminate watercourses. Cement pollution poses a significant risk to water quality as cement materials are highly alkaline and therefore can directly affect water chemistry in the water column and sediments, and indirectly can affect ecology and fish health.

Summary of the construction phase surface water quality impacts and effects

10.5.12 The following provides the cumulative impact and effect having taken into consideration all of the relevant aspects and risks outlined in the above discussion. Taking the multiple impact source risks into consideration, the limited dilution in the immediate receiving watercourse and the assumptions on mitigating features of the design of the construction works; it is considered that there is a **moderate negative** impact magnitude on surface water quality of the receiving water environment (Nant-Y-Fendrod) **medium sensitivity** (main river WFD Class moderate) from the proposed works activities. The impact is therefore considered **intermediate adverse**. This is an unmitigated environmental effect of importance and further mitigation needs to be considered.

Wastewater/Sewage

10.5.13 The toilet facilities and washroom facilities will be temporarily supplied with mains water and sewerage collection will either be directly disposed of via a mains sewer connection or collected from an onsite cess pit / holding tank. The additional impact of the construction workforce generating additional sewage loadings is not expected to cause a reduction in the efficiency of the local Waste Water Treatment Works (WwTW). The additional load is a very small proportion of the daily flows treated at the works.

Operational Phase Effects

Flood Risk

10.5.14 The new development will not result in an increase in impermeable areas on site since the building extension and incineration plant will all be located within areas of existing hardstanding. Therefore, it is proposed that the small extension to the building will drain to the existing drainage network on site without any increase in flows.

10.5.15 The proposed extension to the building is small (180 sqm). It is not intended that the building will be flood resistant, and the building will be allowed to flood in the event of an extreme overtopping scenario. There will therefore be no significant loss of flood plain as a result of the development. No alterations to external ground levels within the Site are proposed. The development will not increase flood risk to the surrounding area as a result of displaced flood water.

10.5.16 In the operational phase the flood risk impact of the development on the downstream watercourse (Nant-Y-Fendrod and Tawe) is anticipated to be **negligible**. The sensitivity of the receiving watercourses (Nant-Y-Fendrod and Tawe) in flood risk terms is **high** (main river flood zone C1). Therefore, the resulting unmitigated significance of the effect of increased flood risk from the operational site run-off is **neutral**. This is a not a significant environmental effect.

10.5.17 The quantity of waste stored on site at any time will be relatively small, and will only be stored within the building. The existing drainage provision at the site includes trapped gullies and an oil interceptor, to protect the receiving water environment from silt, debris and hydrocarbons. The

impact of the development on the quality of the receiving watercourse is considered to be of **Negligible** Magnitude. The sensitivity of the receiving watercourse (Nant-Y-Fendrod) is **medium** in respect of contamination risk; therefore the resulting unmitigated significance of the effect of watercourse contamination risk during operation is a **Neutral** effect.

10.5.18 The developed Site will be located within Flood Zone C1 and is considered a highly vulnerable land use in line with TAN 15. The development is therefore considered to have a **High Sensitivity** to flood risk.

10.5.19 The proposed development would result in an increase in vulnerability to flood risk within the Site. It should be noted however that under the baseline condition, waste is temporarily stored at the Council waste transfer station, which is also located within the extent of Flood Zone C1 (and adjacent the River Tawe). Considering the flood plain as a whole there would be no environmental impact as a result of the development.

10.5.20 The submitted design includes mitigation measures to ensure that occupants of the Site can be safely evacuated in advance of an extreme flood event. The flood management plan is based on the continual monitoring of flood warnings and following a pre-arranged response plan which states the appropriate actions to take for each level of flood warning. During an extreme flood warning any new deliveries will be diverted away from the Site as part of the evacuation protocol and waste storage bunkers on site will be enclosed using stop logs as part of the site shut down procedure.

Water Quality

10.5.21 The environmental risk posed by the commercial waste (non hazardous) is considered insignificant compared to the contamination of flood water by debris and sewerage within the flood plain.

10.5.22 Taking account of the current waste collection arrangements and the proposed mitigation measures; the impact of flood risk on the developed Site is considered to be **negligible**. The significance of the impact is therefore considered **Neutral**.

10.6 Additional Mitigation, Compensation and Enhancement Measures

Construction Phase

10.6.1 Discharge consents will be required for temporary discharges to ground or surface water from the construction site under the Water Resources Act 1991. It is assumed that any required water related consents will be in place before works commence and it is the responsibility of the developer and contractor to ensure that this is the case. The surface water and foul water drainage measures proposed will be further developed in consultation with the EA. This is not additional mitigation but is stated here for clarity.

10.6.2 The pre-mitigation assessment has identified pollution risks as a result of particular activities and accidental or extreme events that could occur on the construction site such as large scale accidental spillages, extreme rainfall events or uncontrolled releases of cement. This is a precautionary assessment considering the outline nature of the proposals and unavailable construction drainage plan to be expected at this planning stage.

10.6.3 The proposed CEMP is an appropriate document within which suitable procedures and methods can be specified to protect the water environment. This will include a series of specific method statements identifying methods of working and controls to address the surface water environment impacts. The CEMP will be implemented during the construction phase. This will include as a minimum the following best practice measures:



- All relevant Natural Resource Wales/Environment Agency, Pollution Prevention Guidelines including as a minimum:
- Those previously mentioned which are related to legal requirements (including: PPG 2 Above ground oil storage tanks, PPG 3 Use and design of oil separators in surface water drainage systems, PPG 4 Disposal of sewage where no mains drainage is available, PPG 8 Safe Storage and Disposal of used Oils, PPG 26 Drums and intermediate bulk containers). These are not counted as additional mitigation in the residual assessment, but are re-stated here for clarity.
- General Guide to the Prevention of Water Pollution: PPG1
- Works and maintenance in or near water: PPG5
- Working at construction and demolition sites: PPG6
- The safe operation of refuelling facilities: PPG 7
- Managing fire water and major spillages: PPG18
- Dewatering of underground ducts and chambers: PPG20
- Incident Response Planning: PPG 21
- Dealing with spills: PPG 22.
- EA Regulatory Position Statement (June 2011): Managing concrete wash waters on construction sites: good practice and temporary discharges to ground or to surface waters.

changes in colour or turbidity, or for olfactory evidence which may indicate a temporary reduction in water quality. If on a visual inspection the drainage appears to be polluted or excessively turbid, the Environment Agency will be contacted regarding the appropriate action and the source of the pollution should be identified if possible and the spillage/containment procedure specified in the CEMP followed.

Operational Phase

- 10.6.5 Continual monitoring of flood warnings will be necessary throughout the Sites operation. Actions will need to be taken in response to flood warnings in accordance with the flood management plan.
- 10.6.6 As the development progresses through detailed design, the mitigation measures contained within the Flood Consequences Assessment will need to be considered and developed.

10.7 Assessment Summary and Likely Significant Residual Environmental Effects

- 10.7.1 Based on the assessment undertaken in this section and the previous section there are potential residual risks related to:
 - The risk of accidental spillages during remediation and construction.
 - Climate change.
- 10.7.2 There is little opportunity to implement further mitigation measures to reduce the impacts of such scenarios other than undertaking risk and site specific emergency planning.

10.8 Cumulative impacts

- 10.8.1 The impact assessment above has considered cumulative effects associated with multiple impact sources on surface water resources, from the development alone.

- 10.6.4 The temporary construction drainage system and neighbouring water courses will be visually inspected on a pre-agreed basis during construction to detect any problems with function and any



Table 10.1 Assessment Summary and Residual Environmental Effects (Water Resources and Flood Risk)

Summary description of the identified impact	Sensitivity of Receptor	Impact Magnitude	Significance and Nature of Effect	Additional Mitigation	Residual Impact Magnitude	Residual Significance and Nature of Effect	Confidence Level
Construction							
Increased Surface water runoff: River Tawe flood plain	High	Negligible (temporary, reversible)	Neutral (not significant)	Further development and agreement of the Construction Drainage Plan	Negligible	Neutral (not significant)	High
Surface water quality: Nant-Y-Fendrod	Medium	Moderate negative (temporary, reversible)	Intermediate adverse (significant)	Development of a Detailed Construction Drainage Plan and contractor's CEMP with specific method statements following best practice standards and techniques to address all activities that have the potential to result in surface water quality pollution, including contingency planning for extreme or accidental scenarios.	Slight negative	Minor adverse (not significant)	High
Operation							
Increased flood risk: (Nant-Y-Fendrod and Tawe flood plain)	High	Negligible	Neutral (not significant)	None proposed.	Negligible	Neutral (not significant)	High
Surface water quality: Nant-Y-Fendrod	Medium	Negligible	Neutral (not significant)	None proposed.	Negligible	Neutral (not significant)	High
Flood risk within developed Site	High	Negligible	Neutral (not significant)	Monitor flood warnings and act on flood management plan in response to flood warnings.	Negligible	Neutral (not significant)	High



10.9 References

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