



9.0 Ground Conditions

9.1 Introduction

9.1.1 This chapter presents the methodology followed and provides a review of the baseline ground conditions (geology and soils) and hydrogeological features of the Site and surrounding area. This chapter includes consideration of existing land contamination and provides details of potential contaminative impacts and effects to various environmental receptors and human health.

9.1.2 This chapter presents the results of the assessment of the impact and effects of the proposed development on the baseline environmental features and resources in order to determine the magnitude and significance of any effect anticipated. Mitigation measures that can be implemented during the design, construction or operational phases are presented and discussed.

9.2 Methodology and Scope

Relevant legislation and Policies

9.2.1 The assessment of baseline land contamination and ground conditions was undertaken under the regulatory framework set out within the Environmental Protection Act (EPA) 1990, the provisions of which were included within Section 57 of the Environment Act 1995. Part 2A of EPA 1990 relates to contaminated land and provides a risk-based approach to the identification and remediation of land where contamination poses an unacceptable risk to human health or the environment. The act also provides a means by which enforcing authorities should seek to find and deal with such land. Under Part 2A, the starting point should be that land is not contaminated land unless there is reason to consider otherwise. The principles of this have also been incorporated into Chapter 13 of the Welsh Government Document Planning Policy Wales (Edition 9, November 2016).

9.2.2 The overarching objectives of the Government's policy on contaminated land and the Part 2A regime are:

- To identify and remove unacceptable risks to human health and the environment;
- To seek to ensure that contaminated land is made suitable for its current use; and
- To ensure that the burdens faced by individuals, companies and society as a whole are proportionate, manageable and compatible with the principles of sustainable development.

9.2.3 Whilst the EPA 1990 provides the underpinning legislation to contaminated land policy in the UK, the main driver for investigation, assessment and remediation of contaminated land in the UK is through the redevelopment of brownfield land, controlled via the development control process outlined within Chapter 13 of the Welsh Government Document Planning Policy Wales (Edition 9, November 2016) which states that planning policies and decisions should also ensure that:

- The Site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation;

- After remediation, as a minimum, land should not be capable of being determined as contaminated land under Part 2A of the Environmental Protection Act 1990; and
- Adequate site investigation information, prepared by a competent person, is presented.

9.2.4 Legislation of relevance to controlled waters taken into account by the assessment included the following:

- Control of Pollution Act 1974;
- EC Dangerous Substances Directive (76/464/EEC);
- EC Fisheries Directive (78/659/EEC);
- Environmental Protection Act 1990;
- Land Drainage Act 1991;
- Environment Act 1995;
- Groundwater Regulations 1998;
- UK Water Quality (Water Supply) Regulations 2000;
- Water Framework Directive (2000/60/EC); and
- Draft Floods and Water Bill 2009.

9.2.5 In addition, the Construction Industry Research and Information Association (CIRIA) publish the following guidance:

- Report C532 – Control of Water from Construction Sites; and,
- Report C692 – Environmental Good Practice on Site. 3rd Ed. 2010.

9.2.6 The protection of groundwater is covered by a series of policy statements issued by the Environment Agency in 2017 and subsequently adopted by Natural Resources Wales. The EA/NRW approach to groundwater protection is outlined in the following document:

- Environment Agency 'The Environment Agency's approach to groundwater protection'. November 2017. Version 1.1.

9.3 Assessment Methodology

Method of Baseline Data Gathering

9.3.1 Baseline conditions pertaining to the ground conditions and hydrogeological issues have been obtained from the following sources:

- The Coal Authority, CON29M Non-Residential Mining Report – Order Number 51001812654002 – dated 3 April 2018 (Appendix 9.1) ;
- Envirocheck Report – Order Number 161275324_1_1 - dated 3 April 2018;
- 1:50,000 Scale Geological Plan – derived from British Geological Society (BGS) Sheet 247 – Swansea (2011);
- BGS GeoIndex Website – www.bgs.ac.uk/geoindex/;
- British Geological Survey Lexicon of Named Rock Units – www.bgs.ac.uk/lexicon/;



- Natural Resources Wales Website – <https://naturalresources.wales/?lang=en>;
- Public Health England Website – www.ukradon.org/information/radonsearches;
- Intersoil Limited, Draft Soils Investigation Report: Clarion Close, Swansea Enterprise Park, Swansea (2018) (Appendix 9.2) .

Environmental Impact Assessment Approach

- 9.3.2 Potential land contamination impacts and associated risks to human health have been assessed using a methodology based upon the CLR11 Model Procedures for the Management of Land Contamination (Environment Agency, 2011) and CIRIA C552 Contaminated Land Risk Assessment – A Guide to Good Practice document. The method is specifically tailored to assess the impacts and risks that may arise from exposure to ground contamination and ground gases.
- 9.3.3 The results of the risk assessment on environmental receptors such as soils, surface water and groundwater are taken into account in this chapter using EIA terminology resulting in the determination of significance. The consequence of harm risk assessment result is also provided in brackets in the assessment summary table in the significance of effect column (for comparison).

Sensitivity

- 9.3.4 Environmental receptors can demonstrate different sensitivities to changes in their environment. It is also recognised that environmental impacts can operate over a range of geographical areas and therefore a geographical scale should be taken into account in the scale/magnitude of the impact, as well as the receptor. The sensitivity of the receptor also considers the long or short-term exposure of the receptor.
- 9.3.5 For the purpose of this assessment sensitivity is determined as Very High, High, Medium and Low as detailed in Table 9.1 below.

Table 9.1 Methodology for Assessing Sensitivity of a Receptor

Sensitivity	Criteria	Example Criteria
Very High	Attribute has a high quality and/or rarity on a regional or national scale	<p>Sites of Special Scientific Interest (SSSIs) with geological/geomorphological qualifying interest.</p> <p>Groundwater aquifers currently used, or likely to be suitable for use as, public potable supplies (e.g. Principal Aquifers, Source Protection Zone for a potable groundwater supplies).</p> <p>Groundwater that is providing baseflow to 'very good' WFD status quality surface waters.</p> <p>Soils with a very high likelihood of readily transmitting contaminants to nearby sensitive receptors or over a large distance (e.g. granular deposits in saturated zone or in continuity with river systems etc.). H1 soils as defined by the Environment Agency groundwater vulnerability classification system.</p> <p>Human population (e.g. local residents and site construction workers etc.).</p> <p>Mineral Resource with planning permission for extraction.</p>
High	Attribute has a high quality and/or rarity on local scale	<p>Regionally Important Geological Sites (RIGS).</p> <p>Groundwater aquifers currently used for, or likely to be suitable for, providing non-potable supplies or limited domestic supplies (e.g. Secondary Aquifers for domestic supplies or industrial abstractions).</p> <p>Groundwater that is providing baseflow to 'good' WFD quality status surface waters.</p> <p>Soil sensitivity to pollution: soils with a moderately high potential to transmit contaminants to other receptors or over a significant distance (e.g. mixed cohesive and granular deposits of alluvium). H2/H3 soils as defined by the Environment Agency groundwater vulnerability classification system.</p> <p>Resource identified in Mineral Safeguarding Area.</p>



Sensitivity	Criteria	Example Criteria
Medium	Attribute has a medium quality and / or rarity on local scale	Groundwater that is unlikely to be suitable for providing abstractions (e.g. aquifers in areas of saline intrusion). Soils with an intermediate potential to transmit contaminants (e.g. Glacial Clays with occasional sand bands). Soils of intermediate (I1 or I2) leaching potential as defined by the Environment Agency groundwater vulnerability classification system. Underlying mineral resource is not currently viable (in respect to quality of quantity).
Low	Attribute has a low quality and/or rarity on local scale.	Non sensitive water resources (non-classified, static groundwater). Soils with a low potential to transmit contaminants (e.g. competent clay). Soils of low (L) leaching potential as defined by the Environment Agency groundwater vulnerability classification system. No Mineral resource.

Impact Magnitude and Nature of Impacts

9.3.6 The magnitude of potential impacts during both construction and operation of the proposed development has been assessed using the criteria presented in Table 9.2. The magnitude (scale of change) is determined by considering the degree of deviation from the baseline conditions and whether this is likely to result in any exceedances of statutory objectives or changes in suitable uses of the receptor.

9.3.7 In determining the scale of impacts some consideration has to be made regarding the likelihood of impact occurring. It is not considered suitable to undertake the assessment using the worst possible scenario for all impacts as these are unlikely to occur in normal circumstances.

Table 9.2 Methodology for Assessing Magnitude of Impacts

Impact magnitude	Example Criteria ¹
Substantial negative	Change in soil quality or ground gas regime for a large area (>20ha) of land, sufficient to alter land use (e.g. remediation of 20ha of industrial land sufficient to enable mixed residential / commercial use)

Impact magnitude	Example Criteria ¹
	Change in groundwater conditions sufficient to change aquifer use (e.g. contamination that prevents abstraction for potable supplies, or remediation of impacted aquifer sufficient to enable potable abstractions) Generation of large volumes of non-inert waste materials for disposal off-site to landfill. Sterilisation of Mineral Resource.
Moderate negative	Change in soil quality or ground gas regime for a moderate area of land (<20ha) to a degree sufficient to alter land use in localised portions of the site or to a degree requiring a change in management / mitigation measures for site use. Change in groundwater conditions that may be sufficient to change local groundwater regime and potential aquifer uses (e.g. localised contaminant impact, localised change in groundwater levels). Sterilisation of Mineral Resource within Mineral Safeguarding Plan.
Slight negative	Measurable but relatively small scale change in an area of contaminated land or ground gas regime, but insufficient to alter end land use. Change in groundwater conditions that are insufficient to change status or potential use of the water body. Sterilisation of non-viable mineral resource.
Negligible ²	No measurable contamination mobilised. No discernible change to groundwater regime. No change to mineral resource.

TABLE NOTES:

- (1) An impact magnitude can be either positive or negative, except for negligible.
- (2) If the assessor is certain that a receptor or attribute of a feature will suffer no impact whatsoever then the term 'No Impact' can be used in the place of 'Negligible Impact'.

9.3.8 It is recognised that environmental impacts can operate over a range of geographical areas and therefore a range of geographical scales will be taken into account in the magnitude of the impact.

¹ We assume that as a minimum waste will be managed in accordance with legislation and thus not fly tipped. We also assume that appropriate PPE is used when handling waste therefore no health risks.



9.3.9 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 or permanent;
- Short, medium or long term;
- Reversible or irreversible; and
- Cumulative.

9.3.10 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' or 'no impact', whereas **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'.

9.3.11 The EIA Regulations require consideration of a variety of types of effect, namely direct/indirect, secondary, cumulative, positive/negative, short/medium/long-term, and permanent/temporary. In this ES, effects are considered in terms of how they arise, their valency (i.e. whether they are positive or negative) and duration. Each will have a source originating from the development, a pathway and a receptor.

9.3.12 Most predicted effects will be adverse/negative or beneficial/positive, direct, indirect, secondary or cumulative, temporary or permanent, short, medium or long term. Table 14.3 provides definitions of typical terminologies used in describing the nature of effects. In some cases, it is appropriate to identify that the interpretation of a change is a matter of personal opinion, and such effects will be described as 'subjective'.

9.3.13 The temporal scope of environmental effects is stated where known. Effects are typically described as:

- Temporary – these are likely to be related to a particular activity and cease when the activity finishes. The terms 'short-term' and 'long-term' may also be used to provide a further indication of how long the effect will be experienced; and
- Permanent – this typically means an unrecoverable change.

Table 9.3 Terminology Definitions for Typical Effects

Nature of Effect	Description
Direct	Effects arising on-site
Indirect	Effects arising off-site due to the proposed development.
Temporary	Effects which cause a change to the baseline for a limited period of time.
Permanent	Effects causing an irreversible change to the baseline.
Short-term	These temporal scales are defined within each topic assessment at levels appropriate to the receptor being assessed.
Medium-term	
Long-term	

Nature of Effect	Description
Cumulative	Effects which arise from multiple types of effect on a particular receptor. These may overlap spatially or temporally.

9.3.14 Table 9.4 shows how the interaction of magnitude and sensitivity results in the significance of an environmental effect. If the impact is negative (i.e. undesirable) then the resulting effect is adverse. If the impact is positive (i.e. desirable) then the resulting effect is beneficial.

Table 9.4 Methodology for Assessing the Significance of Impacts

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

9.3.15 The residual risk after consideration of the mitigation or remediation associated with identified significant effects will be reassessed using the same methodology as given in the assessment tables above.

9.3.16 Impacts of intermediate or higher significance will be deemed to be potentially significant and will require, where practicable, mitigation methods to be adopted.

9.3.17 For the operational phase assessment, an assumption of the potential impacts associated with the operational land uses will be made and the above assessment methodology will be undertaken regarding the potential future impacts. These assumptions should be checked and revised as detailed design progresses for the scheme.

9.3.18 The methodology for the assessment of the level of confidence will be attributed as high or low.



Contaminated Land Risks Assessment Methodology

- 9.3.19 Potential contamination impacts and associated risks to human health are assessed using a methodology based upon the CIRIA C552 Contaminated Land Risk Assessment – A Guide to Good Practice document. This method is specifically tailored to assess the impacts and risks that may arise from exposure to ground contamination and ground gases.
- 9.3.20 The CIRIA C552 method uses a broadly similar approach to the EIA method detailed above and makes use of a matrix table to evaluate the significance of any identified risks. The main differences in the two approaches are that the CIRIA C552 method integrates the sensitivity of the receptor into the assessment of the magnitude (defined as consequence in C552) of harm and then compares this against the likelihood of the harm occurring.
- 9.3.21 Impacts of moderate or higher will be deemed to be potentially significant and will require, where practicable, mitigation methods to be adopted.

Table 9.5 CIRIA 552 Methodology Risk Assessment Categories

		Potential Severity			
		Severe	Medium	Mild	Minor
Probability of Risk	High Likelihood	Very high	High	Moderate	Moderate
	Likely	High	Moderate	Moderate	Low
	Low Likelihood	Moderate	Moderate	Low	Very low
	Unlikely	Low	Low	Very low	Very low

Limitations of the Assessment

- 9.3.22 No Site-specific ground contamination data was available for review, this assessment has been based solely on desk-based research and Site-specific borehole logs reported by Intersoil Limited (**Appendix 9.1**) (note, the logs from only two boreholes locations have been reviewed, a third borehole was sunk but the log was not available for review at the time of writing this Chapter).

Level of Confidence

- 9.3.23 It is considered that there is generally a high level of confidence regarding the assessment of the impacts and risks for this Site.

9.4 Baseline Environment

Current Site Description

- 9.4.1 The Site is located within an existing waste management and transport depot at Clarion Close Industrial Estate, circa 5km northeast of Swansea City Centre. The Site consists of an extant disused storage building, an aboveground diesel storage tank and hardstand located within a larger depot.
- 9.4.2 The Site is part of a waste management facility that collects and transfers trade waste from commercial premises. The risk of contamination with the potential to cause future harm to human health or controlled waters from waste management activities is considered to be very low because no landfilling or waste processing occurs within the Site and appropriate systems are in place to mitigate potential pollution incidents from on site activities.

Geology

- 9.4.3 According to the BGS maps, Made Ground is mapped within the western half of the Site and surrounds. Landscaped Ground (undivided) is mapped within the eastern half. Based on a review of the historical Ordnance Survey plans supplied by Landmark Information Group, two (potentially three) watercourses within the sSite were infilled.
- 9.4.4 Site-specific borehole logs indicate that the Site is generally underlain by Made Ground comprising of gravel of dolerite, weathered mudstone and/ or gravelly clay. Underlying Made Ground was superficial deposits of Alluvium comprising silt and clay with occasional organic matter (upper), sand and gravel, and silt and clay (lower).
- 9.4.5 A review of BGS maps indicates that superficial deposits of Alluvium lie beneath the Site and surrounds. The BGS describes Alluvium as “normally soft to firm consolidated, compressible silty clay, but can contain layers of silt, sand, peat and basal gravel. A stronger, desiccated surface zone may be present”.
- 9.4.6 According to the BGS maps, the Site is underlain by bedrock of the Grovesend Formation of the parent unit Warwickshire Group. The BGS describes the Grovesend Formation as “predominantly argillaceous, comprising mudstones and siltstones, with well-developed coals; minor lithic (“Pennant”) sandstones”.

Mining

- 9.4.7 The Site is in an area that may have been affected by coal mining activity. The CON29M Non-Residential Mining Report (**Appendix 9.2**) indicates that the property is in an area that could be affected by underground mining in one seam of coal at 80m to 110m depth, last worked in 1876. There are no known coal mine entries within or within a 20m radius of the Site. Any movement to the ground from mining activities should have ceased. No notices have been given stating that the land is at risk of subsidence. The Coal Authority is not aware of any damage due to geological faults or other lines of weakness that have been affected by coal mining.
- 9.4.8 No BGS recorded mineral sites are located on Site or within a 500m radius.



Radon

- 9.4.9 The Site is located within a lower probability radon area, as less than 1% of homes are above the action level. The Envirocheck report states that radon protective measures are not necessary in the construction of new dwellings or extensions.
- 9.4.10 The Site is located within a 0-1% radon potential band, assessed by Public Health England (PHE) as an area of low radon risk (not a radon affected area). The provision of basic radon protection is not currently a routine requirement for buildings in this band, though PHE suggest that this *"might still be considered, particularly if there is a high risk location such as a routinely occupied basement"*.

Ground Stability

- 9.4.11 The Site's geotechnical properties have been provided within the Envirocheck Report. Different findings have been recorded within different areas of the Site. The range of findings for each hazard are presented below.
- 'No Hazard' potential for collapsible ground stability hazards;
 - 'No Hazard to Very Low Hazard' potential for compressible ground stability hazards;
 - 'No Hazard' potential for ground dissolution ground stability hazards;
 - 'Very Low Hazard' potential for landslide ground stability hazards;
 - 'No Hazard to Very Low Hazard' potential for running sand ground stability hazards;
 - 'Very Low Hazard' potential for shrinking or swelling clay ground stability hazards.

Hydrogeology

Aquifer Classification

- 9.4.12 Superficial deposits of Alluvium and the Grovesend Formation bedrock strata are classified as Secondary A Aquifers. Groundwater is considered to be at a depth of approximately 2.0m on the basis of BGS borehole logs within the surrounding area. Groundwater is likely to flow in a westerly direction towards the River Tame; however, given the number of watercourses present in the catchment area, groundwater flow may vary.

Source Protection Zones

- 9.4.13 A groundwater Source Protection Zone (SPZ) is an area of protection placed around a well or borehole that supplies groundwater of potable quality. The Site is not located within a SPZ.

Groundwater Abstractions

- 9.4.14 Licensed groundwater abstraction wells were not identified on Site. The nearest groundwater abstraction well is located 445m northeast; groundwater is abstracted for a private non-industrial amenity.

Hydrology

- 9.4.15 The Nant-y-Fendrod waterway was artificially modified in the c.1980s to flow 20m east of the Site. The Nant-y-Fendrod flows in a general southerly direction before discharging into a pond. Outflow from the pond is controlled by a weir connected to the River Tawe.

- 9.4.16 Natural Resources Wales Flood Map indicates that the Site is located within an area of high probability of river flooding (greater than 1 in 30 annual probability).

Historical Land Uses

- 9.4.17 The earliest available OS plan (1876-1881) indicates that the Site was used as undeveloped grassland with two unnamed waterways and the Nant-y-Fendrod stream flowing through the Site. In the c.1980s, the unnamed waterways were infilled and the Nant-y-Fendrod stream was artificially modified to flow 20m east of the site. By the 1990s, the Site and surrounds were developed with the Biffa waste management facility. A tank was noted in the central-west.
- 9.4.18 The land immediately surrounding the Site was used as grassland and marshland from c.1870s until the 1980s and 1990s when it was incrementally developed with industrial and commercial premises. A colliery operated 110m southeast until the c.1890s, prior to it being converted to a tin plate works. Various other steel/ tin plate works, and their associated slag heaps, were noted in the surrounding land; the nearest was located 100m southeast. By the c.1980s, the steel/ tin plate works were removed and the areas developed with industrial and commercial premises.

Environmental Regulatory Setting

- 9.4.19 The following summary is generally limited to locations within 250m of the Site boundaries unless it is considered that installations or activities beyond that range could potentially have an impact on the Site or be affected by the redevelopment of the Site.

Discharge Consents

- 9.4.20 Discharge consents to surface water, groundwater or land were not identified on Site or within 250m.

Enforcements and Controls

- 9.4.21 None of the following enforcements and controls were identified on Site:
- Enforcement and Prohibition Notices;
 - Integrated Pollution Control authorities;
 - Integrated Pollution Prevention and Control authorities;
 - Local Authority Integrated Pollution Prevention and Control authorisations;
 - Local Authority Pollution Prevention and Control authorisations; and
 - Local Authority Pollution Prevention and Control Enforcements.

- 9.4.22 A Local Authority Pollution Prevention and Control authority was issued for printing of flexible packaging located 173m west.

Waste Management

- 9.4.23 The Envirocheck Report does not list any current/historical landfills or waste management facilities within the Site. However, the Site is currently part of the Biffa waste management facility; operations comprise the collection and transfer of trade waste from commercial customers in the Swansea area.

Fuel Stations

- 9.4.24 Commercial fuel stations are not located on Site or within 250m.



Contemporary Trade Directory Entries

9.4.25 One contemporary trade directory entry for industrial services is listed for the Site. Thirty-nine contemporary trade directory entries were noted within a 250m radius of the Site. Entries included, but not limited to, manufacturers, car dealerships, retailers, engineers and printers.

Contaminated Land

9.4.26 Contaminated land register entries and notices were not listed on Site or within 250m.

Areas of Sensitive Land Use

9.4.27 The Site and surrounds are not located within an area of sensitive land use.

Future baseline

9.4.28 The geo-environmental baseline is not expected to change if not developed the Site will continue to be completely covered with hardstand.

9.5 Mitigation within the Submitted Design

9.5.1 The following information sets out the specific scheme design features taken into account in the impact assessment. The base environmental effects assessment reported within this ES chapter assumes the project will be constructed in accordance with industry standard techniques and mandatory minimum standards and assumes suitably experienced contractors will be appointed to design, construct and commission the redevelopment.

Design

9.5.2 It is understood that the proposed development comprises the construction of a small-scale incineration facility within the extant disused storage building located within the depot. It is proposed that the southern end of the storage building will be extended by 6m. We understand that no ground breaking works are required to facility the development of the extension.

9.5.3 This assessment is based upon no ground breaking works occurring on the Site. Should any alternative proposals be considered, a revision of this assessment will be required.

9.5.4 No gas assessment has been undertaken. Based on the presence of Made Ground underlying the Site, the risk of gas ingress to building is considered to be low to moderate. However, as the building will be only sporadically occupied and it will likely be well ventilated, the risk of gas to site users is considered to be low. This ES assumes that adequate gas protection measures (if required) will be implemented into the building design.

Construction Phase

9.5.5 The ES assumes a scenario where a standard Construction Drainage Design Plan is in place during the external extension works to prevent water quality being significantly impacted. This is regarded by WYG as industry standard practice and also includes mandatory legal requirements in terms of protecting soil quality, surface water and groundwater from pollution which are considered as integral to the development being assessed in this ES.

9.5.6 The following points list key mandatory requirements that would be in place:

- The developer and principal contractor will ensure that all consents and licences are in place before works commence.
- Prior to the commencement of construction an adequately developed Principal Contractor's 'Construction Phase Plan' will be prepared a Construction Environmental Management Plan (CEMP).
- The construction works will be monitored by an Employers Agent, who will also liaise with the various environmental and other advisers who will have input into the project.

9.5.7 Attention will be given to the storage and use of fuels on Site. All storage and use of fuels and oils will be in accordance with best practice guidelines (as may be updated) Environment Agency Pollution Prevention Guidelines (PPG 2 Above ground oil storage tanks, and PPG 8 Safe Storage and Disposal of used Oils). This is regarded by WYG as industry standard practice and also includes mandatory legal requirements which are considered as integral to the development being assessed in this ES.

9.5.8 Environment Agency Pollution Prevention Guidance (PPG 26 Drums and intermediate bulk containers) should be implemented when storing and handling of drums and Intermediate Bulk Containers (IBCs) (if required).

9.5.9 Any storage and handling of flammable liquids (defined as any liquid with a flash point of 55°C and below) will be required to conform to the Chemicals (Hazardous Information and Packaging for Supply) Regulations and HSG51 (HSE, 1998). Reference should be made to Environment Agency HSG140 for suitable guidance. The PPG series of guidance was withdrawn on the 14th December 2015 but may contain relevant guidance.

- EA Regulatory Position Statement (June 2011): Managing concrete wash waters on construction Sites: good practice and temporary discharges to ground or to surface waters.

Operational Phase

9.5.10 The assessment assumes that a surface water design will be developed and agreed with the Lead Drainage Authority as part of the subsequent detailed planning application process. The Site drainage system should mitigate pollution of soils and groundwater underlying the Site.

9.5.11 It is understood that only refuse-derived fuel (RFD) waste will be incinerated at the Site. No storage and handling of liquid waste is proposed. Therefore, the hardstand (provided it is in good condition, e.g. no substantial cracks) is likely to be sufficient to prevent a pollution migration pathway to the underlying soils and groundwater.

9.5.12 It is understood that all fuels and chemicals required for on Site operations will be stored and handled according to best management practices (as listed previously and are not repeated here for brevity). Appropriate storage and handling of fuels/chemicals in conjunction with the surface water design should be sufficient to prevent any pollution pathways to the neighbouring surface water (Nant-y-Fendrod).

9.6 Assessment of Potential Environmental Effects and Significance

9.6.1 The following sections set out the results of the impact assessment taking into account these mandatory requirements and the design mitigation referred to before.



Construction /Decommissioning Phase

9.6.2 The following receptors have been identified:

- Construction workers;
- On Site and surrounding site users; and
- Controlled waters.

9.6.3 Based upon the development proposals (i.e. no ground breaking works) and the assumed ground conditions at the Site, there is no valid pathway between source (potential contaminated ground) and receptor (construction workers). Therefore, the expected potential severity effect is anticipated to be **negligible**. If ground breaking works are required to facilitate the development, this assessment will need to be readdressed.

9.6.4 It is considered that decommission works will be similar to construction effects. Therefore, the expected potential severity effect is anticipated to be **negligible**. If ground breaking works are required as part of decommissioning, this assessment will need to be readdressed.

Operational Phase Environmental Effects

9.6.5 Based upon the retrofitting development proposal and the known ground conditions at the site, the following impacts were considered to be applicable to the site prior to the implementation of mitigation measures during the operational phase:

- Impacts on future Site users (very high sensitivity); and
- Impacts (Contamination and Recharge) on Controlled Waters (Groundwater and Surface Water) (high sensitivity).

9.6.6 The following impacts and effects are considered to be likely as a result of operational phase activities.

- **Future Site Users** - There is expected to be a **negligible** potential severity effect on future Site users during the operational lifetime of the Proposed Development, representing a **negligible** risk as the Site will be completely covered with hardstand.
- **Controlled Waters (Recharge)** – The use of sustainable drainage systems on Site should mitigate the potential for leaks and spills from vehicles using the Site entering nearby surface waters. The Site will be covered with hardstand, so no leaks/ spills can migrate to the groundwater table. The Site is currently covered with hardstand; the proposed redevelopment works will not alter the impermeable surface area; therefore, no alterations to the recharge of the underlying aquifer is anticipated. The magnitude should therefore be reduced to **negligible** to a **high** sensitive receptor with the significance being **neutral**.

Cumulative Impacts and Effects

9.6.7 The assessment considers that other committed developments proposed in the district area are unlikely to result in particularly significant cumulative effects to the geology or soils environment from altering the baseline significantly, or from overlapping construction phases with the project proposed.

9.7 Additional Mitigation Measures

9.7.1 No additional measures will be required to reduce the effects identified, subject to all legal requirements are complied with.

9.8 Assessment Summary and Residual Environmental Effects

9.8.1 Table 9.6 provides a summary of the residual assessed impacts to ground conditions and hydrogeology receptors during the construction and operational phase following the implementation of the proposed additional mitigation.



Table 9.6 Ground Conditions (Geology and Soils) and Hydrogeology Environmental Impact Assessment Summary and Residual Environmental Effects

Summary description of the identified impact	Sensitivity of Receptor/Potential Severity	Impact Magnitude/Probability of Risk	Nature of the Impact / Risk	Significance	Additional Mitigation	Residual Impact Magnitude	Residual Significance of Effects	Confidence Level
Construction								
Impacts on Construction Workers from exposure to underlying soils	Very High	Negligible	Negligible	Not Significant	None required	Negligible	Neutral	High
Impacts on Site and surrounding Site users	Mild	Negligible	Negligible	Not Significant	None required	Negligible	Neutral	High
Impacts on controlled waters	High	Negligible	Negligible	Not Significant	None required	Negligible	Neutral	High
Operation								
Summary description of the identified impact	Sensitivity of Receptor	Impact Magnitude	Nature of the Impact	Significance	Additional Mitigation	Residual Impact Magnitude	Residual Significance of Effects	Confidence Level
Impacts on Future Site Users	Mild	Negligible	Negligible	Not Significant	None required	Negligible	Neutral	High
Impacts on controlled waters	High	Negligible	Negligible	Not Significant	None required	Negligible	Neutral	High



9.9 References

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