

USKMOUTH POWER STATION DEVELOPMENT

Appendix 5.1 - Preliminary Risk Assessment

Simec Uskmouth Power Ltd

EXECUTIVE SUMMARY

Site address	Simec Uskmouth Power Station, West Nash Road, Nash, Newport, NP18 2BZ.
NGR, site area	ST 32830 83838, 63 ha.
Current use	Coal fired power station.
Proposed future use	Conversion of Uskmouth B coal fired power station to combust waste derived fuel pellets.
Topography	Little variation across site, typically ranging from 7.6 mAOD to 12.2 mAOD with waste tips in the south-west of up to approximately 24 mAOD.
Geology	Made Ground with thickness varying from 0.2 to 5.0 m overlying up to 14 m of low permeability Tidal Flat Deposits (TFD). Underlying the TFD, sands and gravels assumed to be glaciofluvial in origin have been identified in historical boreholes (Glacio Fluvial Deposits - GFD) with a maximum proven thickness of 11.25 m. Bedrock geology comprises Mercia Mudstone Group (MMG) strata typically from 18.5 to 22.5 mbgl.
Hydrogeology	The TFD are classified as unproductive strata, the GFD potentially a Secondary A Aquifer and the MMG bedrock as a Secondary B Aquifer. There are no identified abstractions or Source Protection Zones (SPZs) within 2 km. Groundwater is likely to be subject to saline intrusion and tidal influence rendering the groundwater unfit for supply and poor quality (chloride).
Hydrology	The River Usk defines the western and northern boundaries of the site. The River Usk is designated as a Special Area of Conservation (SAC) and a Site of Special Scientific Interest (SSSI).
Site history	Site first identified as in use as a power station circa 1963, following which there have been variations to the layout through extension and demolition of one of the power stations (Uskmouth A).
Current surrounding land use	Predominantly wetlands of designated environmental sensitivity to the south, River Usk to north and west and predominantly agricultural land with railway, sewage works and steel works to the east and north-east.
Previous site investigation findings	<p>The Site is subject to Environmental Permitting and previous site investigations comprise geotechnical survey and Site Protection and Monitoring Programme with groundwater monitoring. Most recent data comprising groundwater monitoring in 2015 indicate low level of contaminants of concern typically below EQS guidelines, although marginally over for chromium, nickel and zinc. The 2008 dataset for groundwater indicated low levels of hydrocarbons in the made ground. Groundwater in the made ground is isolated from deeper groundwater body. Groundwater level in the made ground doesn't appear affected by tidal influence whereas the GFD and MMG is influenced.</p> <p>The available soil quality dataset is generally characterised by low levels of organic and inorganic contamination in soils. Soil quality is largely characterised by the absence of Volatile Organic Compounds (VOCs) and Semivolatile Organic Compounds (SVOCs), with exceptions for Total Petroleum Hydrocarbons (TPH), recorded in their low range, less mobile bands. The concentrations of the contaminants identified in soil are lower than those recorded in the overlying Made Ground. No hot spots indicative of gross soil contamination was identified in 2008 and no requirement for site remediation was identified on the basis of observed soil quality.</p>
Identified source-pathway-receptor linkages	<ul style="list-style-type: none"> • Risks to surface water and deeper lying groundwater aquifers by use of piled foundations. • Human health risks from mobilised ground gases from piling activities, from exposure to Made Ground Soils (landfill, asbestos).
Additional works recommended	<ul style="list-style-type: none"> • Foundation works risk assessment to identify the potential impact of piled foundations for the proposed silos and to allow specific mitigation measures to be implemented for Controlled Waters and gas protection as necessary.

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	<ul style="list-style-type: none">• Ground investigation of the existing coal stockyard/landfill, railway and oil store areas to confirm anticipated ground conditions and for geotechnical/geo-environmental assessment including soil sampling and laboratory analysis.
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Drawing 1	019784-RPS-SI-ZZ-DR-A-5000-P04-Site Location Plan
Drawing 2	019784-RPS-SI-ZZ-DR-A-5001-P03-Site Boundary
Drawing 3	Conceptual Site Model

Annexes

Appendix A	PRA Methodology
Appendix B	Envirocheck Land Data Report
Appendix C	Historical Maps and Historical Aerial Photographs
Appendix D	Site Plans (Existing and Proposed SUP Plans)

1 INTRODUCTION

1.1 Scope of Works

1.1.1 RPS Consulting Services Ltd ('RPS') was commissioned by Simec Uskmouth Power Ltd (SUP) to undertake a Preliminary Risk Assessment (PRA) report to support a planning application for redevelopment of their site at Simec Uskmouth Power Station (the 'proposed development site') to a plant that would generate electricity by combusting waste derived fuel pellets.

1.2 Objectives

1.2.1 The objectives of this PRA are to:

- Assess likely existing ground conditions, including geological, hydrogeological and hydrological conditions to establish baseline conditions and allow an assessment of environmental sensitivity;
- Identify potential contamination sources, both from historical and current activities, that may have led to contamination of the proposed development site; and,
- Develop a Conceptual Site Model (CSM) including cross-section and Pollutant (Source-Pathway-Receptor) Linkage Assessment table, to support an assessment of the likely risks associated with potential contamination at the proposed development site.

1.3 Assessment Approach

1.3.1 The assessment has been undertaken in accordance with ISO 21365:2019 and is considered suitable to meet the initial requirements of planning as outlined within the National Planning Policy Framework (NPPF). The assessment also reflects the requirements of the guidance within Model Procedures for the Management of Contaminated Land (CLR11).

1.3.2 The assessment has been undertaken based upon;

- A review of environmental records from local, regional, and national agencies. The information is derived from Envirocheck Reports provided by Landmark Information Group, Ref. 228896479_1_1. Please note the terms and conditions attached to the supply of data from Landmark.
- An assessment of potential sources of contamination on and surrounding the site, from a review of historical maps and aerial photographs dated from 1883; information also sourced from Landmark.
- A review of the site geology using published maps, borehole records and other relevant information.
- A review of information supporting the variation of permit EPR/LP3131SW which includes amongst other documents an Environmental Risk Assessment, the Industrial Emissions Directive Baseline Report and Site Condition Report.

1.3.2 The methodology followed to produce this PRA is detailed in Annex A.

1.4 Assessment Area

1.4.1 The area forming the basis of the assessment undertaken is defined by the red-line land ownership boundary for the facility as owned by Simec Uskmouth Power Ltd and shown on Drawing 2. To allow the geological, hydrogeological and environmental setting of the site to be adequately assessed for determination of a suitable CSM, data searches undertaken have initially included a buffer of up to 2 km from the red-line boundary of the site.

1.5 Limitations of Assessment

- 1.5.1 A site walkover survey was not undertaken as part of this PRA due to the nature of the proposed redevelopment which will comprise primarily modification and reuse of existing infrastructure on the redevelopment part of the site.
- 1.5.2 Consultation with the regulatory authorities, i.e. the Local Authority (LA) and National Resources Wales (NRW) has not been undertaken due to the anticipated response time and time restrictions relating to completion of this assessment.

1.6 Report Structure

- 1.6.1 The remainder of this report is structured as follows:
- Section 2 – Site Description
 - Section 3 – Environmental Setting
 - Section 4 – Current Land Use
 - Section 5 – Historical Land Use
 - Section 6 – Historical Reporting
 - Section 7 – Regulatory Information
 - Section 8 – Preliminary Risk Assessment
 - Section 9 – Conclusions

2 SITE DESCRIPTION

2.1 Site Location

- 2.1.1 Uskmouth Power Station was historically made up of two units, Uskmouth A and Uskmouth B coal-fired power stations. The proposed development would be implemented entirely within the site of the existing Uskmouth B coal-fired power station, referred to as Simec Uskmouth Power Station. Uskmouth A has been decommissioned in 1981 and demolished in 2002.
- 2.1.2 The power station site is located on the eastern bank of the River Usk, close to the confluence with the Severn Estuary, around 4 km south of central Newport. The Ordnance Survey National Grid Reference is ST 32830 83838 and the site address is Simec Uskmouth Power, West Nash Road, Nash, Newport, NP18 2BZ. Drawing 1 shows the general site location.
- 2.1.3 The wider site setting is industrialised to the north, with the Liberty Steel works and industrial estates on the east bank of the River Usk stretching from the proposed development site to the A48 'Southern Distributor Road' dual carriageway through the outskirts of Newport.
- 2.1.4 The River Usk and the Severn Estuary lie beyond the Siemens Combined Cycle Gas Turbine (CCGT) Severn Power Station and Newport Wetlands to the west and south. On the west bank of the Usk is Alexandra Docks, with varied commercial and industrial land-uses.
- 2.1.5 To the east, the wider setting is rural, with farmland, minor roads, reens (drainage channels) and individual or small groups of houses. The nearest settlement is the village of Nash, approximately 1.5 km east from the proposed development site.
- 2.1.6 The topography of the Assessment Site, based upon Ordnance Survey spot heights, generally varies between 7.6 mAOD and 10.6 mAOD with localised areas of greater elevation of up to 23.9 mAOD associated with spoil mounds.

2.2 Site Boundaries

- 2.2.1 In the central area the site adjoins the Severn Power CCGT power station, constructed in 2007 on the site of the former Uskmouth A coal-fired power station. This is excluded from the proposed development site forming the basis of this risk assessment.
- 2.2.2 Immediately to the north and west is the River Usk and to the north-east, Newport Uskmouth Sailing Club; to the east is the railway line, a mixture of land with vegetation, hardstanding and a sewage treatment works; and to the south, former ash pits (now vegetated), beyond which is the Newport Wetlands national nature reserve.
- 2.2.3 Drawing 2 shows the redline ownership boundary for the site, however the area of proposed redevelopment comprises of a comparatively small part of the power station site, with the existing Uskmouth B coal-fired power station occupying the eastern half.

2.3 Site Regulation

- 2.3.1 Reference to the Envirocheck Data Report for the site identifies that the site has a history of activities permitted under Integrated Pollution Control (IPC) and Integrated Pollution Prevention and Control (IPPC). These relate to fuel combustion processes and several of the permits have been superseded by variation. The site currently holds an environmental permit (No. EPR/LP3131SW). A variation of this permit enabling use of non-recyclable waste derived pellets as fuel has been submitted in December 2019 and is pending determination.
- 2.3.2 Records indicate fifteen former/revoked or current discharge consents granted by NRW that are applicable to the operations of the Uskmouth Power Station. The consents are for discharges into the River Usk estuary of site drainage, treated effluent/sewage and cooling water. Four of the

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identified consents for sewage/effluent or site drainage discharges are indicated as being 'new consents' or 'effective'.

3 ENVIRONMENTAL SETTING

3.1 Hydrology & Drainage

- 3.1.1 Historically prior to construction of the power station, the site area was crossed by a network of reens/drainage ditches. Following development of the site there remain a small number of drainage ditches and ponds in the southern half of the site, mostly surrounding the spoil mounds/tips present in the same area.
- 3.1.2 The site area falls within the Usk Catchment and within the Severn River Basin District under the Water Framework Directive (WFD).
- 3.1.3 The River Usk defines the western and northern boundaries of the site. The River Usk is designated as a Special Area of Conservation (SAC) and a Site of Special Scientific Interest (SSSI) for a range of fish species and as an example of large lowland river.
- 3.1.4 The River Usk is classed as a transitional waterbody described under the WFD as mixed and extensive intertidal and a with a status of heavily modified. The River Usk has a tidal range of over 11 m during spring tides.
- 3.1.5 The identified WFD waterbody for the site area is “Monks Ditch – source to Wainbridge”. This is categorised by the WFD as a low/small/calcareous waterbody, heavily modified and with an overall status of moderate.
- 3.1.6 The river quality biology or chemistry is further described in Section 3.4.
- 3.1.7 Topographically, from the Ordnance Survey maps procured for the site, there is generally little variation in elevation across the site area with spot heights across the site area shown as varying between 7.6 mAOD and 12.2 mAOD. There are mounds in the south-west and south of the site where elevations extend to up to 23.9 mAOD.
- 3.1.8 There is a surface water abstraction from the River Usk located 51 m to the north-west of the site. This is identified as being from tidal sources for non-evaporative cooling associated with Uskmouth Power Station and operated by AES East Usk Ltd. Daily maximum abstraction limits are 1,832,000 m³ but is not currently utilised. There is one active surface water abstraction licensed by Alphasteel Limited located 866 m north of the site used for evaporative cooling.
- 3.1.9 There are numerous revoked or current discharge consents that have been granted for the site and immediate surrounding area associated with the power station activities. There are two current consents still operational for sewage discharges (final/treated effluent) into the River Usk with locations identified within the north and west of the site and up to 71 m north of the site boundary. Other discharges are located at Newport Docks.
- 3.1.10 The majority of the site area, including the area of proposed development are identified as falling within areas identified by NRW as at risk of Extreme Flooding (Zone 2) or flooding (Zone 3) from rivers or sea without defences. It is noted that there are localised areas of the site with identified flood defences.
- 3.1.11 It is assumed from the reference to former ‘saltings’ on and in close proximity to the site that the site area has a history of tidal flooding from the River Usk.

3.2 Geology and Soils

- 3.2.1 British Geological Survey (BGS) England and Wales (Sheet No. 249, Newport 1:50,000) and the BGS online geology (1:50,000) have been referenced for details on the published geology of the site area and are summarised in Table 3.1 below.
- 3.2.2 The published data has been supplemented by inspection of available BGS borehole logs for the site area, dated either 1947 (ST38SW/42 to 47) or 1988 (ST38SW/39-41). Further information has

been collated from site specific ground investigation. The available records are for boreholes located within or close to the former Uskmouth A Power Station and also on the northern side of the main power station development extending towards the River Usk.

Table 3.1 Geological Summary

Deposits/Strata	Description/Information	Issues/comments
Hardstanding/cover	Buildings, Tarmacadam or Concrete paving/roads.	From the available survey drawings, aerial photography and site investigation, much of the site in the area of proposed redevelopment has hardstanding and building cover.
Made Ground	Made Ground is present across much of the site area as either sub-base to the existing hardstanding cover or as a result of former phases of construction and demolition. The made ground has been described as composed of loose sand, gravel, brick, hardcore, ash, coal and railway ballast.	BGS borehole records confirm localised presence of Made Ground in one borehole (ST38SW/39) comprising ash, brick and gravel and site intrusive investigation confirmed proven thickness ranging from 0 to 5.0 mbgl. Most of the site investigation has been produced in 2005 and 2008.
Superficial Deposits	<ul style="list-style-type: none"> Tidal Flat Deposits (TFD) – unconsolidated mud or sand sediments and typically comprise soft silty clay with layers of sand, gravel or peat. Organic content of TFD can generate elevated levels of ground gases. The site investigation described the stratum as firm, brown/grey mottled clay. Glaciofluvial Deposits (GFD) - Sand and gravel, locally with lenses of silt/clay. The site investigation described the stratum as wet, slightly fine sand with sandy clay and silt layers. The base of the formation is described as fine to coarse gravels and cobbles. 	<p>Published geology shows continuous lateral extent of TFD to more than 2 km of the site boundary. BGS borehole records confirm presence in all boreholes to depths of between 15.45 mbgl and 19.81 mbgl and typically comprising organic silty clays with localised lenses of sand or peat.</p> <p>Proven in the boreholes underlying the TFD a strata band of sands and gravels was identified overlying the bedrock, proven to depth of 23.15 mbgl in ST38SW/39 with the base unproven in other boreholes. The site investigation identified the base of the GFD ranging from 22.5 mbgl to 23 mbgl.</p>
Bedrock	Mercia Mudstone Group (MMG) – Generally reddish-brown, less commonly green-grey, mudstones and subordinate siltstones weathering to a clay/silt material.	<p>Lateral extent of MMG shown on published geological records as extending more than 2 km from the site boundary. Only proven in one of the BGS borehole records (ST38SW/39) and identified as red-brown mudstone present from 23.15 mbgl to in excess of the base of the borehole.</p> <p>The site investigation identified the formation being present across the site without fully penetrating the formation.</p>

Mining

3.2.3 The site is in an area that is not considered to be affected by coal or non-coal mining, assessed on a 1 km buffer zone from the red-line boundary.

Radon

- 3.2.4 The site is not located within a radon affected area as identified by UKradon. Radon protective measures are not considered necessary for the proposed redevelopment given the setting and nature of the development.

3.3 Hydrogeology

Superficial Deposits

- 3.3.1 The TFD are classed as unproductive strata, comprising layers with low permeability that have negligible significance for water supply or river base flow. These deposits are expected to have very low hydraulic permeability resulting in limited vertical water movement within this stratum and limited lateral flow restricted to localized lenses or layers with a more granular content.
- 3.3.2 Groundwater was found in three discrete groundwater horizons, with notable observations that the made ground is not tidally influenced:
- Made Ground;
 - Glaciofluvial Deposits; and
 - Mercia Mudstone Group.
- 3.3.3 Groundwater in the Made Ground was found ranging from 1.30 mbgl to 2.55 mbgl in 2006.
- 3.3.4 The granular deposits of the GFD present between the overlying TFD and the underlying MMG have no identified aquifer status from the data reviewed. Typically, the GFD are classed as a Secondary A aquifer, comprising permeable layers capable of supporting water supplies at a local rather than strategic scale and in some cases forming an important source of base flow to rivers.
- 3.3.5 Recorded water strikes on the BGS borehole logs ST38SW/39-41 were at depths of 15.45 mbgl and 15.85 mbgl, the interface between the base of the TFD and the GFD. The GFD and MMG groundwater level monitoring provides no evidence of flow between these two units. Groundwater levels in the GFD has been observed in 2006 ranging between 4.42 mbgl and 7.0 mbgl. Groundwater monitoring data for the GFD indicate the influence of the tidal signature which confirms the TFD between the made ground and the GFD acts as an aquitard.
- 3.3.6 The groundwater vulnerability from the NRW interactive map viewer is shown as being low-medium.

Bedrock

- 3.3.7 The MMG bedrock is designated as a Secondary B Aquifer of low vulnerability, typically comprising lower permeability layers that may store and yield limited amounts of groundwater due to localised fissures, thin permeable layers and weathering. Fracture flow is the prime means of groundwater flow through this stratum. Although in hydraulic continuity with the overlying GFD, groundwater flow in the MMG is less prone to tidal influence.
- 3.3.8 There are no groundwater abstractions or groundwater Source Protection Zones (SPZs) within 2 km of the site associated with either superficial or bedrock aquifers. It is considered likely that this might be the result of saline intrusion rendering the groundwater of the area as poor quality and the local significance to water resources is very limited. It is apparent that the groundwater level and quality beneath the site may also be affected by tidal influence given the proximity of the River Usk and reference to historically the site being covered by surface water during high tides.
- 3.3.9 Under the Water Framework Directive (WFD) the site falls within the Usk Devonian Old Red Sandstone waterbody within the Wales South East operational area. This WFD groundwater body is designated as a Drinking Water Protected Area, also an area protected under the Nitrates Directive.

3.4 Environmental Sensitivity

3.4.1 Details provided by general searches of accessible on-line databases of the LA, BGS, Environment Agency (EA)/National Resource Wales (NRW) and Statutory Authorities' records, together with commercial archives as presented in the Envirocheck Land Data Report in Annex B and review of interactive online mapping (MAGIC and NRW), have been reviewed to determine designated sensitive environmental sites on an in close proximity to the site. Salient details are presented in Table 3.2 below:

Table 3.2 Sensitive Land Uses

Sensitive Land Use	Distance/direction from site	Comments
National Nature Reserve – SSSI Newport Wetlands	Adjoining southern boundaries	Designated Site (biological)
SSSI / SAC – River Usk	Adjoining northern boundary	Designated site (biological)
Ramsar / SSSI / SAC / SPA – Severn Estuary	450 m west of proposed development	Designated site (biological)
WFD higher sensitivity habitat – Saltmarsh	450 m south-west of proposed development	Intertidal area of the Severn Estuary
SSSI – Gwent levels	1,400 m west of proposed development	Designated site (biological)

3.4.2 An Environmental Permit Habitat Regulation Assessment has been produced as part of the Permit Variation application. It has been concluded that there are no potential likely significant effects on any interest features within the River Usk SAC, Severn Estuary SAC, SPA and Ramsar sites during the operational phase of the proposed development either alone or in combination.

3.4.3 The Environmental Statement (ES) for the proposed development also considers Ecology. The ES indicated no significant impacts on environmental sensitive receptors.

3.5 Summary

Hydrogeological Model

3.5.1 The area of the proposed development is, from the available information, likely to comprise a variable cover of Made Ground overlying approximately 15-20 m of TFD, cohesive deposits recognised as an unproductive aquifer of low vulnerability and unlikely to contain groundwater in significant quantities other than discontinuous water within localised sandy or gravelly lenses or layers.

3.5.2 Beneath the TFD, historical boreholes have identified a layer of granular deposits comprising sands and gravels, assumed to be potentially glaciofluvial in origin and a confined aquifer. It is at the interface at the base of the TFD and the underlying granular materials that groundwater strikes were encountered in the most recent historical boreholes on the site. If these deposits are GFD then their aquifer classification is assumed to be Secondary A. The presence of the tidal River Usk estuary in close proximity of the site is expected to result in fluctuating water pressures within the GFD and MMG. Groundwater flow within the concealed GFD is expected to be lateral, orientated towards the River Usk and subject to tidal and saline variations indicating that it is unlikely that they would represent a viable source of groundwater abstraction. There are no recorded superficial groundwater abstractions or SPZs within 2 km that would indicate that they can be regarded as a significant source of supply.

3.5.3 The bedrock aquifer (MMG) is identified as a Secondary B aquifer and again there are no licensed abstractions or SPZs associated with this stratum within 2 km of the site boundary. Groundwater flow is likely to be restricted to fracture flow through what are generally low permeability rocks. The

limited storage capacity of the bedrock aquifer and likely continuity with water in the GFD affected by saline intrusion would again suggest low sensitivity to contamination.

Controlled Waters & Environmental Receptors

3.5.4 The identified Controlled Water and environmental receptors within close proximity of the site boundaries are summarised in Table 3.3 below.

Table 3.3 Controlled Water and Environmental Receptors

Receptor	Distance from site	Relevance for further assessment
GFD and MMG aquifers	Beneath site	Installation of piled foundations for silos and deep excavations may provide new pathways which may lead to perched groundwater within any Made Ground entering the currently confined aquifer within the GFD and MMG.
River Usk	Bordering west and north of site	Redevelopment in the north is likely to involve minor modification of existing structures and as no demolition/new structures is planned, there is unlikely to be any variation to existing drainage and discharge procedures limiting the possible creation of pathways.
Saltmarsh/wetlands (Severn estuary)	In south-west and adjoining western boundary	Outside area of proposed redevelopment and unlikely to be affected by any shallow groundwater flow through TFD from proposed redevelopment area. Discounted as significant receptor.
Julian's Pill to River Usk	immediately north east of the site	Discharge from facility. Discounted as managed through Discharge Consent
Gwent Levels	Approximately 400 m north-east	Assumed to be upgradient of site and unlikely to be in continuity with shallow groundwater in made ground. Discounted as significant receptor.
Newport Wetlands	Immediately south of the site	The site surface drainage is captured by surrounding drainage ditch to attenuation pond. The wetlands sits on historical PFA landfill unlikely to be in continuity with shallow groundwater in made ground. Discounted as significant receptor.

4 CURRENT LAND USE

4.1 Data Sources

- 4.1.1 In the absence of a specific site walkover, the assessment of current land use on site is based upon the existing site plan provided to RPS for review and first presented as drawing ref 019784-RPS-SI-ZZ-DR-A-5002 and dated 13th May 2019. This is focused on the area within the Uskmouth B coal-fired power station designated for the proposed redevelopment. The power station site defined by the redline boundary contains many potential contamination sources, particularly above ground storage tanks, from OS map evidence.
- 4.1.2 The nature of the current land use of the surrounding area has been sourced from review of the Envirocheck Data Report data set on current land uses and current OS mapping. Potential Contaminants of Concern have been sourced from Volume 2 of the BRE/CIEH document 'Guidance on the Safe Development of Housing on land affected by Contamination' (2008) which is in turn sourced from Department of Environment (DoE) Industry Profiles.

4.2 Onsite Land Use

- 4.2.1 The survey drawings provided for the site as referenced above, show the location of the proposed plant in relation to current land use. The northern section of the proposed plant currently comprises the existing turbine house, boiler house and Flue Gas Desulphurisation plant of the Uskmouth B power station. The latter removes sulphur dioxide from the flue gas prior to release into the atmosphere, coal typically having a high sulphur content. In close proximity to the boiler house and turbine house are other identified structures that may be regarded as potential contamination sources, including a substation, lime and fly ash silos, fuel oil tank and carpenters' workshop.
- 4.2.2 The southern section comprises much of the existing coal stockyard together with the biomass storage shed, ash treatment facility, hoppers and coal conveyors linking the storage area with the boiler house. Railway sidings cross the central part of the development site. In the southern part of the development site is an oil store.
- 4.2.3 The potential contamination sources identified from the survey drawings in the proposed construction area are listed in Table 4.1. TFD have also been included as a potential on site contamination source due to the potential for release of ground gases from organic content if disturbed during construction works for the new buildings and silos.

Table 4.1 Current On-site Potentially Contaminative Land Uses

Potentially Contaminative Activities	Potential Contaminants of Concern	Relevance for further Assessment
Above ground tanks	Assumed hydrocarbons	To be retained. Outside area of proposed construction activities or soft landscaping. Discounted for PRA assessment.
Oil Store	Hydrocarbons	Oil store to be retained in area of soft landscaping/aggregate cover. Possible mobilisation of any historical spills from increased infiltration potential.
Railway sidings	Metals, sulphates, asbestos, PAHs, PCBs, chlorinated aliphatic hydrocarbons	Sidings to be included within area of soft landscaping, possible risk to health of future site users if exposed to residual soils. Further assessment required.
Electricity substation	PCBs, oils	To be retained. Outside area of proposed construction activities or soft landscaping. Discounted for PRA assessment.

Potentially Contaminative Activities	Potential Contaminants of Concern	Relevance for further Assessment
Carpenters Workshop	Expected to include varnishes, glues, paints (solvents/VOCs)	To be retained. Outside area of area of proposed construction activities or soft landscaping. Discounted for PRA assessment.
Existing Coal Stockyard	Accumulation of Coal dust – metals and sulphur	Coal stockpile understood to have been removed however residual soil contamination by coal dust will need to be assessed in relation to proposed soft landscaping finish in this area.
TFD	Methane or carbon dioxide from organic content	Foundation excavations for new de-dusting building and storage silos likely to penetrate TFD. Potential for mobilisation of pockets of ground gas will require further assessment.

4.3 Offsite Land Use

4.3.1 Details provided by general searches of accessible databases of Contemporary Trade Directory Entries and current Ordnance Survey mapping as presented in the Envirocheck Land Data Report in Annex B, have been reviewed to determine potentially contaminative activities. Pertinent details are presented in Table 4.2 below:

Table 4.2 Current Off-site Potentially Contaminative Land Uses within 500 m

Potentially Contaminative Activities	Distance/direction from site	Potential Contaminants of Concern	Relevance for Assessment
Tank	474 m north	Hydrocarbons	On north bank of River Usk, Continuity of groundwater and viable migration pathway unlikely. Discounted for PRA assessment.
Cooling Tank	145 m north-east	Likely to be non-contaminative	Unlikely to be contaminative source and seemingly incorrectly located within River Usk. Discounted for PRA assessment.
Ash ponds	Adjoining southern site boundary	Arsenic, barium, beryllium, boron, cadmium, chromium, mercury, molybdenum	Likely to be retained by low-permeability clay layers and cut-off trenches/walls. If penetrated, vertical leachate migration through suspected thickness of TFD unlikely given low permeability characteristics. Discounted for PRA assessment.
Nash Sewage Treatment Works	Approximately 100 m east	Metals, cyanide, pH, nitrates, sulphates, asbestos, hydrocarbons, PCBs	Liquid or leachable contaminants unlikely to have migrated over this distance through discontinuous shallow groundwater and upwind of site when compared to prevailing wind-direction therefore airborne contamination of site unlikely. Discounted for PRA assessment.

Potentially Contaminative Activities	Distance/direction from site	Potential Contaminants of Concern	Relevance for Assessment
Liberty Steel Works/power station	Approximately 250 m north-east	Metals, pH, sulphates, asbestos, hydrocarbons, PCBs, phenols, hydrocarbons, PAHs, PCBs	Liquid or leachable contaminants unlikely to have migrated over this distance through shallow groundwater and upwind of site when compared to prevailing wind-direction therefore airborne contamination of site unlikely. Potential for migration in GFD groundwater through pathways created by piled foundations unconfirmed. Discounted for PRA assessment.

4.3.2 It is concluded that the low permeability of the TFD present across the 2 km radius buffer around the site will retard vertical migration of any off-site derived contaminants into the underlying GFD or MMG aquifers unless pathways have been created through use of piled foundations and therefore potential lateral flow through the deeper lying groundwater in the direction of the site is considered to be unlikely.

4.4 Summary of Potential Contamination Sources

4.4.1 The salient current on-site sources of contamination identified for inclusion in the PRA are summarised in Table 4.3 below.

Table 4.3 Current Potential Contamination Sources

Source	Location	Contaminants of Concern
Oil Store	On-site	Hydrocarbons
Railway sidings	On-site	Metals, sulphates, asbestos, PAHs, PCBs, chlorinated aliphatic hydrocarbons
Existing Coal Stockyard	On-site	Accumulation of Coal dust – metals and sulphur
TFD	On-site	Methane or carbon dioxide from organic content

5 HISTORICAL LAND USE

5.1 Data Sources

- 5.1.1 The historical land use of the site has been assessed through a review of historical maps/aerial photographs dated from 1883; information sourced from Landmark as part of the Envirocheck Data Report Ref. 228896479_1_1.

5.2 Historical Land Use - Onsite

- 5.2.1 The historical maps and aerial photographs presented in Annex C have been reviewed and summarised in Table 5.1 below to identify potentially contaminative historical land uses.

Table 5.1 Site History – Onsite

Date Range	Source (Map/Aerial Photograph)	Pertinent Features
1883-1902	Historical maps	The site comprises predominantly a network of drainage ditches/reens with localised farm/residential buildings and mooring posts alongside the bank of the River Usk in the north. In the north-west is Thieves Pill, an inlet from the River Usk with an associated landing stage.
1920-1922	Historical maps	The majority of the site is identified as 'saltings' i.e. land regularly covered by tides. The East Usk branch line of the Great Western Railway has been constructed on embankment aligned south-west to north-east through the centre of the site.
1949-1958	Historical maps/Aerial Photograph	The photograph and maps show extensive development taking place in particular to the north of the branch line of the GWR. Buildings are identified as 'works' and multiple railway lines have been constructed extending as far as the western boundary on the branch line. Former farm buildings have been demolished. Much of the eastern area and the south-west is shown as marshland.
1963-2006	Historical maps/Aerial Photograph	The 'works' buildings are now identified as an 'electricity generating station' with two main buildings in both the west (Uskmouth A) and east (Uskmouth B). There are many electricity pylons apparent across the site area. A pipeline, conveyor and the ancillary buildings, chimney and tanks identified on the current layout plan for Uskmouth B are evident by this time. The branch railway lines are no longer evident crossing the site. An aerial photograph dated 2000 shows that much of the western and northern periphery of the site comprises grassland/trees.
2006-2019	Historical maps	The westernmost building has been demolished and additional railway sidings are now apparent aligned south-west to north-east through the central part of the site.
2019	Historical maps	The site, now identified as a power station, resembles the current layout with an additional group of buildings, tanks and infrastructure of the Severn Power CCGT power station present within the centre of the site.

5.3 Historical Land Use - Offsite

5.3.1 The history of the immediate surrounding area within 500 m has also been assessed through review of the same data sources as listed above. Off-site land use is presented in Table 5.2.

Table 5.2 Site History – Offsite (within 500 m)

Date Range	Source (Map/Aerial Photograph)	Pertinent Features
1883-1902	Historical maps	The Usk estuary occupies the land to the north and west. To the south and east the land is undeveloped and crossed by numerous reens/drainage ditches. Between the northern boundary and the River Usk are a group of small buildings and slipways into the river.
1920-1922	Historical maps	Little Change although the buildings/slipways to the north have been demolished. The East Usk branch line of the Great Western Railway continues to the north. On the north bank of the River Usk are Newport Docks.
1949-1958	Historical maps/Aerial Photograph	Many of the reens to the south are no longer evident and there has been construction of several embankments across this area. Immediately east circa 1956 are a group of buildings named Nash Camp (wartime artillery camp). Approximately 500 m north-east is an Alumina Works also linked by sidings to the GWR.
1963-1999	Historical maps	Many of the reens to the south are no longer evident and there has been construction of several embankments across this area, now identified as Caldicot Level. A large sewage works (Nash C) is present by the 1980s approximately 100-200 m east. Nash Camp is no longer evident after 1964. By 1969, large ash ponds were present immediately to the south-east and a Thermalite Works (aerated concrete blocks made from about 80% fuel ash) with multiple storage tanks present some 100 m east.
1999-2006	Historical maps/Aerial Photograph	The development of the electricity generating station has resulted in the presence of many transmission lines and pylons in the land to the south. An ash pond is also evident 250 m south-east. The Thermalite Works has been demolished although the footprint of the building and surrounding hardstanding is still visible on the aerial photograph of 2000. The Alumina works has been significantly extended and is now approximately 250 m north-east.
2006-2019	Historical maps	Little change although the land to the south is shown as lakes/marshland.
2019	Historical maps	Little change although the land to the south is shown as lakes/marshland.

5.4 Summary of Potential Contamination Sources

5.4.1 The main on and off site historical potential contamination sources are summarised in Table 5.3 below.

Table 5.3 Historical Potential Contamination Sources

Potential contamination source	Distance/direction from site	Potential Contaminants of Concern	Relevance for Assessment
Former Uskmouth A power station (coal carbonisation plant)	On site	Metals, cyanide, sulphate, sulphide, asbestos, pH, spent oxides, sulphur dioxide, flue dust, boiler ash, clinker, foul lime	The Uskmouth A facility was demolished after the construction of Uskmouth B which forms the redevelopment site. It is unlikely that there will be residual Made Ground beneath the redevelopment site associated with Uskmouth A although airborne dust may have accumulated on the redevelopment site or perched water within Made Ground may have potentially migrated beneath the proposed redevelopment site.
Railway (GWR) and sidings	On site	Metals, sulphates, asbestos, PAHs, PCBs, chlorinated aliphatic hydrocarbons	Former route crossed area of proposed redevelopment.
Former Buildings (farms, residential properties and power station buildings)	On site	Demolition materials (potentially including asbestos containing materials)	The nearest former farm buildings were located close to the western edge of the proposed redevelopment area, therefore there remains a possibility that demolition materials may extend within the area of proposed construction works. Additional assessment required.
Thermalite Works	100 m east	Metals, sulphides, asbestos, pH, hydrocarbons, propanone, PAHs, PCBs	Liquid or leachable contaminants unlikely to have migrated over this distance through discontinuous shallow groundwater and upwind of site when compared to prevailing wind-direction therefore airborne contamination of site unlikely. Discounted for PRA assessment.

6 HISTORICAL REPORTING

6.1 Data Sources

6.1.1 Site investigation reports made available for review as part of this PRA include:

- Phase II Site Investigation Report, Final Report Uskmouth Power Limited by ERM (2006)
- Design Site Protection and Monitoring Programme, Final Report Uskmouth Power Limited by ERM (2008)
- First Report of Site Protection and Monitoring Programme, Final Report Uskmouth Power Limited by ERM (2008)
- Groundwater Monitoring and Sampling Report, Uskmouth Power Station by Enzygo (2015)
- Geotechnical Desk Study, Uskmouth Power Station Conversion by WSP (2019)

6.1.2 Previous Site Investigation reports that have not been provided for this study but mentioned in aforementioned report, and are therefore not deemed to be detrimental to the Preliminary Risk Assessment findings, include:

- Gwent Levels Wetland Reserve – Ground investigation and risk assessment for proposed temporary waste transfer station – Interpretative Report for Cardiff Bay Development Corporation by Mason Pittendrigh Consulting Engineer (1997)
- AES Fifoots Power Station – Ground Investigation for AES Fifoots Ltd by Kennedy & Donkin Limited (1998)
- Asbestos Site Investigation Report – Uskmouth Power Station for Uskmouth Power Company by ERM (2005)

7 REGULATORY INFORMATION

7.1 Data Sources

7.1.1 Regulatory information is derived from review of Envirocheck Reports provided by Landmark Information Group, Ref. 228896479_1_1.

7.2 Land Report

7.2.1 Details provided by general searches of accessible databases of the LA, BGS, EA and Statutory Authorities' records, together with commercial archives (Envirocheck Report - Annex B), have been reviewed to determine potentially contaminative activities. Salient details are presented in Table 7.1 below. Datasets where there are no identified records within 500 m of the proposed development have been excluded as being significant given the low permeability of shallow soils and assumed absence of continuous shallow groundwater in the TFD minimising migration potential of liquid, leachable or gaseous contaminants.

Table 7.1 Summary of Environmental Data (within 500 m)

Data	Location	Comments
Integrated Pollution Control (IPC) sites	On site	<ul style="list-style-type: none"> • Uskmouth B Power Station – Combustion processes (application not yet authorised) • Uskmouth Power Station – Combustion processes (authorisation surrendered by operator) • Uskmouth substation – combustion processes (revoked or superseded by non-substantial variation) x 10
Integrated Pollution Prevention and Control (IPPC) sites	On site	<ul style="list-style-type: none"> • Western Power (Severn Power Station) – bespoke application (effective) • Severn Power Station (Siemens plc) – minor variation for combustion processes (effective) • Severn Power Station (Siemens plc) – two variations for combustion processes (superseded by variation) • Uskmouth Sub-station, AES Fifoots Power Station (Effective)
Pollution Incidents to Controlled Waters	192 m north (adjacent to power station) 168 m north (associated with Nash Sewage Works) 390 m north-east (Orb works, Newport)	<ul style="list-style-type: none"> • Minor Incident dated 1991 – release of oils (diesel) • Minor incident dated 1995 – crude sewage • Significant Incident dated 1991 - sewage
Substantiated Pollution Incident register	436 m north	<ul style="list-style-type: none"> • Category 2 significant incident in 2018 – pollution by gas and fuel oils
Water Industry Act Referral	20 m east	<ul style="list-style-type: none"> • Nash STW – Permission granted to discharge under the Water Industry Act. •
Landfills and other Waste Sites BGS Recorded landfill sites Historical landfill sites Licensed Waste management facilities Registered Landfill Sites	On site (In south and south-west)	<ul style="list-style-type: none"> • CEGB Uskmouth Power Station Landfill Site – active 1950-1977 for industrial/household waste and liquid sludge. • Uskmouth Power Station Landfill – AES East Usk Ltd for industrial waste (inactive) • Uskmouth Power Station (Ash lagoons No 5 10-13 – national Power Plc (inactive)

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Data	Location	Comments
Registered Waste Transfer Sites		<ul style="list-style-type: none"> Uskmouth Power Station 'A' – Cardiff Bay development Corporation for waste transfer of Pulverised Fuel Ash (PFA) and furnace bottom ash. Uskmouth Power Station – Aes East Usk Ltd – inert waste (operational)
Landfills and other Waste Sites <ul style="list-style-type: none"> Historical landfill sites Licensed Waste management facilities Registered Landfill Sites 	<ul style="list-style-type: none"> 325-431 m south (land south-west of East Usk Lighthouse) 380 m north (South Dock, Newport Docks) 400 m north (South Dock, Phase 2) 9-25 m east 120 m north-east (east of Alpha Steel) 	<ul style="list-style-type: none"> Uskmouth Power Station – active 1979-2004 for industrial, commercial and household waste South Dock Phase 1 – active 1986-1990 for industrial/household waste South Dock Phase 2 – active 1990-1994 for industrial/household waste/liquid sludge Uskmouth Power Station Landfill – industrial waste (inactive) Sloblands – Industrial Waste Landfill

7.3 Regulatory Communications

7.3.1 No additional information requests have been made as part of the information gathering for this assessment.

7.4 Key Findings

Potential Source of Contamination

7.4.1 Relevant potential sources of contamination identified from the regulatory data search are summarised in Table 7.2 below and assessed for relevance to the PRA.

Table 7.2 Summary of Potential Contamination Sources identified from regulatory databases (within 500 m)

Potential contamination source	Location	Relevance for Assessment
IPC site	On site – Uskmouth B Power Station	It is assumed that this is still the active permit for the current site activity and the site practices conform to the requirements of the IPC permit. Discounted for PRA assessment.
IPPC sites	On site effective permits for Siemens and Western Power	No reported breaches of permit conditions. Discounted for PRA assessment.
Pollution Incidents to Controlled Waters	None	None of the recorded incidents were for groundwater, all for the River Usk. None of these incidents were attributable to or likely to have adversely impacted on the site. Discounted for PRA assessment.
Substantiated Pollution Incident register entry	436 m north, location in Newport Docks on north side of River Usk	The presence of the River Usk represents a barrier to any viable shallow groundwater migration pathway that may exist. Discounted for PRA assessment.
On site landfills	Within the southern boundary of the site	The boundaries of one of the on-site landfills extends within the area of proposed development occupying the southern part of the existing coal stockyard. This will need to be assessed as part of the PRA. Other sites within the site boundary likely to have limited gas or leachate migration potential through shallow granular Made Ground deposits.

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Potential contamination source	Location	Relevance for Assessment
Off-site landfills	<ul style="list-style-type: none"> • 325-431 m south (land south-west of East Usk Lighthouse) • 380 m north (South Dock, Newport Docks) • 400 m north (South Dock, Phase 2) • 9-25 m east • 120 m north-east (east of Alpha Steel) 	<p>Locations within Newport Docks - The presence of the River Usk represents a barrier to any viable shallow gas migration pathway that may exist. Discounted for PRA assessment.</p> <p>Alphasteel landfills are located upstream or upgradient of the proposed development. Discounted for PRA assessment.</p>

8 PRELIMINARY RISK ASSESSMENT

8.1 Conceptual Site Model

Introduction

8.1.1 The Risk Assessment consists of an appraisal of the source-pathway-receptor 'pollutant linkages' which is central to the approach used to determine the existence of 'contaminated land' according to the definition set out under Part 2A of the Environmental Protection Act 1990. For a risk to exist (under Part 2A), all three of the following components must be present to facilitate a potential 'pollutant linkage'.

- Source of contamination (Hazard);
- Pathway for the contaminant to move from the source(s) to receptor(s); and
- Receptor (Target) that could be affected by the contaminant(s).

Sources

8.1.2 The main potential contamination sources considered relevant as part of the PRA are listed below in Table 8.1. Following ISO 21365:2019, sources are distinguished between primary and secondary, where primary source relates to a spill of contaminants stored on site (loss of containment) and secondary source relates to the presence of contaminants in soil or groundwater.

Table 8.1 Potential Contamination Sources to be included in PRA

Source	Primary / Secondary Source	Contaminants of Concern	Location	Contamination status	Receptor
Soils in the existing Coal Stockyard	Secondary	Metals and sulphur	In south of proposed development site	Suspected	Human Health/ Groundwater / Surface Water
On site Landfill	Primary	Ground gases/possible elevated inorganic/organic contaminant concentrations	In south of proposed development site	Suspected	Human Health / Groundwater / Surface Water
TFD (organic content)	Primary	Ground gases (methane and carbon dioxide)	Beneath proposed development site	Suspected	Human Health
Railway sidings	Secondary	Metals, sulphates, asbestos, PAHs, PCBs, chlorinated aliphatic hydrocarbons	Crossing central part of proposed development site.	Suspected	Human Health
Oil Store (soils contaminated from previous spills)	Secondary	hydrocarbons	In central part of proposed development site	Possible	Surface Water / Human Health
Made Ground from demolition of	Secondary	Demolition materials (potentially including	Within site and potentially close to	Possible	Human Health

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former structures		asbestos containing materials)	western edge of proposed development site		
Former Uskmouth A power station (residual soil/shallow groundwater contamination)	Secondary	Metals, cyanide, sulphate, sulphide, asbestos, pH, spent oxides, sulphur dioxide, flue dust, boiler ash, clinker, foul lime	Close to western edge of proposed development site	Possible	Human Health

Receptors

- 8.1.3 Receptors include human beings, other living organisms, crops, controlled waters and buildings / structures. The mere presence of a contaminant source / hazard at a site does not mean that there will necessarily be attendant risks or that the site will be designated as 'contaminated land'.

Controlled Waters

- 8.1.4 The Controlled Waters receptors for assessment as part of the PRA are listed below in Table 8.2.

Table 8.2 Controlled Waters Receptors to be included in PRA

Name	Description	Designation	Sensitivity	Water dependency	Distance from site
River Usk	Surface water	SSSI / SAC	High	Groundwater (GFD/MMG)	Adjoining northern Site boundaries
GFD aquifer	Groundwater	Secondary A	Low-Medium	Groundwater (MMG)	Beneath Site
MMG aquifer	Groundwater	Secondary B	Low	Groundwater (GFD)	Beneath Site

Human Health

- 8.1.5 The Human Health receptors for assessment as part of the PRA are listed below in Table 8.3.

Table 8.3 Human Health Receptors to be included in PRA

Name	Exposure Pathways
Construction workers	Dermal contact, ingestion, inhalation
Future Site Workers	Dermal contact, ingestion, inhalation
Current Site Workers during construction phase	Inhalation of dust/fibres

Additional Receptors

- 8.1.6 Other potential receptors, as identified in paragraph 8.1.3, have been excluded from the PRA following the initial screening assessment of sensitive environmental receptors in Table 3.3 and the current absence of any utility supplies (potable water supply).

Preliminary Conceptual Model for Pathway Determination

- 8.2 A graphical Preliminary Conceptual Model has been prepared to identify how the sources listed above may impact on the identified potential receptors. This is presented as Figure 3.

8.2 Pollutant (Source-Pathway-Receptor) Linkages

Based on the CSM a pollutant (SPR) linkage table has been developed (

8.2.1 Table 8.4) and potential linkages assessed. As the proposals are for future site redevelopment, the contamination status of the site has been evaluated against the design / construction elements anticipated as associated with the proposed development.

Assigning Qualitative Risk

8.2.2 This represents an initial assessment of the level of risk a contamination source represents to the named receptor considering the potential exposure pathway. It combines its likelihood of occurrence and potential impact on a specific receptor. It has been classified under three broad categories:

- Low risk – it is considered unlikely that issues assigned this designation will give rise to significant harm;
- Moderate risk – it is possible, but not certain that issues assigned this designation may give rise to significant harm or a liability/cost for the owner of the site; and
- High risk – there is a high potential that issues assigned this designation may give rise to significant harm or a liability/cost for the owner of the site.

8.2.3 The ‘certainty’ (High/Medium/Low) of the pollutant linkage risk estimate has also been provided based on the extent of information upon which the risk estimate is based.

8.2.4 The combination of risk with certainty has been used to assess the “proposed response” (i.e. nature and extent of additional work) required to adequately investigate and mitigate that pollution linkage.

8.3 Proposed Development

8.3.1 The proposed development currently to comprise conversion of the existing coal-fired power station to a plant that would generate electricity through combustion of fuel pellets derived from non-recyclable waste together with construction of ancillary infrastructure and buildings including four fuel storage silos and associated conveyor systems, fuel de-dusting facilities and rail unloading facilities.

8.3.2 The main area of development will take place on the existing coal stockyard through construction of four primary fuel storage silos of up to 42 m in height. As there will be a reduction in the storage area required when compared to coal, a large proportion of the existing coal stockyard will be converted to soft landscaping. It is understood that the remaining coal in the storage area has been removed and sold and that any remaining differences in level will be filled to create a development platform.

8.3.3 No demolition is required for the proposed development. The conversion process including, construction of the silos and conveyors, access and conversion of equipment within the power station buildings is anticipated to take around 18 months. The details of construction are currently unknown however it is assumed from the height of the silos and anticipated loading that there may be requirement for use of piled foundations into the GFD or MMG strata.

8.3.4 It is envisaged that the supply of fuel to the facility will continue to be primarily via the existing rail connection with refurbishment and extension of the existing rail unloading hopper forming part of the proposed development.

Table 8.4 Pollutant (SPR) Linkage Assessment – Proposed Development Area

Activity (Description)	Contamination Source Potentially Affected		Exposure Pathway	Receptor	Qualitative Assessment of Risk	Certainty	Justification	Proposed Response
	Description	Contaminants of Concern						
Construction and Pile Formation for Fuel Storage Silos	Existing Coal Stockyard On site former landfill Railway sidings	Elevated concentrations of metals and sulphur, other contaminants that may be present within landfill Metals, sulphates, asbestos, PAHs, PCBs, chlorinated aliphatic hydrocarbons Ground Gases (methane/carbon dioxide)	Dermal contact Ingestion Inhalation	Construction Workers	High	Low	Exposure to flammable/toxic gases and landfill/Made Ground soils via preferential pathways created during pile formation.	Ground investigation recommended to establish nature and contaminant concentrations of Made Ground/ and concentrations of ground gases.
			Air	Current site workers outside redevelopment area	Moderate	Low	Potential for mobilisation of dust or fibres from.	Dust suppression and application of good working practices during construction will mitigate risks posed to neighbouring site users.
			Groundwater via pile formation into underlying aquifers	Groundwater within GFD or MMG River Usk	Moderate	Medium	Pile formation would penetrate TFD and could result in possible release of leachable / liquid contaminants in perched water via pile formation into underlying aquifers.	Ground investigation recommended to establish presence of perched water, contaminant concentrations and/or leachability of Made Ground soils.

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Activity (Description)	Contamination Source Potentially Affected		Exposure Pathway	Receptor	Qualitative Assessment of Risk	Certainty	Justification	Proposed Response
	Description	Contaminants of Concern						
	TFD (organic content)	Ground Gases (methane/carbon dioxide)	Exposure to flammable/toxic gases via preferential pathways created during pile formation from penetration of trapped pockets of organic material	Construction Workers/future site users	High	High	Previous ground investigations in the local area on a similar geological sequence have identified this as a potentially significant linkage.	Requirement for foundation works risk assessment to assess potential impact of piled foundations for the and mitigation for Controlled Waters and gas protection as necessary.
Surface Water Management	Oil Store (soils contaminated from previous spills)	Hydrocarbons	Site drainage or lateral flow through perched shallow groundwater in Made Ground. Preferential pathways may be associated with courses of former ditches/reens beneath the site	River Usk	Low	Low	Possible mobilisation of hydrocarbons in soils in perched shallow groundwater via any deficiencies in site surface water drainage.	Ground investigation to determine any evidence of hydrocarbons in soils in proximity of oil store and drainage survey to confirm competence.
Soft Landscaped Areas	Made Ground Existing Coal Stockyard On site former landfill Railway sidings	Metals and sulphur, asbestos, landfill contents Metals, sulphates, asbestos, PAHs, PCBs, chlorinated	Dermal contact Ingestion Inhalation	Future Site Users	Moderate	Low	History of existing coal stockyard likely to have left shallow soils with a content of coal dust. Former landfill activities could have resulted in residual soil contamination	Ground investigation recommended to establish nature and contaminant concentrations of Made Ground. Creation of development platform with

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Activity (Description)	Contamination Source Potentially Affected		Exposure Pathway	Receptor	Qualitative Assessment of Risk	Certainty	Justification	Proposed Response
	Description	Contaminants of Concern						
		aliphatic hydrocarbons					by a range of contaminants. Presence and nature unproven.	assumed clean imported material likely to mitigate risk.

9 CONCLUSIONS

The PRA undertaken has identified potential source-pathway-receptor linkages relating to the proposed redevelopment as listed in

- 9.1.1 Table 8.4. There is a residual risk of the presence of unknown contamination being discovered during construction works. This would be addressed through a contamination discovery strategy as part of a Construction and Environment Management Plan (CEMP).
- 9.1.2 From the assessment of the PRA findings, we would recommend that a targeted geo-environmental and geotechnical ground investigation is undertaken to confirm the anticipated ground conditions, to provide geotechnical design data for foundation design for new structures forming part of the proposed redevelopment.

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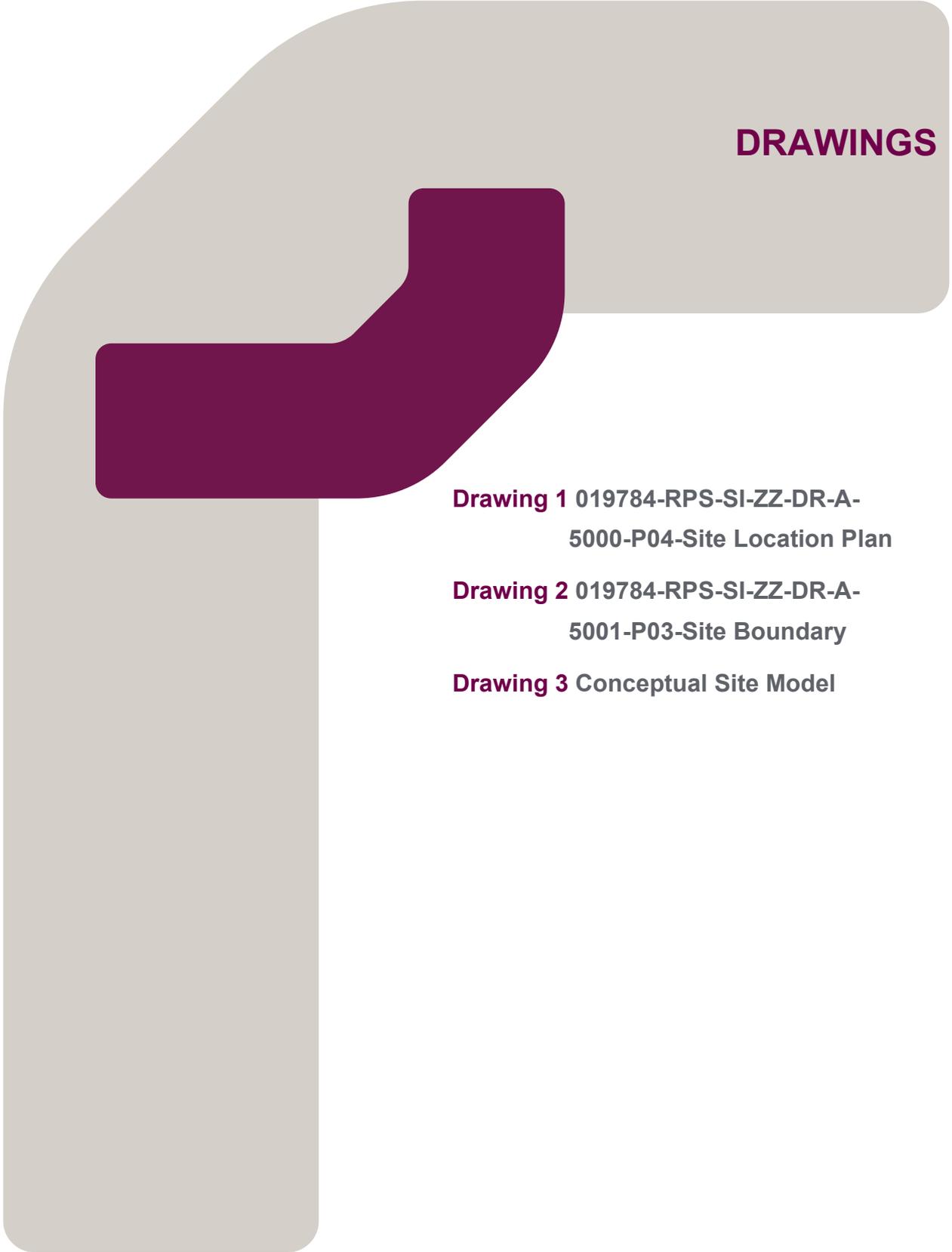
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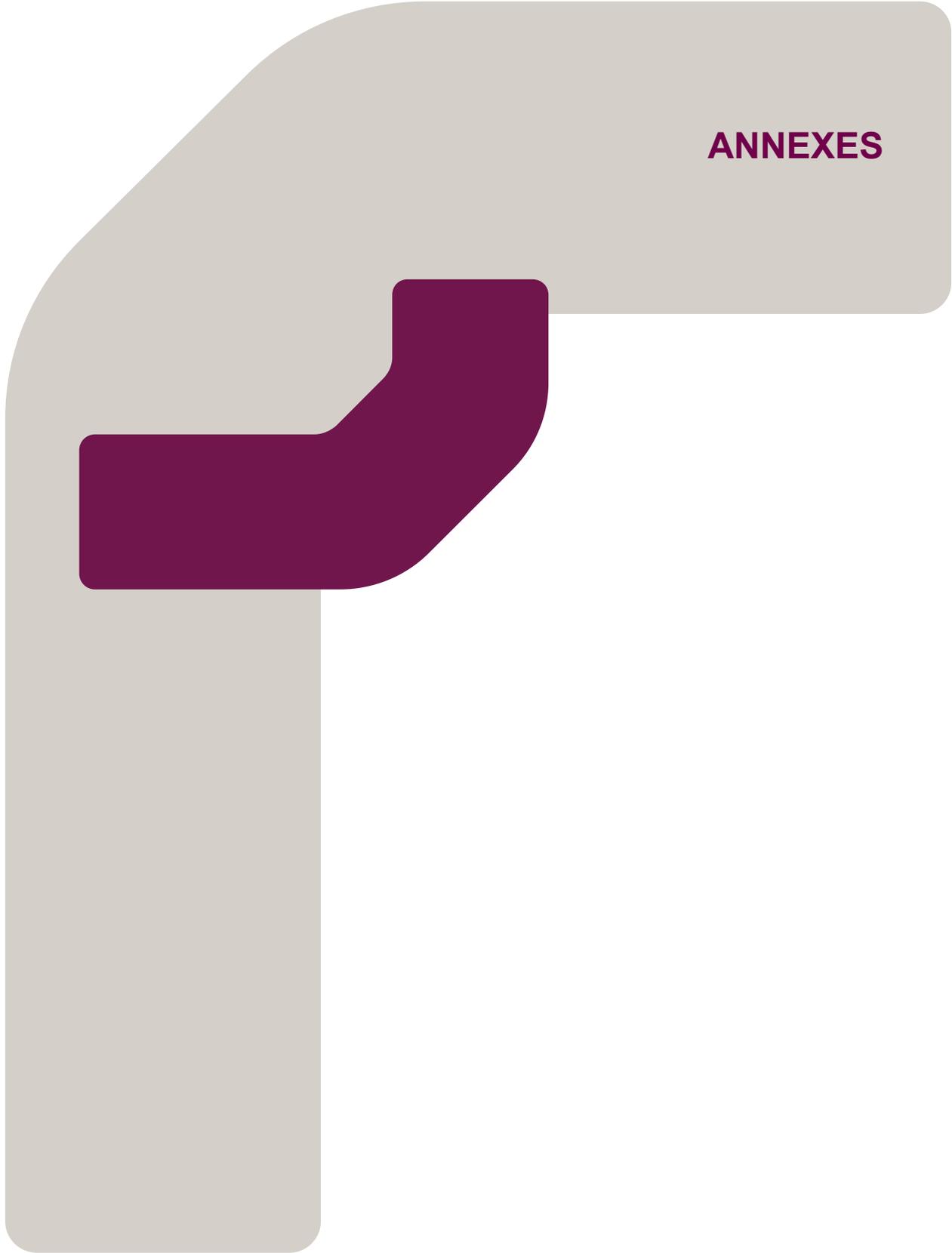


DRAWINGS

Drawing 1 019784-RPS-SI-ZZ-DR-A-
5000-P04-Site Location Plan

Drawing 2 019784-RPS-SI-ZZ-DR-A-
5001-P03-Site Boundary

Drawing 3 Conceptual Site Model



ANNEXES

Annex A
PRA Methodology

INTRODUCTION

This report provides available factual data for the site obtained only from the sources described below and related to the site on the basis of the location provided by the client. The desk study information is not necessarily exhaustive and further information relevant to the site may be available from other sources. No responsibility can be accepted by RPS for inaccuracies in the data supplied by any other party.

This report is written in the context of an agreed scope of work and should not be used in a different context. Furthermore, new information and changes in legislation may necessitate a re-interpretation of the report in whole or in part after its original submission. The report is provided for sole use by the client and is confidential to them and their professional advisors. No reliance whatsoever is provided to any party other than the client unless otherwise agreed.

INFORMATION SOURCES

Current and Historical Land Use

This section establishes the former and current uses of the site, which could have caused contamination. Details of the site location, the current and proposed site uses have been provided by the client.

Information about the history of the site has been obtained through an inspection of historical maps at 1:10,000, 1:2,500 and 1:1,250 scales and historical aerial photographs (where available). The accuracy of maps cannot be guaranteed, and it should be recognised that different conditions on-site may have existed between, and subsequent to, the map survey dates.

Regulatory Records

Regulatory records including landfills, pollution incidents ('major' and 'significant' only), industry authorisations and licensed water abstractions are derived from information purchased from Landmark Ltd (unless otherwise specified).

Environmental Setting

The geological sequence underlying the site and the approximate depths of strata are provided by maps published by the British Geological Survey (BGS) 1:50,000 scale and available borehole records held by the BGS.

The hydrogeological classification is obtained from Groundwater Vulnerability mapping by National Resources Wales (NRW). The vulnerability of groundwater is determined from this mapping and geological information.

The location of surface watercourses is obtained from an inspection of current OS maps. Flood risk details and information on groundwater SPZs are obtained from readily available NRW information published on-line and supplied by Landmark Ltd.

Details of sensitive ecosystems/habitats and coal mining areas are supplied by NRW and the Coal Authority respectively via Landmark Ltd and inspection of NRW interactive mapping and the MAGIC website.

Radon is a radioactive gas produced naturally by certain types of geology. This report uses the Indicative Atlas of Radon in England and Wales (2007) produced by the Health Protection Agency (HPA) and the British Geological Survey (BGS) to determine whether the site is located in an area at risk from radon gas. Where potential issues are identified, a site-specific radon report is obtained from the HPA and BGS to provide a more accurate estimate of the probability of the site being affected by radon gas ingress.

Annex B
Envirocheck Land Data Report

Annex C
Historical Maps and Historical Aerial Photographs

Annex D
Site Plans (Existing and Proposed SUP Plans)