Land Contamination Preliminary Risk Assessment

Cwrt Sart Comprehensive School

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Neath Port Talbot
Castell-nedd Port Talbot
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EXECUTIVE SUMMARY

Neath Port Talbot County Borough Council's (NPTCBC) Pollution Control Team have been commissioned by NPTCBC Environment Directorate (hereafter known as the Client) to produce a Land Contamination Preliminary Risk Assessment for Cwrt Sart Community Comprehensive.

The site is approximately 3.7ha; it is currently occupied by Cwrt Sart Community Comprehensive School. The site is centred at NGR 274440, 195420 and is accessed from Old Road in Briton Ferry, Neath. The site comprises a mixture of school buildings, tarmacked surfaces, playing fields and astroturf tennis courts. The surrounding area consists mainly of residential properties and there are some small retail premises nearby.

The bedrock geology underlying the site comprises the Hughes Member. The superficial geology map indicates that the site is underlain by Tidal Flat Deposits in the north and northwest and by Devensian Till in the south and southwest.

The preliminary risk assessment has identified plausible pollutant linkages posing a moderate to high risk to human health and a moderate/low risk to controlled waters at the site. It is recommended that an intrusive investigation is carried out to establish the presence or not of contamination.

A plausible pollutant linkage has been identified from ground gas associated with both onsite and offsite sources, it is recommended that gas monitoring and risk assessment be carried out. Gas monitoring should comply with current guidance and it is worth noting at this stage that it is often necessary to carry out the monitoring over a number of months, this should be built into the timescales for the development.

Asbestos has been identified in a number of locations and during demolition this will need to be removed by a licensed contractor.

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1.0 INTRODUCTION

1.1 General

Neath Port Talbot County Borough Council's (NPTCBC) Pollution Control Team have been commissioned by NPTCBC Environment Directorate (hereafter known as the Client) to produce a Land Contamination Preliminary Risk Assessment (PRA) for Cwrt Sart Comprehensive School, hereafter known as "the site".

The current regime for contaminated land was introduced by Part 2A of the Environmental Protection Act 1990. Part 2A aims to deal with the legacy of contaminated land in the UK by addressing serious contamination that poses a risk to human health and/or the environment. In support of Part 2A, land contamination is a material consideration within the planning regime. Planning Policy Wales says that Local Planning Authorities must make provision for dealing with contamination both within their development plans and on individual applications. This requirement is addressed within Neath Port Talbot's Local Development Plan, and in particular POLICY EN8 which states that planning will not be permitted unless the risks of contamination have been fully assessed and addressed by the applicant.

In accordance with CLR 11 The Model Procedures for the Management of Land Contamination a tiered approach to risk assessment is carried out starting with a PRA. The purpose of the PRA is to identify any previous contaminative land uses which have the potential to generate sources of contamination, identify potential receptors and any pathways. The PRA will then define the preliminary Conceptual Site Model (CSM) and establish whether there are any potential contaminant linkages requiring further risk assessment. The objective of this phase is to identify and assess potential site hazards and to determine what actions if any are required for subsequent phases of work.

1.2 Scope of Works and Report Objectives

The aim of this PRA report is to undertake an initial assessment of geo-environmental issues relating to the site and proposed development. This report involved the desk study review of all available third party information relating to the site including published geological and historical maps, Coal Authority report, Envirocheck database obtained from Landmark, previous site investigation data and regulatory data. A site walkover has also been completed by NPTCBC Pollution Control Team.

Specific objectives of the report are as follows:

- To assess land contamination issues and environmental hazards associated with the history of the site and surrounding areas that may affect the proposed development;
- To assess the environmental setting of the site, including geology, hydrogeology, hydrology and the presence of any sensitive ecosystems;
- To develop an initial CSM and undertake a preliminary risk assessment in relation to land contamination.

The methods used in this report were carried out in accordance with the contract specification and current UK guidance.

1.3 Report Limitations

This desk study is based on information made available to NPTCBC Pollution Control Team and includes information provided by third parties. The information provided by third parties has not been independently verified by the Pollution Control Team, unless otherwise stated.

The conclusions presented within this report are limited by the uncertainties inherent in any site investigation and data obtained from third parties. The possibility that there may be different ground conditions, isolated hotspots not identified in the currently available data set or the existence of other important information sources which have not been considered cannot be discounted.

This report is for the sole use of the Client and their contractors and shall not be relied upon or transferred to any other parties without the express written consent of the Pollution Control Team. Any unauthorised third parties who rely on the contents of this report do so at their own risk. The Pollution Control Team owes no duty of care or skill. The document has been prepared as a commercial in confidence document to protect the interests of NPTCBC.

The advice given in this report with respect to contamination is based on guidelines available at the time of writing.

A geotechnical assessment has not been made as part of this report.

2.0 BACKGROUND INFORMATION REVIEW

2.1 Site Location and Description

The site is approximately 3.7ha; it is currently occupied by Cwrt Sart Community Comprehensive School. The site is centred at NGR 274440, 195420 and is accessed from Old Road in Briton Ferry, Neath. The site comprises a mixture of school buildings, tarmacked surfaces, playing fields and astroturf tennis courts. A site location plan and site boundary plan are included in Appendix A. The surrounding area consists mainly of residential properties and there are some small retail premises nearby.

Development plans were not finalised at the time of writing, however, this report is to be used as part of the tender process to appoint a design and build contractor and then in the submission of a planning application for demolition of all buildings and construction of a new primary school with a mix of playing fields and artificial surfacing.

2.2 Observations from Site Walkover

A site walkover was carried out on the 11th March 2016 by NPTCBC Pollution Control Team; full details of the observations made during this walkover are

presented in Appendix B along with photographs of the site. At the time of the walkover the school was open.

The site is mostly flat with some embankments, particularly around the large playing field, which was at a lower level to much of the surrounding land. There were a number of gates and access points around the school boundary, cars and other vehicles were parked within the site and easy access was available. The site consists of a number of large school buildings, it was apparent that the buildings in the south eastern corner of the site were older than the main buildings in the centre. Basement doors were noted below ground level in the older part of the school, access to these areas was not available at the time of the visit.

There are 3(no.) boiler houses on site, their locations are marked on the annotated walkover plan in Appendix B. A low building was noted near to the older part of the school, the caretaker explained that it was the coal shed for the boiler house historically. Another building near to the main school entrance was also noted; the caretaker explained that this was the gas meter. An electricity substation was observed adjacent to the north eastern boundary facing onto Old Road.

A marshy piece of land was noted within a fenced off area in the middle of the northern part of the site, marked on the annotated walkover plan in Appendix B. There was an area of wooded land which is currently used as a nature area for the school, Japanese Knotweed was noted within this area, and was also observed in a small fenced off area on the western boundary.

A number of manholes were observed across the site and a large deep chamber was observed near to the southern boundary, a drainage survey for the site was not available at the time of writing, but available service plans are included in Appendix A.

In the location of the reception entrance there were a number of low walls which appeared to be the remains of a building, within the remains there were a number small built areas, this was a greenhouse previously.

Made ground was observed in some locations. A concrete plinth with metal protruding was observed in the north western tip of the site within an enclosure.

2.3 Site History

The historical land uses of the site and the surrounding areas have been identified by reviewing Ordnance Survey (OS) historical maps. Copies of the maps are included in Appendix C. The main land uses have been summarised in Table 1.

Table 1: Historical Land Use

Map Source	On Site	Adjacent Land
Published Date: 1878 **Source: 1:2500** **Epoch 1**	The site is shown as fields with trees around, a drain runs through the centre of the site and a tramway along the western boundary. Garreg Hir is marked in the south of the site.	The surrounding area is mainly fields with some small areas of housing. The Great Western Railway runs approximately 95m to the west. A line feeding into the GWR runs approximately 390m south of the site. A feature runs towards the western boundary of the site from a north western direction, possibly a canal it is indicated as marshy and feeds into the Neath Canal. Some small quarries are located approximately 300m north, northeast and southeast of the site.
Published Date: 1884 **Source: 1:10560** **Epoch 1**	The site remains unchanged.	The surrounding area remains largely unchanged. A well is noted approximately 30m north.
Published Date: 1899 **Source: 1:2500** **Epoch 2**	The site remains unchanged.	A row of houses have appeared approximately 10m to the west of the site. The quarry to the north has extended. The railway to the south is now labelled as the South Wales Mineral Railway. Court Sart Station has appeared approximately 120m southwest. The Great Western Railway Locomotive and Carriage Repairing Works has appeared approximately 120m northwest. The railway line now picks up the path of the marshy feature.
Published Date: 1900 **Source: 1:10560** **Epoch 2**	The site remains unchanged.	The surrounding area remains largely unchanged.

Map Source	On Site	Adjacent Land
Published Date: 1918 Source: 1:2500 Epoch 3	A school and infant school have appeared in the southern part of the site.	There has been much residential development in the area, particularly to the west and south of the site. A large building has appeared approximately 200m to the north which is labelled New Graded Infirmary. 195m to the west, beyond the GWR, an old colliery is now labelled.
Published Date: 1921 Source: 1:10560 Epoch 3	The site remains unchanged.	The surrounding area remains largely unchanged.
Published Date: 1935 Source: 1:2500 Epoch 4	The site remains unchanged.	An area of marsh land and a possible spoil heap has appeared adjacent to the northern boundary of the site. A building labelled nurses home is now 120m north of the site. The infirmary is now labelled Penrhiwtyn Infirmary. A row of houses have appeared next to the southeast boundary of the site.
Published Date: 1935 Source: 1:10560 Epoch 4	.The site remains unchanged.	The surrounding area remains largely unchanged.
Published Date: 1951 Source: 1:1250 Epoch A5	The site is largely unchanged, a refuse heap is located to the north of the site and encroaches slightly into the site boundary.	A refuse heap is marked to the north of the site, adjacent to which there are now some allotments. A pond is marked approximately 190m northeast. The hospital has expanded and is now labelled Neath General Hospital.
Published Date: 1952 Source: 1:2500 Epoch A5	The site remains unchanged.	Some new residential development has occurred approximately 300m to the west of the site, the rest of the surrounding area remains largely unchanged.
Published Date: 1959 Source: 1:1250 Epoch B6	The area to the northwest of the site including the refuse heap appears to have been landscaped.	The refuse heap seems to have been landscaped and a pond has appeared approximately 40m to the north. Hen Gwrt County Primary School is now labelled approximately 240m west of the site.
Published Date: 1967 Source: 1:1250 Epoch C7	The site remains largely unchanged.	The surrounding area remains largely unchanged.
Published Date: 1970 Source: 1:2500 Epoch B6	The site remains largely unchanged.	The surrounding area remains largely unchanged.
Published Date: 1980 Source: 1:10000 Epoch M5	A large school building has appeared in the middle of the site.	The surrounding area remains largely unchanged.
Published Date: 1992 Source: 1:10000 Epoch M7	The site remains largely unchanged.	A large building has appeared approximately 12m to the north of the site. It is unclear from the map whether this building is part of the hospital or not. Approximately 220m east a covered reservoir is marked.

3.0 ENVIRONMENTAL SETTING

An Envirocheck Report was obtained for the site, details of the report are summarised in this section and the full Envirocheck datasheets and maps can be found in Appendix D.

3.1 Superficial Deposits and Geology

The geological extracts from the British Geological Survey (BGS) Digital Geological Map of Great Britain at 1:10,000 scale were consulted and identified that the artificial ground and landslip map shows made ground encroaching onto the northern boundary of the site. The superficial geology map indicates that the site is underlain by Tidal Flat Deposits in the north and northwest and by Devensian Till in the south and southwest. The bedrock and faults map indicates the bedrock geology underlying the site comprises the Hughes Member which is made up of *"green-grey, lithic arenites ("Pennant sandstones"), with thin mudstone/siltstone and seatearth interbeds, and mainly thin coals"* (BGS, 2016).

3.1.1 Ground Stability Hazards

The information contained within the Envirocheck Report regarding possible ground stability hazards is contained in Table 2.

Table 2 Ground Stability Hazards

Hazard	On-site	Within 250m
Collapsible Ground Stability Hazard	Very low	
Compressible Ground Stability Hazard	Moderate	Moderate
Ground Dissolution Stability Hazard	No hazard	
Landslide Ground Stability Hazard	Low	Moderate
Running Sand Ground Stability Hazard	Moderate	Moderate
Shrinking or Swelling Clay Ground Stability Hazard	Very low	

3.1.2 Hydrogeology

The nearest surface water feature is 28 metres northwest of the site. There are no groundwater source protection zones either on site or within 1km of the site boundary.

The Envirocheck information states that the Bedrock Aquifer is designated as a Secondary A Aquifer and the Superficial Aquifers are designated as follows;

- Tidal Flat Deposits – Secondary A Aquifer
- Devensian Till – Unproductive Strata

Secondary A aquifers are defined as permeable layers capable of supporting water supplies at a local rather than a strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formally known as minor aquifers. Unproductive strata are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

The Groundwater Vulnerability information was obtained from the Environment Agency Groundwater Vulnerability Maps, 1:100,000 scale, sheet 35 West Glamorgan. The drift deposits are classified as having low permeability. The soils beneath the site are classified as having a high leaching potential.

There are no groundwater abstractions recorded within 1km of the site boundary.

3.2 Hydrology

3.2.1 Watercourses

The nearest water course is approximately 28 metres northwest of the site. It is known locally as the Grandison Brook and runs towards the River Neath which is located approximately 1280 metres to the southwest. The Neath Canal is located approximately 850 metres to the west of the site.

3.2.2 Discharges

The Envirocheck Report lists 7(no.).current discharge consents within 1km of the site, the nearest being approximately 589 metres to the north of the site and is for sewage discharges from a Dwr Cymru pumping station.

3.2.3 Flood Risk

The NRW flood maps for the site indicate that the site is at risk of extreme flooding from rivers or see without defences, the area does not benefit from flood defences.

3.2.4 Surface Water Sensitivity

There are no licensed surface water abstractions within 250m of the site; the closest is located approximately 1599 metres away.

3.3 Database Search

A database search was carried out as part of the Envirocheck report obtained from Landmark. The search identifies site sensitivity issues that may affect the development of the site. The Envirocheck datasheets are summarised in Table 3 along with an assessment of whether they require further assessment within the CSM.

Table 3 Envirocheck Database Search Summary

Data Type	On Site	0-250m	251-500m	501-1km	Potential Issue for Site Use? Yes/No/Comments
Agency & Hydrological					
Contaminated Land Register Entries and Notices					
Discharge Consents				13	No, the nearest is 589m from the site and therefore considered unlikely to impact the site.
Enforcement and Prohibition Notices					
Integrated Pollution Controls					
Integrated Pollution Prevention And Control		1		2	No, the closest is registered as 176m from the site, it says it has been superseded by a variation, the address given is a residential street with no obvious industrial uses.
Local Authority Integrated Pollution Prevention and Control				1	No, due to distance from the site this is not considered to pose a risk.
Local Authority Pollution Prevention and Controls				3	No, due to distance from the site these are not considered to pose a risk.
Local Authority Pollution Prevention and Controls Enforcement					
Pollution Incidents to Controlled Waters	1	4	7	5	Yes
Prosecutions Relating to Authorised Processes				1	No, due to distance from the site this is not considered to pose a risk.
Prosecutions Relating to Controlled Waters					
Registered Radioactive Substances			7		No, due to distance from the site this is not considered to pose a risk.
River Quality					
River Quality Biology Sampling Points					
River Quality Chemical Sampling Points					
Substantiated Pollution Incident Register			1	1	No, due to distance from the site this is not considered to pose a risk.
Waste					
BGS Recorded Landfill Sites				1	No, due to distance from the site this is not considered to pose a risk.
Historical Landfill Sites				1	No, due to distance from the site this is not considered to pose a risk.
Integrated Pollution Control Registered Waste Sites					

Data Type	On Site	0-250m	251-500m	501-1km	Potential Issue for Site Use? Yes/No/Comments
Licensed Waste Management Facilities (Landfill Boundaries)				2	No, due to distance from the site this is not considered to pose a risk.
Licensed Waste Management Facilities (Locations)				3	No, this operated as a clinical waste transfer station and the permit has now been surrendered.
Local Authority Recorded Landfill Sites				2	No, due to distance from the site this is not considered to pose a risk.
Registered Landfill Sites				2	No, due to distance from the site this is not considered to pose a risk.
Registered Waste Transfer Sites		2		1	Yes
Registered Waste Treatment or Disposal Sites		1			Yes
Hazardous Substances					
Control of Major Accident Hazards Sites (COMAH)					
Explosive Sites					
Notification of Installations Handling Hazardous Substances (NIHHS)					
Planning Hazardous Substance Consents					
Planning Hazardous Substance Enforcements					
Industrial Land Use					
Contemporary Trade Directory Entries		6	3	20	Yes
Fuel Station Entries				2	No, due to distance from the site this is not considered to pose a risk.

3.3.1 Proximity to Historical or Active Landfills

The Envirocheck report identifies 2 Local Authority recorded landfills within 1km of the site. However, it does not highlight the fact that a refuse tip is marked within the northern site boundary on the historical maps.

3.3.2 Radon Report

The site is not within a radon affected area.

3.3.3 Protected Sites and Ecosystems

The Eaglebush Valley Local Nature Reserve is located approximately 808 metres north of the site. Due to the distance from the site contamination originating from the subject site is not considered to pose a risk to this sensitive site.

3.3.4 Cultural Heritage

The Carreg Hir Standing Stone is located within the site boundary. Information held by Neath Port Talbot CBC that has been provided by Cadw does not suggest that the standing stone is a Scheduled Ancient Monument, however, due to its historic value this stone should be considered as a potentially sensitive receptor at this stage.

3.4 Previous Site Investigations

At the time of writing no previous site investigations were available for the site, however, reports were identified for the adjacent Former Neath Hospital and the IMO Car Wash Site and Land Adjoining.

Former Neath Hosptial – Report written by Integral Geotechnique entitled Neath General Hospital – Phase One dated February 2004. Made ground was encountered across the site, logs record brick, concrete, metal, wood, plastic, ash and slag amongst the made ground. The report identifies elevated heavy metals and Polycyclic Aromatic Hydrocarbons (PAHs) onsite and recommended that 600mm of clean soil was used in all gardens. Gas monitoring was carried out as part of the assessment and identified carbon dioxide up to 1.7% volume, a characteristic situation 2 was applied an gas protection measures were required in the buildings.

IMO Car Wash Site and Land Adjoining – A number of reports were written by Jacobs on behalf of NPTCBC. In June 2005 United Utilities PLC identified hydrocarbon contamination when they were excavating a service trench in the area. The source was identified as the former Petrol Filling Station on Pantyhoel Road in Briton Ferry. Subsequent site investigation also carried out

by Jacobs found hydrocarbon contamination in the soil and groundwater, however, they concluded that there were no significant ongoing sources of contamination and therefore that no significant pollutant linkages were present, no further action was taken with regard to Part 2A.

4.0 PRELIMINARY RISK ASSESSMENT

A geotechnical assessment has not been undertaken for this site.

A Coal Authority Report was requested for the site, a copy of which is included in Appendix E. The report states that the site is not within the likely zone of influence of any past or present underground or surface coal workings. The site is not in an area where the Coal Authority has granted or plans to grant a licence to remove coal using underground methods. It is not in an area likely to be affected by any planned future underground coal mining, however, the Coal Authority states that reserves of coal exist in the local area that could be worked at some point in the future.

In order to further assess the contaminated land impacts associated with the site an initial CSM has been developed. The CSM identifies all possible receptors, potential contamination and contaminant migration pathways, and shows the possible relationships between them (potential contaminant linkages), taking into account the proposed uses of the site. The CSM is based on the collection of all desk based information and the findings of the site walkover previously discussed.

4.1 Potential Contamination Sources

Table 4 is a screen of industrial uses and where relevant an explanation of why sites have not been taken forward for consideration with the CSM is also provided. Those highlighted in green require further assessment.

Table 4 Screen of industrial uses

Industrial Use	Distance	Direction	Potential Source?	Why?
Boiler houses, coal sheds and fuel tanks	Onsite	N/A	Yes	Potential onsite source of contamination
Refuse heap	Onsite	N/A	Yes	Potential onsite source of contamination
Made ground	Onsite	N/A	Yes	Potential onsite source of contamination
Electrical substation	Adjacent	North east	Yes	Potential source adjacent to the site
Infilled Well	30m	North	Yes	Yes, potential offsite gas risk if the well has been infilled
Railway	95m	West	No	Railway lines and stations are generally associated with more localised contamination than such uses as engineering works or sidings. Due to the distance from the site the railway land is considered unlikely to pose a risk to the site.
Hospital	200m	North	No	Due to the distance it is considered unlikely that this site poses a risk to the site
Quarries	300m	North	No	Due to the distance it is considered unlikely that these sites pose a risk to the site, however, the potential gas risk will be addressed by the consideration of the onsite refuse heap.

Fuel tanks have been included with the boiler house and coal sheds because it is possible that boilers would have been oil fired at some point prior to the introduction of gas, however, if they were present their locations are unknown. It is assumed that they would have been in close proximity to the boiler houses.

A refuse heap was located to the north of the site and encroaches slightly into the northern boundary. A housing estate now exists on the main part of the refuse heap known as Harvard Jones Close. Enquiries were made to NHBC regarding ground conditions during the construction of this housing estate. Emma Jones responded as follows;

"A 2002 site investigation report does refer to a refuse heap in the southern area of larger hospital site. In brief - the report details suggest this was a low lying marshy ground with up to 5m of peat present. This marshy area was subsequently filled and even though labelled refuse it appeared to be ash and other inert & reworked material. Report notes elevated metals & PAHs, site underwent significant re-profiling & generally a 2m turnover to remove remnant

structures, most areas were either reduced in level or built up to suitable development plateaux. Supp works carried out on each phase which included contamination testing & 600mm remedial capping was applied. Validation was received on a plot by plot basis. This was all done under NHBC building control services." (Jones, 2016)

Pollution incidents have been identified onsite and nearby. The onsite incident refers to pollution from a cesspit contents, it occurred 22 years ago as did the other incidents and are considered unlikely to still have an impact on the site. However, if there is a cesspit on site this will need to be considered within the CSM. This will be clarified when the drainage survey for the site is received. It is possible that the marshy area identified during the walkover survey could be a cesspit, but this will need to be confirmed.

An asbestos survey has been carried out at the site and is included in Appendix F. Asbestos was identified in various locations on site and will need to be considered within the CSM.

The remains of a greenhouse were noted during the walkover survey, it is probable that herbicides and pesticides were used and therefore they should be considered as a potential source of contamination within the CSM.

Industry Profiles were produced by the Department of the Environment (DoE) to *"provide developers, local authorities and anyone else interested in contaminated land with information on the processes, materials and wastes associated with individual industries"* (DoE, 1995). Relevant industry profiles were identified and are listed in Table 5, along with a list of the potential contaminants of concern associated with the industries. Where possible industry profiles have been used, however, where they are not available this is indicated and contaminants of concern are based on best available information for that land use.

Table 5 Contaminants of concern

Process	Contaminant
Boiler houses, coal shed and fuel tanks (no industry profile available)	Hydrocarbons
	PAHs
	Asbestos
Refuse heap and made ground (Waste recycling, treatment and disposal sites; landfills and other waste treatment or waste disposal sites)	Ground gas
	Metals, semi metals and non-metals
	Inorganic chemicals
	Asbestos
	Chlorinated hydrocarbons
	PCBs
	Hydrocarbons
	PAHs
Infilled well (no industry profile available)	Ground gas
Electrical substation (Engineering works; electrical and electronic equipment manufacturing works (including works manufacturing equipment containing PCBs))	PCBs
	Hydrocarbons
Historical spill of hydrocarbons	Hydrocarbons
	PAHs

4.2 Potential Receptors

The Contaminated Land Statutory Guidance defines a receptor as *"something that can be affected by a contaminant, for example, a person, an organism, an ecosystem, property or controlled waters"* (WG, 2012). The following section details the receptors relevant to this site and the proposed end use, with consideration to the type of ecological and property receptors set out in the statutory guidance.

4.2.1 Human Health Receptors

Generic land use scenarios are not available for school land uses, the site will be redeveloped into a primary school. It is common for primary schools to have small gardens and allotments and as such the land use scenario is not dissimilar to a residential land use, and exposure pathways are considered to

be similar. It is therefore considered prudent to adopt a conservative approach and a residential with gardens land use scenario will be used at this stage. The critical receptor for a residential land use scenario is the 0-6 year old female child. This is conservative for a primary school, however, in the absence of definitive development plans it is considered appropriate to adopt this conservative approach as often primary schools can include nurseries and preschools. This receptor could be refined at future stages in the risk assessment process if required.

Construction workers are a potential receptor to contamination but the risk can usually be managed through good practice and PPE particularly as significant onsite sources have not been identified. Therefore, construction workers will not be included in the preliminary CSM.

4.2.2 Controlled Waters Receptors

The controlled waters receptors identified for the site are the secondary A aquifer beneath the site and the nearby unnamed stream located 28 metres north west of the site. The Neath Canal is located approximately 850 metres to the west of the site and the River Neath is located approximately 1280 metres to the southwest.

4.2.3 Other Receptors

The desk study has not identified any potentially sensitive ecological receptors likely to be affected by the site. An ancient monument, namely Carreg Hir, is present on site, although the records do not indicate that this is a Scheduled Ancient Monument it should be considered a sensitive receptor at this stage.

Ground gas has been identified which can be explosive and as such future onsite buildings are considered a potential receptor.

4.3 Potential Pathways

A pathway is a route by which a receptor may be affected by contamination. The exposure pathways associated with a residential with gardens end use are;

- Inhalation of vapours and dust (indoor and outdoor)
- Ingestion of soil and dust (indoor and outdoor)
- Dermal contact with soil and dust (indoor and outdoor)
- Consumption of homegrown produce and the soil attached
- Gas ingress into buildings

The underlying strata is a secondary A aquifer and as such the groundwater beneath the site is a potential receptor. A watercourse is located 28m from the site which ultimately feeds into the River Neath, the watercourse is known locally as the Grandison Brook. The watercourse is culverted beneath the site, further information including a location plan for the culvert and the brook is provided in Appendix G. The Neath Canal is not considered to be a receptor because at the location where the watercourse crosses the canal it is culverted beneath the canal. There are no water abstractions within 1km of the site.

Groundwater onsite is assumed at this stage to be relatively shallow because of the previous drainage ditches shown on the historical maps and the flooding risk applied to the site. There is also anecdotal information in Appendix G suggesting that the groundwater is very shallow. Although the drift deposits are classed as having a low permeability the soils are classed as having a high leaching potential and if groundwater is shallow contaminants could leach into the underlying aquifer.

The relevant controlled waters pathways for the site are;

- Leaching of contamination from the soils into underlying aquifer
- Dissolved phase migration of contaminants towards the surface water feature

Pathways to ecological receptors do not need to be considered as none have been identified by the desk study.

The ancient monument on site has the potential to be impacted by contamination; the pathway will be chemical attack of the structure, which is installed on a concrete plinth.

4.4 Summary Conceptual Site Model

In order for contamination to affect a receptor there must be a linkage by which the receptor can be exposed to the source of contamination, otherwise known as a contaminant linkage. For a contaminant linkage to exist all elements of the contaminant-pathway-receptor linkage must be in place. In order to assess the likely presence of any contaminant linkages for the site a CSM has been developed.

Where plausible contaminant linkages have been identified, a risk assessment based on the consequence and probability of that risk occurring has been carried out. The risk assessment is in general accordance with the methodology contained within Ciria C552 Contaminated Land Risk Assessment – A good practice guide, further details of which are presented in Appendix H.

A medium hazard consequence has been applied to all human health pollutant linkages, with the exception of ground gas. This is because there is no evidence to suggest an acute risk from contamination on site. Probability of occurrence is assumed to be likely which results in a moderate risk to human health from the identified contaminants of concern. Pollutant linkages that pose a moderate risk require investigation to clarify the risk and to determine whether or not remedial works are required. In the case of ground gas a severe hazard consequence category has been applied because of the potential explosive risk, which has resulted in a high risk to human health from ground gas.

As previously explained it is assumed that risk to construction workers will be managed by good site practices and PPE.

A mild hazard consequence has been applied to potential controlled water receptors because there are no abstractions, source protection zones, bathing

waters, recreational uses or other sensitive uses of the waters in the vicinity of the site. A likely probability has been assumed which has resulted in a moderate to low risk of contamination of controlled waters. It is considered prudent to carry out an investigation to identify the presence or otherwise of contamination likely to impact controlled waters.

A mild hazard consequence has been applied to pollutant linkages likely to impact buildings and the ancient monument and a low probability of occurrence has been applied because significant contamination is not expected on the site based on the former uses. The ancient monument is installed on a concrete plinth and is not considered likely to be impacted by contaminants in the ground.

Figure 1 Conceptual Site Model

Contaminant	Pathway	Receptor	Hazard Consequence	Probability of Occurrence	Potential Risk
Inorganic contaminants, metals and metalloids	Inhalation of dust (indoor and outdoor)	Human	Medium	Likely	Moderate Risk
	Ingestion of soil and dust (indoor and outdoor)				
	Dermal contact with soil and dust (indoor and outdoor)				
	Consumption of homegrown veg and the soil attached				
	Leaching from soils	Secondary A Aquifer	Mild	Likely	Moderate/Low Risk
	Migration of dissolved phase contaminants	Unnamed watercourse			
Organic contaminants, hydrocarbons, PAHs, herbicides, pesticides, chlorinated hydrocarbons, acids and alkalis	Inhalation of vapours and dust (indoor and outdoor)	Human	Medium	Likely	Moderate Risk
	Ingestion of soil and dust (indoor and outdoor)				
	Dermal contact with soil and dust (indoor and outdoor)				
	Consumption of homegrown veg and the soil attached				
	Leaching from soils	Secondary A Aquifer	Mild	Likely	Moderate/Low Risk
	Migration of dissolved phase contaminants	Unnamed watercourse			
	Chemical attack	Buildings and ancient monument	Mild	Low	Low Risk

Contaminant	Pathway	Receptor	Hazard Consequence	Probability of Occurrence	Potential Risk
PCBs	Inhalation of vapours and dust (indoor and outdoor)	Human	Medium	Likely	Moderate Risk
	Ingestion of soil and dust (indoor and outdoor)				
	Dermal contact with soil and dust (indoor and outdoor)				
	Consumption of homegrown veg and the soil attached				
	Leaching from soils	Secondary A Aquifer	Mild	Likely	Moderate/Low Risk
	Migration of dissolved phase contaminants	Unnamed watercourse			
Asbestos	Inhalation of fibres	Human	Medium	Likely	Moderate Risk
Ground gas	Inhalation of vapours (indoor and outdoor)	Human	Severe	Likely	High Risk
	Ingress of ground gas into buildings				
Sulphate	Direct contact	Buildings and ancient monument	Mild	Low	Low Risk

5.0 CONCLUSIONS

The preliminary risk assessment has identified plausible pollutant linkages posing a moderate to high risk to human health and a moderate/low risk to controlled waters at the site. It is recommended that an intrusive investigation is carried out to establish the presence or not of contamination.

A plausible pollutant linkage has been identified from ground gas associated with both onsite and offsite sources. Information from the NHBC suggests that the waste in the former Neath Hospital Site did not contain significant quantities of putrescible or household waste; however, as this information is not complete it is recommended that gas monitoring and risk assessment be carried out. Gas monitoring should comply with current guidance and it is worth noting at this stage that it is often necessary to carry out the monitoring over a number of months, this should be built into the timescales for the development.

Asbestos has been identified in a number of locations and during demolition this will need to be removed by a licensed contractor.

A drainage survey is required for the site, drainage could act as a pathway for contamination, but additionally it is possible that there is a cesspit on site, this must be clarified because if there is a cesspit it will need to be considered within the CSM.

Risk to construction workers should be managed at the site through the provision of appropriate Personal Protective Equipment (PPE) and the adoption of safe working practices as outlined in the CIRIA document 132 - "A Guide for Safe Working on Contaminated Sites".

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Appendices

Appendix A Site Plans

Appendix B Walkover Survey

Appendix C Historic Maps

Appendix D Envirocheck Report

Appendix E Coal Authority Report

Appendix F Asbestos Survey

Appendix G Drainage Information

Appendix H Conceptual Site Model Matrix