

Appendix G.1: Historical Development of the Site and Surrounding Area

Dates	Relevant Historical Information
<p>Historical County Series 1878 – 1987 (1:2,500)</p> <p>Historical County Series 1885 (1:10,560)</p>	<p>Historical maps indicate that the Site is undeveloped, being largely occupied by mudflats with a small area of shingle in the northernmost region of the Site.</p> <p>The surrounding land is also undeveloped, being occupied by mudflats, agricultural fields and moors (Sully Moors approximately 250m to the northeast and Sheeping Moors approximately 500m to the northeast). Approximately 400m to the north of the Site, the River Cadoxton runs in a northeast-southwest orientation towards the Bristol Channel, which is situated approximately 370m to the south of the Site.</p> <p>Barry Island is located approximately 600m to the southwest of the Site.</p>
<p>Historical County Series 1900 (1:2,500)</p> <p>Historical County Series 1901 (1:10,560)</p>	<p>The Site is no longer referred to as mudflats as a result of the construction of breakwaters approximately 400m to the southwest of the Site and 250m to the southeast of the Site. Barry Docks was established in 1884 consisting of 3 basins referred to as Dock No.1, Dock No.2 and Dock No.3. These docks are located approximately 450m to the west of the Site, 100m to the north of the Site and 350m to the southwest of the Site, respectively. The material excavated in order to create the basins was potentially deposited on the Site and adjacent areas to aid in the reclamation of the land.</p> <p>By 1900, the dockland is served by many railway lines and sidings, including a line that runs immediately along the north western Site boundary. Where the sidings meet with the docks, coal tips are present. Between the sidings of Dock No.1 are a number of commercial / industrial units.</p> <p>The construction of the docklands has altered the natural course of the Cadoxton River which now forms marshland 1km to the north of the Site. The Cadoxton Brook has formed 280m to the east of the Site flowing in a south westerly direction towards the Bristol Channel.</p> <p>Beyond the dockland area, 650m to the northwest of the Site, former agricultural land is now occupied by a residential area.</p> <p>Approximately 850m to the northeast of the Site lies a timber pond, beyond which a second, larger timber pond is under construction (located on the former moor land). A hydraulic engine house has been constructed approximately 700m to the east of the Site.</p>
<p>Historical County Series 1920 (1:2,500)</p> <p>Historical County Series 1921 (1:10,560)</p>	<p>By 1920, there has been further development of the railway network surrounding the Site. The railway line which previously ran along the north western Site boundary has been developed into sidings which extend approximately 150m into the Site. An additional railway line runs through the centre of the Site, parallel to the sidings and terminates at the north eastern Site boundary.</p> <p>Approximately 200m to the north of the site is a transit shed and another commercial / industrial unit referred to as Atlantic Mills.</p> <p>The large timber pond to the north of the Site that was previously under construction is now complete and operational. In addition, a large freshwater reservoir is situated immediately to the east of this feature.</p> <p>Allotment Gardens and an old quarry are shown approximately 600m to the east of the Site.</p> <p>The Cadoxton Brook has been renamed the Cadoxton River.</p>
<p>Historical County Series 1938 – 1947 (1:10,560)</p> <p>Historical County Series 1943 (1:2,500)</p>	<p>By 1938, the railway sidings on-Site have been further extended, now reaching approximately 250m within the north western Site boundary.</p> <p>A number of large units have been constructed around Dock No.2. Several of these units are referred to as transit sheds, including one 40m to the west of the Site. Although the remaining units are not labelled with this function, their size suggests that they would be associated with commercial / industrial activities. The establishment of commercial / industrial units also extends to the land to the east of Cadoxton River, which is referred to as a trading estate.</p> <p>A Wagon Works has been identified approximately 600m to the north of</p>

Dates	Relevant Historical Information
<p>EnviroCheck Site Sensitivity Map</p> <p>Web-based War Archives</p>	<p>the Site between the sidings on the north bank of Dock No.2. The residential area 650m to the northwest of the Site has expanded. To the west of the Site, a fire station is identified at approximately 110m from the Site and a saw mill is indicated approximately 250m from the Site.</p> <p>During 1940-1942 there are records that the town of Barry, including the docklands, was bombed during World War II.</p> <p>A landfill site, licensed to BP Chemicals Ltd, is recorded as being operational on the Site between 1945 and 1994. Wastes permitted for deposition included industrial wastes, and Special Wastes, liquid sludge, commercial and household waste. The deposition of waste on-Site aided in the reclamation of the land.</p>
<p>Ordnance Survey Plan 1955 – 1956 (1:1,250)</p>	<p>The Site remains largely unchanged.</p> <p>The commercial / industrial units located 40m to the west of the Site and 90m to the north of the Site remain as transit sheds. The commercial / industrial units around Dock No.2 are now referred to as mills, factories and depots.</p>
<p>Ordnance Survey Plan 1963 – 1971 (1:1,250)</p> <p>Ordnance Survey Plan 1965 (1:10,560)</p>	<p>The Site remains largely unchanged.</p> <p>By 1971, a warehouse has been constructed approximately 75m from the northeast Site boundary. A tanker cleaning depot is now situated on the northern bank of Dock No.1, approximately 260m to the northwest of the Site.</p> <p>Although the water bodies associated with the timber ponds located 850m to the northeast of the Site are still present, they are no longer labelled as timber ponds. The coal tips on the railway sidings are no longer identified.</p> <p>To the west of the Site, the fire station is no longer labelled.</p>
<p>Ordnance Survey Plan 1975 (1:10,000)</p>	<p>The majority of the railway sidings that previously extended within the western Site boundary have been removed.</p> <p>A timber yard associated with the saw mill is located 250m to the west of the Site.</p> <p>A number of additional works have established in the area of the wagon works on the northern bank of Dock No. 2.</p> <p>Approximately 250m to the east of the Site, a refuse / slag heap is identified, with a smaller area of refuse / slag approximately 200m to the south of the Site. In addition, a refuse/slag heap is now located 600m to the northeast of the Site, beyond which is a works.</p> <p>A large oil terminal has established around Dock No.1 approximately 1km to the west of the Site.</p>
<p>Ordnance Survey Plan 1984 (1:10,000)</p>	<p>Further railway sidings have been removed from the Site, with just two remaining.</p> <p>In the surrounding area, many of the railway lines and sidings serving the docks have been dismantled and removed.</p> <p>The trading estate to the east of the Site beyond Cadoxton River is now referred to as Atlantic Trading Estate.</p> <p>The tanker cleaning depot 260m to the northwest of the Site is now referred to as a works.</p>

Dates	Relevant Historical Information
<p>Additional SIMs 1984 – 1992 (1:1,250)</p>	<p>By 1987, all the railway sidings have been removed from the Site. One railway line remains, running along the western Site boundary.</p> <p>Immediately adjacent to the north eastern Site boundary, a building of unknown use has been constructed.</p> <p>The refuse / slag heap formerly located 250m to the east of the Site has now extended to within 100m of the Site boundary.</p>
<p>Additional SIMs 1987-1990 (1:1,250)</p>	<p>The Site remains largely unchanged.</p> <p>The refuse / slag heap formerly located 100m to the east of the Site has now extended to within 20m of the Site boundary.</p> <p>Approximately 100m to the southwest of the Site, a depot has been identified.</p>
<p>Ordnance Survey Plan 1991 (1:10,000)</p>	<p>There are no structures located within the Site boundaries and the surface cover is referred to as scrub.</p> <p>The former timber ponds 850m to the northeast of the Site have reduced in size.</p> <p>To the east of the Site, within Atlantic Trading Estate a timber yard and a depot have been identified 750m to the east of the Site.</p> <p>To the south of the refuse / slag heap situated 20m to the east of the Site, a large pond is now identified.</p>
<p>Large-Scale National Grid Data 1993 (1:1,250)</p>	<p>The Site remains unchanged.</p> <p>A large coal yard is now located approximately 125m to the northeast of the Site.</p>
<p>10K Raster Mapping 1999 (1:10,000)</p>	<p>The Site remains unchanged.</p> <p>The commercial / industrial units surrounding the Site persist. Those units that were formerly located along the north banks of Dock No.1 and Dock No.2 have largely been removed and a small amount of residential development has taken place in these areas. The remainder of this land is rough grassland. The oil terminal operational around Dock No.1, although still present has reduced in size.</p> <p>The saw mill and timber yard to the southwest of the Site is no longer identified and the former timber ponds and reservoir 850m to the northeast of the Site have further reduced in size. The coal yard 125m to the northeast of the Site is no longer present. Fewer structures are now present on Atlantic Trading Estate. To the east of the Site, the two ponds have been removed and the refuse / slag heap has expanded to fill the space.</p>
<p>10K Raster Mapping 2008 (1:10,000)</p>	<p>The Site remains unchanged.</p> <p>To the northeast of the Site, there has been a reduction in the number of water bodies associated with the timber ponds.</p> <p>The refuse / slag heap to the south of the Site has expanded, now running adjacent to the southern boundary of the Site and meeting with the breakwaters to the south and east of the Site.</p> <p>There has been further residential development along the north bank of Dock No.1.</p> <p>Other commercial / industrial activities recorded within 500m of the Site are road haulage services, garage service, timber product production, scrap metal merchants and concrete products manufacture.</p>

Appendix G.2: Potentially Contaminative Historic Land Uses

Process/ Land use	Location ^A	Contaminant Groups Potentially Present On Site
Landfill ^B	On-Site (and off-Site adjacent to Site boundaries)	Heavy metals and metalloids (As, Cd, Cr, Pb, Hg, Cu, Ni, Zn); Organic compounds (phenols, PAHs, TPHs Inorganic compounds (cyanide, sulphates, asbestos, ammonia); Chlorinated and non-chlorinated compounds (potential range of VOCs including vinyl chloride); Ash, clinker, coal, sludge from local industries; and Hazardous ground gases (methane, carbon dioxide, hydrogen sulphide).
Dredging (potentially used for reclamation of land)	On-Site	Heavy metals and metalloids (As, Cd, Cr, Pb, Hg, Cu, Ni, Sb, Sn, Mo, Be);
Docklands (including coal and timber transport and storage)	Off-Site (40m to the west of the Site)	Inorganic compounds (chlorides, sulphates, sulphides, cyanides, asbestos,); Organic compounds (phenols, creosols, PAHs, TPHs, solvents); Pesticides; Detergents; Paint residues; and Hazardous ground gases (methane, carbon dioxide and hydrogen sulphide).
Railway Land	On-Site	Heavy metals and metalloids (As, Cd, Cr, Pb, Hg, Cu, Ni, Zn); Inorganic compounds (sulphates, asbestos); Organic compounds (phenols, creosote, PAHs, TPHs, PCBs, ethylene glycol); Chlorinated and non-chlorinated solvents; Herbicides & pesticides (e.g. atrazine, simazine, diuron, glyphosate); and Ash, clinker, coal dust.
Timber product production	Off-Site (132m to the northeast of the Site)	Heavy metals and metalloids (including Cd, Cu, Pb, Zn); Organic compounds (phenols, PAHs, TPHs, PCBs, BTEX, glycols); Inorganic compounds (including ammonium chloride, ammonium sulphate, asbestos); Chlorinated and non-chlorinated solvents (including ketones, tributyl tin) Hazardous ground gases (methane, carbon dioxide, hydrogen sulphide and various VOCs).
Coal yard	Off-Site (125m to the northeast of the Site)	Coal, coal dusts.
Road haulage services	Off-Site (218m southwest of the Site)	Heavy metals and metalloids (Cu, Zn, Pb, Cr, V); Organic compounds (PAHs, TPHs, BTEX, MTBE, TML, TEL, ethylene glycol, polymerised glycols, ethers); Inorganic compounds (e.g. asbestos, sulphur); and Chlorinated and non-chlorinated solvents (e.g. methanol, tetrachloroethylene); and Detergents.
Timber yard and saw mill	Off-Site (250m to the west of the Site)	Heavy metals and metalloids (As, Cr, Cu, Zn); Organic compounds (phenols, creosols, PAHs, TPHs, PCBs, BTEX); Inorganic compounds (asbestos, sulphate); Chlorinated and non-chlorinated solvents (e.g. pentachlorophenoxide, tributyl tin, kerosine); Herbicides & pesticides (e.g. lindane); and

		Coal, ash.
Scrap metal merchants	Off-Site (310m to the east of the Site)	Heavy metals and metalloids (As, Cd, Cr, Cu, Fe, Pb, Ni, Zn, Al, Mn, Sb, Sn); Organic compounds (phenols, PAHs, TPHs, PCBs), Inorganic compounds (chlorides, cyanides, fluorides, phosphorus, sulphates, sulphides, asbestos, ammoniacal liquors, lime); Chlorinated and non-chlorinated solvents (e.g. trichloroethylene, methyl ethyl ketone); and Calcium sulphate sludge, metal sludge.
Garage services	Off-Site (339m to the northwest of the Site)	Heavy metals and metalloids (including Pb, Cu); Organic compounds (PAHs, TPHs, BTEX, MTBE, TML, TEL, ethylene glycol, polymerised glycols, ethers); Inorganic compounds (including asbestos); Chlorinated and non-chlorinated solvents (carbon tetrachloride, paraffin, methanol and degreasing compounds); and Paints (ethyl acetate, butyl acetate, glycol ethers, zinc-rich epoxy primers, polyurethanes).
Concrete product manufacture	Off-Site (475m to the northwest of the Site)	Organic compounds (PAHs, TPHs); Inorganic compounds (including metal oxides, asbestos); Plasticisers, additives, colour pigments, glazing agents; and Furnace slag, pulverised fuel ash, lime.

^A Where more than one of the specified processes /land uses has been identified within 500m of the Site boundaries, the location at the closest distance has been recorded.

^B Contamination at landfill sites varies according to the materials deposited there. An appropriate site investigation would be necessary to determine the exact nature of contamination at the site.

Abbreviations:

PAH	Polycyclic aromatic hydrocarbons
TPH	Total petroleum hydrocarbons
MTBE	Methyl tertiary butyl ether
TEL	Tetraethyl lead
TML	Tetramethyl lead
BTEX	Benzene, toluene, ethyl benzene and xylenes
VOC	Volatile organic compounds

Appendix G.3: Conceptual Site Model

Contaminant(s)	Pathway(s)	Receptor(s)
TPHs; PAHs; VOCs including BTEX, MTBE, TML, TEL, phenols, creosols and vinyl chloride.	Ingestion, inhalation and dermal contact with contaminated soil, windblown dust and vapours.	Future Site users. Current Site users (trespassers). Neighbouring Site users. Construction workers.
	Ingestion, inhalation and dermal contact with contaminated groundwater and/or landfill leachate.	Construction workers.
	Lateral migration of aqueous, free-phase, suspended and dissolved contaminants. Surface run-off of aqueous, free-phase, suspended and dissolved contaminants.	Controlled waters (including River Cadoxton, East Breakwater Stream, Cross Breakwater Stream, Barry Docks and the Severn Estuary). Protected ecosystems (Hayes Point to Bendrick Rocks and Barry Island).
	Vertical migration of aqueous, free-phase, suspended and dissolved contaminants (including the preferential pathway created by future piling activity).	Controlled Waters (underlying minor aquifer).
Heavy metals and metalloids; Tributyl tin; PBCs, Cyanide; Glycols; Herbicides and pesticides (e.g. atrazine, glyphosate)	Ingestion, inhalation and dermal contact with contaminated soil and windblown dust.	Future Site users. Current Site users (trespassers). Neighbouring Site users. Construction workers.
	Ingestion, inhalation and dermal contact with contaminated groundwater and/or landfill leachate.	Construction workers.
	Lateral migration of aqueous, suspended and dissolved contaminants. Surface run-off of aqueous, suspended and dissolved contaminants.	Controlled waters (including River Cadoxton, East Breakwater Stream, Cross Breakwater Stream, Barry Docks and the Severn Estuary). Protected ecosystems (Hayes Point to Bendrick Rocks and Barry Island).
	Vertical migration of aqueous, suspended and dissolved contaminants (including the preferential pathway created by future piling activity).	Controlled Waters (underlying minor aquifer).
Chlorides, Sulphates, Sulphides, Fluorides, Phosphates, Ammonia compounds	Lateral migration of aqueous, suspended and dissolved contaminants. Surface run-off of aqueous, suspended and dissolved contaminants.	Controlled waters (including River Cadoxton, East Breakwater Stream, Cross Breakwater Stream, Barry Docks and the Severn Estuary). Protected ecosystems (Hayes Point to Bendrick Rocks and Barry Island).
	Vertical migration of aqueous, suspended and dissolved contaminants (including the preferential pathway created by future piling activity).	Controlled Waters (underlying minor aquifer).

Contaminant(s)	Pathway(s)	Receptor(s)
Asbestos in soil	Inhalation and dermal contact with contaminated soil and windblown fibres.	Future Site users. Current Site users (trespassers). Neighbouring Site users. Construction workers.
Components of ground gas (carbon dioxide, methane and hydrogen sulphide)	Pressure driven flow of gas through Made Ground and underlying geology. Accumulation of ground gas within basements, buildings and confined spaces. Inhalation of gas flux.	Future Site users. Neighbouring Site users. Construction workers.
Sulphates, sulphide	Direct contact with building foundations.	Future building foundations on-Site.
Heavy metals and metalloids (As, Cd, Cr, Pb, Hg, Se, Sb,); Cyanide; Phenol; Toluene; Sulphate, Sulphur; PAH; TPH	Migration of contaminants to water supply pipes leading to permeation and accelerated deterioration of pipe material and loss of water quality.	Future water supply pipes. Future site users.

Abbreviations:

PAH	Polycyclic aromatic hydrocarbons
TPH	Total petroleum hydrocarbons
MTBE	Methyl tertiary butyl ether
TEL	Tetraethyl lead
TML	Tetramethyl lead
BTEX	Benzene, toluene, ethyl benzene and xylenes
VOC	Volatile organic compounds