

Havant Thicket Reservoir Project

Environmental Statement Volume 4 - Appendices

Appendix A10 Ground Conditions

A10.6 Preliminary Conceptual Site Model Tables

Portsmouth Water Ltd.

21/08/20

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Document history

PW Revision	Status	Purpose description	Originated	Checked	Reviewed	Authorised	Date
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Client signoff

Client	Portsmouth Water Ltd.
Project	Havant Thicket Reservoir Project
Job number	5169117
Client signature / date	

Appendix A10.6 – Preliminary Conceptual Site Model Tables

Table 1 - Reservoir site (including access roads) – preliminary conceptual site models

Source	Receptor		Contaminant exposure / migration pathway	Baseline			Construction with Mitigation			Operation with Mitigation		
				Probability	Consequence	Risk Category	Probability	Consequence	Risk Category	Probability	Consequence	Risk Category
ON-SITE: Re-worked site won material used during the construction of the Upper Lake, Upper Lake Weir, Boat House and the George Canning Monument. Re-worked site material used during the channelization of unnamed watercourses. Potentially contaminated natural superficial strata from localised spills / leaks during past mechanical de-vegetation. Potentially contaminated natural superficial strata from localised spills / leaks from previously observed dumped and burnt out cars or motorbike use. Made Ground associated with the construction and operation of the B2149, Swanmore Road and Calshot Road. Infilled ground associated with two former clay pits located within the northwest and north of the Site and a former chalk pit located within the north west of the Site. Infilled ground associated with a former brickworks and clay pits located within	Human health: On-site	Current members of the public using footpaths and public rights of way	Dermal contact with and ingestion of contaminants in soils, soil-derived dusts and water. Inhalation of contaminants in soil, soil-derived dust, fibres, gas and vapours.	Unlikely	Mild	Very low risk	Receptor not present	--	--	Unlikely	Mild	Very low risk
		Current road users		Unlikely	Mild	Very low risk	Unlikely	Mild	Very low risk	Unlikely	Mild	Very low risk
		Future on-site users: reservoir operatives		Receptor not present	--	--	Receptor not present	--	--	Low likelihood ¹	Mild	Low risk
		Future on-site users: members of the public visiting the reservoir		Receptor not present	--	--	Receptor not present	--	--	Unlikely	Mild	Very low risk
	Human health: Off-site	Workers and residents in surrounding commercial and residential areas.	Dermal contact with and ingestion of contaminants in soil, soil-derived dust and water which may have migrated off-site. Inhalation of contaminants in soil, soil-derived dust, fibres and gas/vapours which may have migrated off-site.	Unlikely	Mild	Very low risk	Unlikely	Mild	Very low risk	Unlikely	Mild	Very low risk
		Visitors using the surrounding footpaths and parks.		Unlikely	Mild	Very low risk	Unlikely	Mild	Very low risk	Unlikely	Mild	Very low risk
	Controlled Waters: groundwater	Groundwater in the superficial Undifferentiated aquifer and bedrock Secondary A aquifers.	Leaching/migration of contaminants in soil to groundwater in underlying aquifers.	Unlikely	Medium	Low risk	Unlikely	Mild	Very low risk	Unlikely	Mild	Very low risk
			Migration of contaminated water through preferential pathways such as underground services, pipes and granular material to groundwater in underlying aquifers.	Unlikely	Medium	Low risk	Unlikely	Mild	Very low risk	Unlikely	Mild	Very low risk
		Groundwater in the Chalk Principal aquifer.	Leaching/migration of contaminants in soil to groundwater in underlying aquifers.	Unlikely	Medium	Low risk	Unlikely	Mild	Very low risk	Unlikely	Mild	Very low risk
			Migration of contaminated water through preferential pathways such as underground services, pipes and granular material to groundwater in underlying aquifers.	Unlikely	Medium	Low risk	Unlikely	Mild	Very low risk	Unlikely	Mild	Very low risk
	Controlled Waters:	On-site: the proposed reservoir, Hermitage Stream, unnamed	Migration of contaminated groundwater along strata and preferential pathways such as service routes or	Unlikely	Medium	Low risk	Unlikely	Mild	Very low risk	Unlikely	Mild	Very low risk

1. It has been assumed that risks to reservoir operatives will be mitigated by the implementation of appropriate health and safety measures and management including PPE.

Source	Receptor		Contaminant exposure / migration pathway	Baseline			Construction with Mitigation			Operation with Mitigation			
				Probability	Consequence	Risk Category	Probability	Consequence	Risk Category	Probability	Consequence	Risk Category	
the northeast of the Site. Potential spills / leaks during construction and operation of the reservoir and access roads. <i>A range of inorganic and organic contaminants including metals, Polyaromatic Hydrocarbons (PAHs), hydrocarbons and potential for asbestos. Fuels and oils attributed to spills from vehicles. Potential for ground gas generation including carbon dioxide and methane from infilled ground / Made Ground.</i>	surface water	watercourses, drains and the Upper Lake.	differentially permeable strata.										
			Discharge of contaminants entrained in groundwater and, or surface water run-off followed by overland flow and discharge.	Unlikely	Medium	Low risk	Unlikely	Mild	Very low risk	Unlikely	Mild	Very low risk	
		Off-site: drains, ponds and the lake within the study area.	Migration of contaminated groundwater along strata and preferential pathways such as service routes or differentially permeable strata.	Unlikely	Medium	Low risk	Unlikely	Mild	Very low risk	Unlikely	Mild	Very low risk	
			Discharge of contaminants entrained in groundwater and, or surface water run-off followed by overland flow and discharge.	Unlikely	Medium	Low risk	Unlikely	Mild	Very low risk	Unlikely	Mild	Very low risk	
	Property / services	Future on-site services and structures.	Direct contact of contaminants in soil and/or groundwater with existing and proposed structures and buried services.	Receptor not present	--	--	Unlikely	Minor	Very low risk	Unlikely	Minor	Very low risk	
			Migration of contaminated groundwater, ground gas and/or vapours along strata and preferential pathways such as service routes or differentially permeable strata.	Receptor not present	--	--	Unlikely	Minor	Very low risk	Unlikely	Minor	Very low risk	
		Existing off-site services and structures within study area including listed buildings.	Direct contact of contaminants in soil and/or groundwater with existing and proposed structures and buried services.	Unlikely	Minor	Very low risk	Unlikely	Minor	Very low risk	Unlikely	Minor	Very low risk	
			Migration of contaminated groundwater, ground gas and/or vapours along strata and preferential pathways such as service routes or differentially permeable strata.	Unlikely	Minor	Very low risk	Unlikely	Minor	Very low risk	Unlikely	Minor	Very low risk	
		Ecological	On-site: South Downs National Park, Ancient Woodland and Sites of Importance for Nature Conservation (SINCs).	Migration of contaminated waters/dust/fibres and subsequent uptake by flora or ingestion/ inhalation/dermal contact by fauna.	Unlikely	Minor	Very low risk	Unlikely	Minor	Very low risk	Unlikely	Minor	Very low risk
			Off-site: South Downs National Park, Ancient Woodland and SINCs		Unlikely	Minor	Very low risk	Unlikely	Minor	Very low risk	Unlikely	Minor	Very low risk
OFF-SITE:	Human health:	Current members of the public using footpaths and public rights of way.	Dermal contact with and ingestion of contaminants	Unlikely	Mild	Very low risk	Unlikely	Mild	Very low risk	Unlikely	Mild	Very low risk	

Source	Receptor		Contaminant exposure / migration pathway	Baseline			Construction with Mitigation			Operation with Mitigation		
				Probability	Consequence	Risk Category	Probability	Consequence	Risk Category	Probability	Consequence	Risk Category
Fuel station 84m east of the Site. Made Ground of unknown provenance used for the infilling of surrounding brick and clay pits located between 50m and 400m to the south east of the Site as well as potentially contaminated ground associated with the operation of the pits, brickfields and associated brickworks. Made Ground and potentially contaminated groundwater associated with Dunsbury Hill Farm historical landfill is located adjacent to the northwest of the Site and Padnell historical landfill located 327m west of the Site. Made Ground of unknown provenance used in construction of housing estates to the east, south and southwest of the Site. Made Ground and potentially contaminated ground associated with the former Leigh Park Estate battery located 60m south of the Site and military base located 350m south of the Site. Former allotments located 250m southeast of the Site Former smithy located 260m south east of the Site.	On-site	Current road users	in soils, soil-derived dusts and water.	Unlikely	Mild	Very low risk	Unlikely	Mild	Very low risk	Unlikely	Mild	Very low risk
		Future on-site users: reservoir operatives	Inhalation of contaminants in soil, soil-derived dust, fibres, gas and vapours.	Receptor not present	--	--	Receptor not present	--	--	Low likelihood ²	Mild	Low risk
		Future on-site users: members of the public visiting the reservoir		Receptor not present	--	--	Unlikely	Mild	Very low risk risk	Unlikely	Mild	Very low risk risk
	Controlled waters: groundwater	On-site: groundwater in the superficial Undifferentiated aquifer and bedrock Secondary A aquifers.	Leaching/migration of contaminants in soil to groundwater in underlying aquifers.	Unlikely	Medium	Low risk	Unlikely	Mild	Very low risk	Unlikely	Mild	Very low risk
			Migration of contaminated water through preferential pathways such as underground services, pipes and granular material to groundwater in underlying aquifers.	Unlikely	Medium	Low risk	Unlikely	Mild	Very low risk	Unlikely	Mild	Very low risk
		Groundwater in the Chalk Principal aquifer.	Leaching/migration of contaminants in soil to groundwater in underlying aquifers.	Unlikely	Medium	Low risk	Unlikely	Mild	Very low risk	Unlikely	Mild	Very low risk
			Migration of contaminated water through preferential pathways such as underground services, pipes and granular material to groundwater in underlying aquifers.	Unlikely	Medium	Low risk	Unlikely	Mild	Very low risk	Unlikely	Mild	Very low risk
	Controlled waters: surface water	On-site: the proposed reservoir, Hermitage Stream, unnamed watercourses, drains and the Upper Lake.	Migration of contaminated groundwater along strata and preferential pathways such as service routes or differentially permeable strata.	Unlikely	Medium	Low risk	Unlikely	Mild	Very low risk	Unlikely	Mild	Very low risk
			Discharge of contaminants entrained in groundwater and, or surface water run-off followed by overland flow and discharge.	Unlikely	Medium	Low risk	Unlikely	Mild	Very low risk	Unlikely	Mild	Very low risk
	Property / services	Future on-site services and structures.	Direct contact of contaminants in soil and/or groundwater with existing and proposed structures and buried services.	Receptor not present	--	--	Unlikely	Minor	Very low risk	Unlikely	Minor	Very low risk
	Ecological	On-site: South Downs National Park, Ancient Woodland and SINCs.	Migration of contaminated waters/dust/fibres and subsequent uptake by flora or ingestion/	Unlikely	Minor	Very low risk	Unlikely	Minor	Very low risk	Unlikely	Minor	Very low risk

² It has been assumed that risks to reservoir operatives will be mitigated by the implementation of appropriate health and safety measures and management including PPE.

Source	Receptor		Contaminant exposure / migration pathway	Baseline			Construction with Mitigation			Operation with Mitigation		
				Probability	Consequence	Risk Category	Probability	Consequence	Risk Category	Probability	Consequence	Risk Category
Made Ground and localised vehicle spills/leaks associated with a motor racing circuit located 400m north. <i>A range of inorganic and organic contaminants including metals, hydrocarbons, asbestos. Fuels and oils attributed to spills from vehicles. Ground gas generation including carbon dioxide and methane from infilled ground / Made Ground and landfills. Pesticides and herbicides attributed to former allotments.</i>			inhalation/dermal contact by fauna.									

Table 2 - Pipeline corridor - preliminary conceptual site models

Source	Receptor		Contaminant exposure / migration pathway	Baseline			Construction with Mitigation			Operation with Mitigation		
				Probability	Consequence	Risk Category	Probability	Consequence	Risk Category	Probability	Consequence	Risk Category
ON-SITE: Made Ground associated with the construction and operation of roads including Botley Drive, Highclere Avenue, Dunsbury Way, Ellisfield Road, Purbrook Way, High Lawn Way and Brunswick Gardens, Bedhampton Road and North Street. Made Ground associated with the construction of former residential properties within Bedhampton and Havant. Made Ground associated with the Southern Railway crossing the Site. Infilled ground associated with a former pond located partly on-site. Portsmouth Water Works licenced waste management facilities – Bedhampton landfill. Potential spills / leaks during construction and operation of the pipeline. <i>A range of inorganic and organic contaminants including metals, hydrocarbons, asbestos. Fuels and oils attributed to spills from vehicles. Ground gas generation including carbon dioxide and methane from infilled ground / Made Ground and landfills.</i>	Human health: On-site	Current road users	Dermal contact with and ingestion of contaminants in soils, soil-derived dusts and water. Inhalation of contaminants in soil, soil-derived dust, fibres, gas and vapours.	Unlikely	Mild	Very low risk	Receptor not present	--	--	Unlikely	Mild	Very low risk
		Pedestrians accessing existing roads, footpaths and public rights of way.		Low likelihood	Mild	Low risk	Receptor not present	--	--	Unlikely	Mild	Very low risk
		Workers and residents in on-site commercial and residential areas.		Unlikely	Mild	Very low risk	Receptor not present	--	--	Unlikely	Mild	Very low risk
		Future on-site users: road users, pedestrians, workers and residents		Receptor not present	--	--	Receptor not present	--	--	Unlikely	Mild	Very low risk
	Human health: Off-site	Workers and residents in surrounding commercial and residential areas.	Dermal contact with and ingestion of contaminants in soil, soil-derived dust and water which may have migrated off-site. Inhalation of contaminants in soil, soil-derived dust, fibres and gas/vapours which may have migrated off-site.	Unlikely	Mild	Very low risk	Unlikely	Mild	Very low risk	Unlikely	Mild	Very low risk
		Pedestrians using the surrounding footpaths, roads and parks.		Low likelihood	Mild	Low risk	Unlikely	Mild	Very low risk	Unlikely	Mild	Very low risk
	Controlled Waters: groundwater	Groundwater in the superficial Undifferentiated aquifer, superficial Secondary A aquifers and the bedrock Secondary A aquifers.	Leaching/migration of contaminants in soil to groundwater in underlying aquifers.	Low likelihood	Medium	Moderate/low risk	Unlikely	Medium	Low risk	Unlikely	Medium	Low risk
			Migration of contaminated water through preferential pathways such as underground services, pipes and granular material to groundwater in underlying aquifers.	Low likelihood	Medium	Moderate/low risk	Unlikely	Medium	Low risk	Unlikely	Medium	Low risk
		Groundwater in the Chalk Principal aquifer.	Leaching/migration of contaminants in soil to groundwater in underlying aquifers.	Low likelihood	Medium	Moderate/low risk	Unlikely	Medium	Low risk	Unlikely	Medium	Low risk
			Migration of contaminated water through	Low likelihood	Medium	Moderate/low risk	Unlikely	Medium	Low risk	Unlikely	Medium	Low risk

Source	Receptor	Contaminant exposure / migration pathway	Baseline			Construction with Mitigation			Operation with Mitigation		
			Probability	Consequence	Risk Category	Probability	Consequence	Risk Category	Probability	Consequence	Risk Category
		preferential pathways such as underground services, pipes and granular material to groundwater in underlying aquifers.									
Controlled Waters: surface water	On-site: Hermitage Stream and Riders Lane Stream.	Migration of contaminated groundwater along strata and preferential pathways such as service routes or differentially permeable strata.	Low likelihood	Medium	Moderate/low risk	Unlikely	Medium	Low risk	Unlikely	Medium	Low risk
		Discharge of contaminants entrained in groundwater and, or surface water run-off followed by overland flow and discharge.	Low likelihood	Medium	Moderate/low risk	Unlikely	Medium	Low risk	Unlikely	Medium	Low risk
	Off-site: the Hermitage Stream, Riders Lane Stream, two unnamed streams (approximately 292m and 330m	Migration of contaminated groundwater along strata and preferential pathways such as service routes or differentially permeable strata.	Low likelihood	Medium	Moderate/low risk	Unlikely	Medium	Low risk	Unlikely	Medium	Low risk
		Discharge of contaminants entrained in groundwater and, or surface water run-off followed by overland flow and discharge.	Low likelihood	Medium	Moderate/low risk	Unlikely	Medium	Low risk	Unlikely	Medium	Low risk
	Property / services	Existing on-site services and below ground structures	Low likelihood	Mild	Low risk	Unlikely	Mild	Very low risk	Unlikely	Mild	Very low risk
		Migration of contaminated groundwater, ground gas and/or vapours along	Low likelihood	Mild	Low risk	Unlikely	Mild	Very low risk	Unlikely	Mild	Very low risk

Source	Receptor	Contaminant exposure / migration pathway	Baseline			Construction with Mitigation			Operation with Mitigation		
			Probability	Consequence	Risk Category	Probability	Consequence	Risk Category	Probability	Consequence	Risk Category
		strata and preferential pathways such as service routes or differentially permeable strata.									
		Future on-site services and structures.	Receptor not present	--	--	Unlikely	Mild	Very low risk	Unlikely	Mild	Very low risk
		Migration of contaminated groundwater, ground gas and/or vapours along strata and preferential pathways such as service routes or differentially permeable strata.	Receptor not present	--	--	Unlikely	Mild	Very low risk	Unlikely	Mild	Very low risk
		Existing services and structures within the study area including listed buildings.	Unlikely	Minor	Very low risk	Unlikely	Minor	Very low risk	Unlikely	Minor	Very low risk
		Migration of contaminated groundwater, ground gas and/or vapours along strata and preferential pathways such as service routes or differentially permeable strata.	Unlikely	Minor	Very low risk	Unlikely	Minor	Very low risk	Unlikely	Minor	Very low risk
OFF-SITE: Made Ground of unknown provenance used in construction of housing estates and commercial properties associated with the development of	Human health: On-site	Current road users	Unlikely	Mild	Very low risk	Receptor not present	--	--	Unlikely	Mild	Very low risk
		Pedestrians accessing existing roads, footpaths and public rights of way	Unlikely	Mild	Very low risk	Receptor not present	--	--	Unlikely	Mild	Very low risk
		Workers and residents in on-site commercial and residential areas.	Unlikely	Mild	Very low risk	Receptor not present	--	--	Unlikely	Mild	Very low risk

Source	Receptor		Contaminant exposure / migration pathway	Baseline			Construction with Mitigation			Operation with Mitigation			
				Probability	Consequence	Risk Category	Probability	Consequence	Risk Category	Probability	Consequence	Risk Category	
	Bedhampton and Havant. Made Ground associated with the construction and operation of adjacent roads. Made Ground of unknown provenance used for the infilling of surrounding sand and clay pits located between 50m west and 380m to the north west of the Site as well as potentially contaminated ground associated with the operation of the pits, brickfields and associated brickworks and tile works. Former mills (including Bedhampton Mill and Upper Mill) located within the study area. Former tannery located 500m south east. Portsmouth water works located 10m south and 420m south east, former pumping station located 160m south west and former water works located 180m south west. Former pumping station located 160m southwest. Former sewage disposal works located 70m north. Former works/factory buildings 80m north and 180m north. Former and active garages and petrol stations located between 40m west and 474m east of the Site.	Future on-site users: road users, pedestrians, workers and residents	dust, fibres, gas and vapours.	Receptor not present	--	--	Receptor not present	--	--	Unlikely	Mild	Very low risk	
	Controlled waters: groundwater	Groundwater in the superficial Undifferentiated aquifer, superficial Secondary A aquifers and the bedrock Secondary A aquifers.	Leaching/migration of contaminants in soil to groundwater in underlying aquifers.	Low likelihood	Medium	Moderate/low risk	Unlikely	Medium	Low risk	Unlikely	Medium	Low risk	
			Migration of contaminated water through preferential pathways such as underground services, pipes and granular material to groundwater in underlying aquifers.	Low likelihood	Medium	Moderate/low risk	Unlikely	Medium	Low risk	Unlikely	Medium	Low risk	
		Groundwater in the Chalk Principal aquifer.	Leaching/migration of contaminants in soil to groundwater in underlying aquifers.	Low likelihood	Medium	Moderate/low risk	Unlikely	Medium	Low risk	Unlikely	Medium	Low risk	
			Migration of contaminated water through preferential pathways such as underground services, pipes and granular material to groundwater in underlying aquifers.	Low likelihood	Medium	Moderate/low risk	Unlikely	Medium	Low risk	Unlikely	Medium	Low risk	
		Controlled waters: surface water	On-site: Hermitage Stream and Riders Lane Stream.	Migration of contaminated groundwater along strata and preferential pathways such as service routes or differentially permeable strata.	Unlikley	Medium	Low risk	Unlikely	Medium	Low risk	Unlikely	Medium	Low risk
				Discharge of contaminants entrained in groundwater and, or surface water run-off followed by overland flow and discharge.	Unlikley	Medium	Low risk	Unlikely	Medium	Low risk	Unlikely	Medium	Low risk

Source	Receptor		Contaminant exposure / migration pathway	Baseline			Construction with Mitigation			Operation with Mitigation		
				Probability	Consequence	Risk Category	Probability	Consequence	Risk Category	Probability	Consequence	Risk Category
Industrial estate located approximately 250m south. Former allotment gardens within the study area. <i>A range of inorganic and organic contaminants including metals, hydrocarbons, asbestos. Fuels and oils attributed to spills from vehicles. Ground gas generation including carbon dioxide and methane from infilled ground / Made Ground and landfills. Pesticides and herbicides attributed to former allotments.</i>	Property / services	Existing services and structures on-site i	Direct contact of contaminants in soil and/or groundwater with existing and proposed structures and buried services.	Unlikely	Minor	Very low risk	Unlikely	Minor	Very low risk	Unlikely	Minor	Very low risk
		Future below ground on-site services and structures		Receptor not present	--	--	Receptor not present	--	--	Unlikely	Minor	Very low risk

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