

Contaminated Land Preliminary Risk Assessment

Risk Rating	Description
High / Unacceptable	Severe harm or pollution is highly likely to occur in the short term, or a major impact is already happening. Urgent remediation, monitoring, or immediate intervention is needed to protect human health or the environment.
Moderate	Harm or pollution is reasonably foreseeable, but it is not inevitable in the short term. Further site investigation, risk refinement, or localized management is usually necessary to ensure the site is safe.
Low / Acceptable	Harm or pollution is possible, but circumstances are unlikely to result in major consequences, or the hazard is minimal. Standard construction controls or good practice measures are typically sufficient. No major engineering controls are needed.

Construction Phases	Key Activities
Phase 1 – Enabling & Site Establishment Works	- Establishment of Site Infrastructure and Security - Civil Works, Access, and Ground Preparation - Water Management and Temporary Drainage
Phase 2 – Commencement of Substantive Excavations Works	- Heavy Ground Engineering and Foundations - Site Setup, Logistics, and Material Storage - Civil Infrastructure, Roads, and Utilities
Phase 3 – Shaft / Portal & tunnelling Works	- Shaft Structural Construction and Excavation - Tunnel Boring Machine (TBM) Breakthrough and Tunnel excavation - Handling and disposal of waste materials (slurry, lubricants, debris)
Phase 4 - Connection Works	- New built tunnel rinsing works - Siphon Pipelines Connection Works - Surface permanent structures preparation works
Phase 5 - Site Reinstatement Works	- Decommissioning and Subsurface Completion - Permanent Surface and Infrastructure Modifications - Environmental Reinstatement and Landscaping

Source	Pathways	Receptors	Risk	Mitigation	Mitigated Risk	Associated Phases
Historical coal mining (Six Inch, Sand Rock & Bassy Coal Seams)	Direct interception by proposed tunnel and TR6/G shaft	Proposed TR6 tunnel		Probe drilling/monitoring/tunnel linings/lowered alignment		Phase 3
		Construction Shaft TR6/G		Grouting/shaft linings		
		TBM and construction equipment		Probe drilling/monitoring/tunnel linings/lowered alignment		
		Construction workforce		TBM shield/monitoring/Health and safety control measures		
		Existing Woodgate Hill WTW structures		Offset distance/grouting/tunnel linings/monitoring		
		Groundwater		Grouting/tunnel and shaft linings/monitoring		
		Surface water (Gypsy Brook vicinity)		Monitoring		
		Future operation of the tunnel		Monitoring and Maintenance		
		Wider Environment		Monitoring		
		Private Water Supply		Grouting/tunnel and shaft linings/monitoring		
Unrecorded mine workings and voids	Direct interception by proposed tunnel and TR6/G shaft	Proposed TR6 tunnel		Probe drilling/monitoring/tunnel linings/lowered alignment		Phase 3
		Construction Shaft TR6/G		Grouting/shaft linings		
		TBM and construction equipment		Probe drilling/monitoring/tunnel linings/lowered alignment		
		Construction workforce		TBM shield/monitoring/Health and safety control measures		
		Existing Woodgate Hill WTW structures		Offset distance/grouting/tunnel linings/monitoring		
		Groundwater		Grouting/tunnel and shaft linings/monitoring		
		Surface water (Gypsy Brook vicinity)		Monitoring		
		Future operation of the tunnel		Monitoring and Maintenance		
		Wider Environment		Monitoring		

Source	Pathways	Receptors	Risk	Mitigation	Mitigated Risk	Associated Phases
		Private Water Supply		Grouting/tunnel and shaft linings/monitoring		
Historic fireclay workings	Direct interception by proposed tunnel and TR6/G shaft	Proposed TR6 tunnel		Probe drilling/monitoring/tunnel linings/lowered alignment		Phases 1 to 3
		Construction Shaft TR6/G		Grouting/shaft linings		
		TBM and construction equipment		Probe drilling/monitoring/tunnel linings/lowered alignment		
		Construction workforce		TBM shield/monitoring/Health and safety control measures		
		Existing Woodgate Hill WTW structures		Offset distance/grouting/tunnel linings/monitoring		
		Groundwater		Grouting/tunnel and shaft linings/monitoring		
		Surface water (Gypsy Brook vicinity)		Monitoring		
		Future operation of the tunnel		Monitoring and Maintenance		
		Wider Environment		Monitoring		
		Private Water Supply		Grouting/tunnel and shaft linings/monitoring		
Historic brick-pit quarries	Direct Interception by surface construction compounds and haul roads	Construction workforce		Dust monitoring/Health and safety control measures		Phases 1 and 2
		Surface water (Gypsy Brook vicinity)		Run off controls/dust controls/Monitoring		

Source	Pathways	Receptors	Risk	Mitigation	Mitigated Risk	Associated Phases
		Nearby residential properties		Run off controls/dust controls/Monitoring		
		Agricultural land		Run off controls/dust controls/Monitoring		
Mine shafts / mine entries (recorded & unrecorded)	Direct interception by proposed tunnel and TR6/G shaft	TBM and construction equipment		Probe drilling/monitoring/tunnel linings/lowered alignment		Phases 1 to 3
	Direct Interception by surface construction compounds and haul roads	Construction workforce		TBM and Shaft shield/grouting/monitoring/Health and safety control measures		
Flooded mine workings	Migration through mine workings	Proposed TR6 tunnel		Probe drilling/monitoring/tunnel linings/lowered alignment		Phase 3
	Direct interception by proposed tunnel and TR6/G shaft	Construction Shaft TR6/G		Grouting/shaft linings		
	Groundwater flow through flooded workings	TBM and construction equipment		Probe drilling/monitoring/tunnel linings/lowered alignment		

Source	Pathways	Receptors	Risk	Mitigation	Mitigated Risk	Associated Phases
	Migration via geological faults and fractures	Construction workforce		TBM shield/monitoring/Health and safety control measures		
		Existing Woodgate Hill WTW structures		Offset distance/grouting/tunnel linings/monitoring		
	Water ingress into excavations	Groundwater		Grouting/tunnel and shaft linings/monitoring		
		Future operation of the tunnel		Monitoring and Maintenance		
		Wider Environment		Monitoring		
		Private Water Supply		Grouting/tunnel and shaft linings/monitoring		
Mine gases (CH ₄ , CO ₂ , CO, H ₂ S)	Migration through mine workings	Proposed TR6 tunnel		Probe drilling/monitoring/tunnel linings/gas management plans/ventilation		Phase 3
	Direct interception by proposed tunnel and TR6/G shaft	Construction Shaft TR6/G		Probe drilling/monitoring/tunnel linings/gas management plans/ventilation		
	Evolution of dissolved gas via groundwater flow through flooded workings	TBM and construction equipment		Monitoring/gas management plans/ventilation		
	Migration via geological faults and fractures	Construction workforce		Monitoring/gas management plans/ventilation		
	Inhalation	Future operation of the tunnel		Monitoring/gas management plans/ventilation		

Source	Pathways	Receptors	Risk	Mitigation	Mitigated Risk	Associated Phases
	Evolution of dissolved gas through water ingress into excavations	Private Water Supply		Monitoring		
		Groundwater		Monitoring/gas management plans/ventilation		
Ground Gases Radon	Migration through mine workings	Proposed TR6 tunnel		Monitoring/gas management plans/ventilation		Phase 3 onwards and permanent use
	Direct interception by proposed tunnel and TR6/G shaft	Construction Shaft TR6/G		Grouting/tunnel and shaft linings/monitoring/ventilation		
	Evolution of dissolved gas via groundwater flow through flooded workings	Construction workforce		Grouting/tunnel and shaft linings/monitoring/ventilation		
	Migration via geological faults and fractures	Future operation of the tunnel		Grouting/tunnel and shaft linings/monitoring/ventilation		
	Inhalation	Private Water Supply		Monitoring		
	Evolution of dissolved gas through water ingress into excavations	Groundwater		Grouting/tunnel and shaft linings/monitoring/ventilation		

Source	Pathways	Receptors	Risk	Mitigation	Mitigated Risk	Associated Phases
	Gas migration through permeable strata and Made Ground	Existing Woodgate Hill WTW structures		Grouting/tunnel and shaft linings/monitoring/ventilation		
Aggressive mine water (iron-rich, sulphate-rich, acidic)	Migration through mine workings	Proposed TR6 tunnel		Grouting/tunnel linings/sampling/monitoring		Phase 3 onwards and permanent use
	Direct interception by proposed tunnel and TR6/G shaft	Construction Shaft TR6/G shaft		Grouting/shaft linings/sampling/monitoring		
	Groundwater flow through flooded workings	Construction workforce		PPE/Health and safety controls		
	Migration via geological faults and fractures	TBM and construction equipment		Grouting/tunnel and shaft linings/monitoring		
	Water ingress into excavations	Private Water Supply		Monitoring		
	Physical contact	Existing Woodgate Hill WTW structures		Grouting/tunnel linings/sampling/monitoring		
		Groundwater		Grouting/tunnel linings/sampling/monitoring		
	Chemical attack on concrete from sulphate-rich groundwater	Future operation of the tunnel		Monitoring and Maintenance		
Made Ground Contaminants	Airbourne Dusts migration and inhalation	Construction workforce		Dust monitoring and mitigation measures/Health and safety control measures		Phases 1 to 3

Source	Pathways	Receptors	Risk	Mitigation	Mitigated Risk	Associated Phases
	Physical Contact	Nearby residential properties		Dust monitoring and mitigation measures/Health and safety control measures		
		Agricultural land		Dust controls		
		Groundwater		Monitoring and sampling		
		Environment		Dust controls/monitoring/sampling		
	Dissolution in surface and groundwaters/run off	Surface water (Gypsy Brook vicinity)		Dust controls/monitoring/sampling		
		Private Water Supply		Monitoring and sampling		
Unexpected Contaminants	Direct Interception by surface construction compounds and haul roads	Proposed TR6 tunnel		Vigilance/sampling/monitoring/testing procedures. Stop works protocols in place		All Phases of construction
		Construction Shaft TR6/G				
		TBM and construction equipment				
		Construction workforce				
	Migration through mine workings	Existing Woodgate Hill WTW structures				
	Direct interception by proposed tunnel and TR6/G shaft	Nearby residential properties				
	Groundwater flow through flooded workings	Agricultural land				

Source	Pathways	Receptors	Risk	Mitigation	Mitigated Risk	Associated Phases	
	Migration via geological faults and fractures	Groundwater					
		Surface water (Gypsy Brook vicinity)					
	Water ingress into excavations	Future operation of the tunnel					
		Private Water Supply					
	Inhalation	Environment					
	Physical contact						