

M5 Junction 10 Improvements Scheme

Environmental Statement Appendix 10.2 Conceptual Site Models TR010063 – APP 6.15

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6.15 Environmental Statement: Appendix 10.2 Conceptual Site Models

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Author:	M5 Junction 10 Improvements Scheme Project Team

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1. Conceptual Site Model

This appendix is to support the Chapter 10 (Geology and Soils) (application document TR010063 – APP 6.8) of the Environmental Statement for M5 Junction 10 Improvements Scheme.

Table 1-1 - Conceptual Site Model

Source	Receptor		Pathway	Potential Consequence	Probability	Risk	Comment
<p>On-site: Made Ground associated with the construction of existing (M5, A4019 and B4634) and proposed carriageways and activities associated with their operation; and Agricultural activities.</p>	Human health: On-site	Construction and maintenance workers of current roads	<p>Dermal contact with and ingestion of contaminants in soils, soil-derived dusts and water.</p> <p>Inhalation of contaminants in soil, soil-derived dust, fibres, gas and vapours.</p>	Medium	Unlikely	Low	<p>There will be short term exposure of soils during construction although best practice site management procedures are likely to be implemented which will minimise short term exposure risk.</p> <p>It is assumed that users of the West Cheltenham Link Road, A4019, B4634 and motorway junction are likely to be transient.</p> <p>Post construction works, the site will comprise hardstanding road surfaces minimising potential for end users to come into direct contact with soils or for dust to be generated.</p> <p>Ground gases are unlikely to be a significant concern as no enclosed structures are proposed as part of the Scheme and infrastructure is likely to be vented.</p> <p>Future maintenance may require localised excavation with</p>

Source	Receptor	Pathway	Potential Consequence	Probability	Risk	Comment
						potential for workers to come into direct contact with soils or inhale soil derived dusts. This work is likely to be short term and infrequent. Works will be risk assessed and best practice controls are likely to be used (e.g. gloves, and protective clothing) minimising potential for exposure.
	Pedestrians accessing existing roads, footpaths and public rights of way	Inhalation of contaminants in soil-derived dust, fibres, gas and vapours.	Medium	Unlikely	Low	
	Current road users	Inhalation of contaminants in soil-derived dust, fibres, gas and vapours.	Medium	Unlikely	Low	
	Users of the new road Scheme	Inhalation of contaminants in soil-derived dust, fibres, gas and vapours.	Medium	Unlikely	Low	
	Farmers and workers on agricultural land	<p>Dermal contact with and ingestion of contaminants in soils, soil-derived dusts and water.</p> <p>Inhalation of contaminants in soil, soil-derived dust, fibres, gas and vapours.</p>	Medium	Unlikely	Low	

Source	Receptor		Pathway	Potential Consequence	Probability	Risk	Comment
	Human health: Off-site	Residents in adjacent properties and users of adjacent commercial / industrial premises	<p>Dermal contact with and ingestion of contaminants in soil-derived dusts and water that may have migrated off-site.</p> <p>Inhalation of soil-derived dust, fibres, gas and vapours which may have migrated off-site.</p>	Medium	Unlikely	Low	<p>Following the construction of the proposed carriageways and motorway junction improvement works, ground cover will comprise hardstanding with minimal areas of exposed bare soil.</p> <p>Road verges would be grassed, binding the soils and minimising the potential for generation of soil derived dusts.</p> <p>Therefore it is unlikely that off-site human health receptors will be come into direct contact / ingest potential soil contaminants.</p>
		Pedestrians accessing surrounding roads, footpaths and public rights of way	<p>Dermal contact with and ingestion of contaminants in soil-derived dusts and water that may have migrated off-site.</p> <p>Inhalation of soil-derived dust, fibres, gas and vapours which may have migrated off-site.</p>	Medium	Unlikely	Low	
		Farmers and workers on agricultural land	<p>Dermal contact with and ingestion of contaminants in soil-derived dusts and water that may have migrated off-site.</p> <p>Inhalation of soil-derived dust, fibres, gas and vapours which may have migrated off-site.</p>	Medium	Unlikely	Low	

Source	Receptor		Pathway	Potential Consequence	Probability	Risk	Comment
	Controlled Waters: groundwater	Groundwater in Secondary undifferentiated and Secondary A bedrock aquifer	Leaching of contaminants in soil to groundwater in underlying aquifers.	Medium	Unlikely	Low	<p>The study area is underlain by intermittent deposits of the superficial Alluvium and Cheltenham Sand and Gravels. Bedrock underling the study area comprises the Rugby Limestone Formation and the Charmouth Mudstone Formation.</p> <p>The Alluvium, Cheltenham Sand and Gravels and Rugby Limestone Formation are all classified as Secondary A aquifers.</p> <p>During construction, works are likely to result in disturbance of soils due to excavation which may result in the release of contaminants in unsaturated Made Ground soils with potential migration to groundwater.</p>
		Groundwater in Secondary A Superficial aquifer					

Source	Receptor		Pathway	Potential Consequence	Probability	Risk	Comment
							A large proportion of the site is unsurfaced and a lower number of exceedances and lower concentrations of analysed contaminants were recorded in groundwater samples in these areas. This indicates groundwater quality is not adversely affected from potential leaching from unsaturated soils.
	Controlled Waters: Surface waters (on-site)	River Chelt, Leigh Brook and surface water drains	Lateral migration of contaminated groundwater with discharge to surface watercourses.	Medium	Unlikely	Low	The construction works are likely to result in disturbance of shallow unsaturated soils during excavation. This may result in the release of contaminants in unsaturated Made Ground soils with potential migration to surface water. Best practice procedures require implementation to minimise leaching of unsaturated soils in excavations and stockpiles. The site specific ground investigation identified that there were no concentrations of analysed contaminants which exceeded the screening criteria in surface water samples collected from the River Chelt and Leigh Brook.
			Discharge of contaminants entrained in groundwater and/ or	Medium	Unlikely	Low	

Source	Receptor		Pathway	Potential Consequence	Probability	Risk	Comment
			surface water run-off followed by overland flow and discharge.				
	Controlled Waters: Surface waters (off-site)	River Chelt, Leigh Brook and surface water drains	Lateral migration of contaminated groundwater with discharge to surface watercourses as base flow.	Medium	Unlikely	Low	
			Discharge of contaminants entrained in groundwater and/or surface water run-off followed by overland flow and discharge.	Medium	Unlikely	Low	
Off-site: Made Ground associated with the construction and operation of adjacent roads; Historical sewage works / farm (Cheltenham Corporation) 260 m west; Allotments and agricultural activities within the surrounding area;	Human health: On-site	Construction and maintenance workers of current roads	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.	Medium	Unlikely	Low	Potentially contaminated groundwater may migrate to the site from off-site sources with the potential for direct contact in excavations. This work is likely to be short term and infrequent. Works will be risk assessed and best practice controls are likely to be used (e.g. gloves, and protective clothing) minimising potential for exposure.

Source	Receptor	Pathway	Potential Consequence	Probability	Risk	Comment
Historical corn mill 190 m west; Historical smithy 250 m east; Historical engineering works 250 m south east; Sainsburys petrol station 200 m north and the Cheltenham Filling Station 360 m south east; Violet Villa historical landfill 30 m north east and Colman Farm historical landfill 200 m north; and Waste management facility 340 m north west of the A4019.						

Source	Receptor	Pathway	Potential Consequence	Probability	Risk	Comment
	Pedestrians accessing existing roads, footpaths and public rights of way	<p>Dermal contact with and ingestion of contaminants in soils, soil-derived dusts and water.</p> <p>Inhalation of contaminants in soil, soil-derived dust, fibres, gas and vapours.</p>	Medium	Unlikely	Low	
	Current road users	<p>Dermal contact with and ingestion of contaminants in soils, soil-derived dusts and water.</p> <p>Inhalation of contaminants in soil, soil-derived dust, fibres, gas and vapours.</p>	Medium	Unlikely	Low	
	Users of the new road Scheme	<p>Dermal contact with and ingestion of contaminants in soils, soil-derived dusts and water.</p> <p>Inhalation of contaminants in soil, soil-derived dust, fibres, gas and vapours.</p>	Medium	Unlikely	Low	
	Farmers and workers on agricultural land	<p>Dermal contact with and ingestion of contaminants in soils, soil-derived dusts and water.</p>	Medium	Unlikely	Low	

Source	Receptor		Pathway	Potential Consequence	Probability	Risk	Comment
			Inhalation of contaminants in soil, soil-derived dust, fibres, gas and vapours.				
	Controlled Waters: groundwater	Groundwater in Secondary undifferentiated and Secondary A bedrock aquifer Groundwater in Secondary A Superficial aquifer	Leaching of contaminants in soil to groundwater in underlying aquifers.	Medium	Unlikely	Low	<p>Potentially contaminated groundwater may migrate to the site from off-site sources.</p> <p>Monitoring completed as part of the site specific ground investigation indicates that groundwater is located approximately 0.7 to 3.0 m below ground level within the Alluvium, Cheltenham Sands and Gravels and Charmouth Formation.</p> <p>Groundwater sampling and analysis identified exceedances against the screening criteria for metals and inorganics which were generally widespread.. It is considered these are indicative of natural background concentrations.</p> <p>Considering that the chemistry of the groundwater up hydraulic gradient of the site and across the site was consistent, evidence for the potential for on-site migration of contaminated groundwater has not been identified.</p>

Source	Receptor		Pathway	Potential Consequence	Probability	Risk	Comment
			Migration of contaminated water through preferential pathways such as underground services, pipes and granular material to groundwater in underlying aquifers.	Medium	Unlikely	Low	
	Controlled Waters: Surface waters (on-site)	River Chelt, Leigh Brook and surface water drains	Lateral migration of contaminated groundwater with discharge to surface watercourses.	Medium	Unlikely	Low	Potentially contaminated groundwater may migrate to the site from off-site sources, potentially affecting surface water in the River Chelt and Leigh Brook. No concentrations of analysed contaminants were identified to exceed the screening criteria in surface water samples collected from the River Chelt and Leigh Brook.
			Discharge of contaminants entrained in groundwater and/or surface water run-off followed by overland flow and discharge.	Medium	Unlikely	Low	

ATKINS

Member of the SNC-Lavalin Group

5th Floor, Block 5
Shire Hall
Bearland
Gloucester
GL1 2TH

Tel: +44 (0) 8000 514 514