

M25 junction 28 improvement scheme TR010029 6.3 Environmental Statement Appendix 10.7: Risk assessment and impact assessment

APFP Regulation 5(2)(a) Planning Act 2008 Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009





Infrastructure Planning

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

M25 junction 28 scheme Development Consent Order 202[x]

6.3 ENVIRONMENTAL STATEMENT APPENDIX 10.7: RISK ASSESSMENT AND IMPACT ASSESSMENT

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Author:	M25 junction 28 improvement scheme project team, Highways England

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Risk assessment
and impact
assessment



10. Risk and impact assessment

Table 10.1: Land contamination risk assessment

			Baseline			Construction w	vithout mitigation	on		Construction w	rith mitigation		Operation		
Source	Receptor	Pathway	Consequence of risk	Probability of risk	Classification of risk (assuming reasonable worst case)	Consequence of risk	Probability of risk	Classification of risk	Mitigation measures	Consequence of risk	Probability of risk	Classification of risk	Consequence of risk	Probability of risk	Classification of risk
Potentially impacted soil/groundwater and gases/vapours associated with the following on site sources:		Inhalation, ingestion and/or dermal contact with chemical parameters in soil, soil- derived dust and ACM fibres*	Medium	Unlikely (Low likelihood)	Low (Moderate/Low) Risk	Medium	Likely (high likelihood)	Moderate (High) Risk	Ground investigation and risk assessments as necessary to define risk. Remediation / removal of existing contamination	Medium	Unlikely (low likelihood)	Low (Moderate/Low) Risk	Medium	Unlikely (Unlikely)	Low (Low) Risk
*Area of historical Brook Street landfill and recently deposited material (minor exceedence of beryllium public open space GAC (park), asbestos and a number of EQS-f exceedences from soil- derived leachate); *Made Ground/infill of	fibres* Inhalat ingesti and/or contact chemic parameter Main Line vary) and potentially ead water aresolved leash as uding from drainage) and leaks uding from drainage) at the long-term use the roads; and uses including tricity substations, there aerodrome, vary line, agricultural vities; and seible leakage from a sub-surface line. On-site members of the public in public spaces within the Scheme boundary On-site members of the public in public spaces within the Scheme boundary On-site members of the public in public spaces within the Scheme boundary On-site members of the public in public spaces within the Scheme boundary On-site members of the public in public spaces within the Scheme boundary On-site members of the public in public spaces within the Scheme boundary On-site members of the public in public spaces within the Scheme boundary On-site future causing asphyxically and/or contact chemic parame within services and site maintenance workers associated with the Scheme On-site future construction workers and site maintenance workers associated with the Scheme On-site future construction workers and site maintenance workers associated with the Scheme On-site future construction workers and site maintenance workers associated with the Scheme On-site future construction workers and site maintenance workers associated with the Scheme On-site future construction workers and site maintenance workers associated with the Scheme On-site future construction workers and site maintenance workers associated with the Scheme On-site future construction workers and site maintenance workers associated with the Scheme On-site future construction workers and site maintenance workers associated with the Scheme On-site future construction workers and site maintenance workers associated with the Scheme On-site future construction workers and site maintenance workers associated with the Scheme On-site future construction workers and site maintenance workers associated with the Scheme	Inhalation, ingestion and/or dermal contact with chemical parameters	Medium	Unlikely	Low Risk	Medium	Low likelihood	Moderate/Low Risk	if risk assessments deem necessary. Use of ventilated temporary structures during construction if risk	Medium	unlikely	Low Risk	Medium	Unlikely	Low Risk
•Made Ground/infill of the unknown material the specific		Acces within the cheme boundary Migration and accumulation of ground gases and/or vapours followed by inhalation and/or ignition causing asphyxiation and/or explosion	Severe	Low likelihood	Moderate Risk	Severe	Low likelihood	Moderate Risk	assessments deem necessary. Use of appropriate hazard signage and / or ground gas protection measures within below ground chambers and	Severe	Low likelihood	Moderate Risk	Severe	Unlikely	Moderate/Low Risk
(including from drainage) from the long-term use of the roads; •Four recorded pollution incidents; •Land uses including electricity substations, former aerodrome,		Inhalation, ingestion and/or dermal contact with chemical parameters within surface	Medium	Low likelihood	Moderate/Low Risk	Medium	Low likelihood	Moderate/Low Risk	ducts if risk assessments deem necessary. Implementation of measures in the EMP such as good	Medium	low likelihood	Moderate/Low Risk	Medium	Unlikely	Low Risk
railway line, agricultural activities; and •Possible leakage from BPA sub-surface pipeline. Potential chemical parameters of concern including heavy metals, metalloids, PAH, TPH,		within surface water Inhalation, ingestion and/or dermal contact with chemical parameters in soil, soil-derived dust and ACM fibres*	within surface water Inhalation, ingestion and/or dermal contact with chemical parameters in soil, soil- derived dust and ACM fibres*			Medium	Low likelihood (likely)	Moderate/Low (Moderate) Risk	management of stockpiles in accordance with Environment Agency Pollution Prevention Guidelines (PPG),	Medium	Unlikely (low likelihood)	Low (Moderate/Low) Risk	Medium	Unlikely (Low)	Low (Moderate/Low) Risk
unleaded an kerosene/naphthalene wo		construction workers and site maintenance workers associated with the Scheme ingestion and/or dermal contact with chemical parameters	Inhalation, ingestion and/or dermal contact with chemical parameters within perched water and shallow		t baseline	Medium	likely	Moderate Risk	implementation of pollution incident control e.g. plant drip trays and spill kits. Implementation of dust management systems. Risk	Medium	low likelihood	Moderate/Low Risk	Medium	Unlikely	Low Risk



			Baseline	CI		Construction v	vithout mitigatio	on		Construction w	vith mitigation		Operation			
Source	Receptor	Pathway	Consequence of risk	Probability of risk	Classification of risk (assuming reasonable worst case)	Consequence of risk	Probability of risk	Classification of risk	Mitigation measures	Consequence of risk	Probability of risk	Classification of risk	Consequence of risk	Probability of risk	Classification of risk	
		Migration and accumulation of ground gases and/or vapours followed by inhalation and/or ignition causing asphyxiation and/or explosion				Severe	Unlikely	Moderate/Low Risk	Assessment and Method Statements (RAMS) to be completed prior to construction and risk management with appropriate Personal Protective	Severe	Unlikely	Moderate/Low Risk	Severe	Unlikely	Moderate/Low Risk	
		Inhalation, ingestion and/or dermal contact with chemical parameters within surface water				Medium	likely	Moderate Risk	Equipment (PPE). See section 10.9 for further details.	Medium	low likelihood	Moderate/Low Risk	Medium	Unlikely	Low Risk	
		Inhalation, ingestion and dermal contact with chemical parameters in windblown soil-derived dust and ACM fibres*	Medium	Unlikely (Low likelihood)	Low (Moderate/Low) Risk	Medium	Low likelihood (likely)	Moderate/Low (Moderate) Risk		Medium	Unlikely (low likelihood)	Low (Moderate/Low) Risk	Medium	Unlikely (Unlikely)	Low (Low) Risk	
	Off-site workers/visitors/users at industrial, agricultural and commercial premises and recreational facilities including those at Grove Farm (garden centre, RJ Waste Management Recycling, skip hire and rubbish clearance), agricultural land workers and residents including those at property on Grove Farm ACM fibres' Inhalation, ingestion ar dermal contact with chemical parameters within perched water and shallow groundwate Migration ar accumulation of ground gases and/or vapours followed by inhalation o ignition causing asphyxiation and/or	ingestion and dermal contact with chemical parameters within perched water and shallow	Medium	Unlikely	Low Risk	Medium	Unlikely	Low Risk		Medium	Unlikely	Low Risk	Medium	Unlikely	Low Risk	
		those at Grove Farm (garden centre, RJ Waste Management Recycling, skip hire and rubbish clearance), agricultural land workers and residents including those at property on Grove Farm	Waste Management Recycling, skip hire and rubbish clearance), agricultural land workers and residents including those at property on Grove Farm Grove Farm ground Migratie accumt of grout gases a vapours followe inhalati ignition causing asphyx and/or explosi Inhalati	Migration and accumulation of ground gases and/or vapours followed by inhalation or ignition causing asphyxiation	Severe	Unlikely	Moderate/Low Risk	Severe	Unlikely	Moderate/Low Risk		Severe	Unlikely	Moderate/Low Risk	Severe	Unlikely
		Inhalation, ingestion and dermal contact with chemical parameters within surface water	Medium	Unlikely	Low Risk	Medium	Low likelihood	Moderate/Low Risk		Medium	Unlikely	Low Risk	Medium	Unlikely	Low Risk	
	On-site groundwater (superficial Secondary A aquifer and Secondary Undifferentiated aquifer). Surface water features (Ingrebourne River	Leaching/ vertical migration of chemical parameters in soils to underlying groundwater	Medium	low likelihood	Moderate/Low Risk	Medium	Likely	Moderate Risk	GI and risk assessment as necessary to define risk. Remediation / removal of existing contamination	Medium	low likelihood	Moderate/Low Risk	Medium	Unlikely	Low Risk	



			Baseline			Construction w	vithout mitigatio	n		Construction w	vith mitigation		Operation		
Source	Receptor	Pathway	Consequence of risk	Probability of risk	Classification of risk (assuming reasonable worst case)	Consequence of risk	Probability of risk	Classification of risk	Mitigation measures	Consequence of risk	Probability of risk	Classification of risk	Consequence of risk	Probability of risk	Classification of risk
	and Weald Brook). Potential new surface water features including attenuation ponds and drainage	Lateral migration of chemical parameters in groundwater	Medium	low likelihood	Moderate/Low Risk	Medium	Likely	Moderate Risk	if risk assessments deem necessary. Controlled	Medium	low likelihood	Moderate/Low Risk	Medium	Unlikely	Low Risk
	features	Migration of chemical parameters entrained in surface water / run-off	Medium	low likelihood	Moderate/Low Risk	Medium	likely	Moderate Risk	Waters PRA and use of appropriate piling methods. Implementation of measures in	Medium	Low likelihood	Moderate/Low Risk	Medium	Unlikely	Low Risk
		groundwater / perched water to surface waters Migration of perched / shallow groundwater and / or	Medium	Low likelihood	Moderate/Low Risk	Medium	Likely	Moderate Risk	the EMP such as good management of stockpiles in accordance with Environment Agency PPG, implementation of pollution	Medium	Low likelihood	Moderate/Low Risk	Medium	Unlikely	Low Risk
	waters Migration of perched / shallow groundwate and / or surface wate via preferential pathways e. attenuation ponds (if unlined) and pond outfalls	Migration of perched / shallow groundwater and / or surface water via preferential pathways e.g. attenuation	Pathway not pr	resent at baseli	ne	Medium	Likely	Moderate Risk		Medium	Low likelihood	Moderate/Low Risk	Medium	Unlikely	Low Risk
		Leaching/ vertical migration of chemical parameters in soils to underlying groundwater	Medium	low likelihood	Moderate/Low Risk	Medium	Likely	Moderate Risk		Medium	low likelihood	Moderate/Low Risk	Medium	Unlikely	Low Risk
	Off-site groundwater (superficial Secondary A aquifer and Secondary	Lateral migration of chemical parameters in groundwater	Medium	Unlikely	Low Risk	Medium	low likelihood	Moderate/Low Risk		Medium	Unlikely	Low Risk	Medium	Unlikely	Low Risk
	Undifferentiated aquifer) and surface water features (Ingrebourne River and Weald Brook)	Migration of chemical parameters entrained in surface water / run-off	Medium	Low likelihood	Moderate/Low Risk	Medium	Likely	Moderate Risk	ŀ	Medium	Low likelihood	Moderate/Low Risk	Medium	Unlikely	Low Risk
	Lateral migration chemical paramete shallow groundwa to surface waters On-site underground services including the NG high pressure gas main and BPA pipeline, existing structures, piles and foundations associated with Lateral migration chemical paramete shallow groundwa to surface waters Chemical attack of buried structures contact w chemical paramete soil or	migration of chemical parameters in shallow groundwater to surface	Medium	unlikely	Low Risk	Medium	low likelihood	Moderate/Low Risk		Medium	unlikely	Low Risk	Medium	Unlikely	Low Risk
		Chemical attack of buried structures in contact with chemical parameters in	Medium	Low likelihood	Moderate/Low Risk	Medium	Low likelihood	Moderate/Low Risk	GI and risk assessment as necessary to define risk. Remediation / removal of existing contamination if risk	Medium	Low likelihood	Moderate/Low Risk	Medium	Unlikely	Low Risk



			Baseline			Construction w	vithout mitigatio	n		Construction w	ith mitigation		Operation		
Source	Receptor	Pathway	Consequence of risk	Probability of risk	Classification of risk (assuming reasonable worst case)	Consequence of risk	Probability of risk	Classification of risk	Mitigation measures	Consequence of risk	Probability of risk	Classification of risk	Consequence of risk	Probability of risk	Classification of risk
	agricultural and commercial properties and future structures, services, piles and foundations	Migration of ground gases and/or vapours along preferential pathways including permeable ground, services trenches and service entry points and accumulation in enclosed spaces such as services ducts or access points	Medium	Low likelihood	Moderate/Low Risk	Medium	Low likelihood	Moderate/Low Risk	assessments deem necessary. Implementation of measures in the EMP such as good management of stockpiles in accordance with Environment Agency PPG, implementation of pollution incident control e.g. plant drip trays and spill kits. Control of run off and implementation of dust management systems. See section 10.9 for further details.	Medium	Low likelihood	Moderate/Low Risk	Medium	Unlikely	Low Risk
		Chemical attack of buried structures in contact with chemical parameters in soil or groundwater	Medium	low likelihood	Moderate/Low Risk	Medium	low likelihood	Moderate/Low Risk	GI and risk assessment as necessary to define risks. Remediation / removal of existing contamination	Medium	Low	Moderate / Low Risk	Medium	Unlikely	Low Risk
	Off-site existing structures, services piles and foundations associated with residential, industrial, agricultural and commercial properties. Other property including agricultural crops and livestock	Migration of ground gases and/or vapours along preferential pathways including permeable ground, services trenches and service entry	Medium	unlikely	Low Risk	Medium	unlikely	Low Risk	if risk assessments deem necessary. Appropriate assessment and design of services resistant to chemical attack if risk assessments deem necessary. Use of appropriate hazard signage and / or ground gas protection measures	Medium	Unlikely	Low Risk	Medium	Unlikely	Low Risk
		Migration of contamination in shallow groundwater and uptake by crops	Mild	unlikely	Very Low Risk	Mild	unlikely	Very Low Risk	within below ground chambers and ducts if risk assessments deem necessary.	Mild	unlikely	Very Low Risk	Mild	unlikely	Very Low Risk



			Baseline			Construction v	vithout mitigatio	n		Construction v	vith mitigation		Operation		
Source	Receptor	Pathway	Consequence of risk	Probability of risk	Classification of risk (assuming reasonable worst case)	Consequence of risk	Probability of risk	Classification of risk	Mitigation measures	Consequence of risk	Probability of risk	Classification of risk	Consequence of risk	Probability of risk	Classification of risk
		Inhalation, ingestion and dermal contact with contaminants in soil and windblown soil-derived dust by livestock	Mild	unlikely	Very Low Risk	Mild	unlikely	Very Low Risk	See section 10.9 for further details.	Mild	unlikely	Very Low Risk	Mild	unlikely	Very Low Risk
Potentially impacted soil/groundwater and gases/vapours associated with the following off site		Inhalation, ingestion and dermal contact with chemical parameters in soil, soil-derived dust and ACM fibres	Medium	low likelihood	Moderate/Low Risk	Medium	likely	Moderate Risk		Medium	low likelihood	Moderate/Low Risk	Medium	Unlikely	Low Risk
•Made Ground/infill of unknown provenance associated with existing roads, off site development infilled pits/ponds/watercourses; •Activities and land uses associated with Grove Farm, including a garden	On-site members of the public in public spaces within the	Inhalation, ingestion and dermal contact with chemical parameters within perched water and shallow groundwater	Medium	low likelihood	Moderate/Low Risk	Medium	likely	Moderate Risk	GI and risk assessment as necessary to define risks. Use of ventilated temporary structures during construction if risk	Medium	Low likelihood	Moderate/Low Risk	Medium	unlikely	Low Risk
centre and RJ Waste Management Recycling, skip hire and rubbish clearance; *Other land uses including fuel stations (former and active); electricity substations, sewage treatment works, former aerodrome (wider area from the Scheme	sed with Grove cluding a garden nd RJ Waste ment Recycling, and rubbish are; and uses g fuel stations and active); y substations, treatment ormer me (wider area	shallow groundwater Migration and accumulation of ground gases and/or vapours followed by	Severe	unlikely	Moderate/Low Risk	Severe	Unlikely	Moderate/Low Risk	assessments deem necessary. Use of appropriate hazard signage and / or ground gas protection measures within below ground	Severe	Unlikely	Moderate/Low Risk	Severe	Unlikely	Moderate/Low Risk
boundary), vehicle service garages, garden centre, farms and associated agricultural activities, vehicle cleaning services; and •Eight recorded pollution incidents.		Inhalation, ingestion and dermal contact with chemical parameters within surface water	Medium	Low likelihood	Moderate/Low Risk	Medium	likely	Moderate Risk	chambers and ducts if risk assessments deem necessary. RAMS to be completed prior to	Medium	Low likelihood	Moderate/Low Risk	Medium	unlikely	Low Risk
Potential chemical parameters of concern include a range of organics and inorganics-heavy metals, metalloids, PAH, TPH, unleaded kerosene/naphthalene (associated with former	dents. ential chemical ameters of concern ude a range of aniorganics-talloids, PAH, TPH, eaded osene/naphthalene sociated with former odrome), solvents, bicides and sticides. Water Inhalation ingestion dermal contact w chemical paramete soil, soil-derived derived deri	water Inhalation, ingestion and dermal contact with chemical parameters in soil, soil- derived dust and ACM fibres	water Inhalation, ingestion and dermal contact with chemical parameters in soil, soil- derived dust and ACM		Medium	low likelihood	Moderate/Low Risk	construction and risk management with appropriate PPE. See section 10.9 for further details.	Medium	low likelihood	Moderate/Low Risk	Medium	Unlikely	Low Risk	
aerodrome), solvents, asbestos, PCBs, herbicides and pesticides.		site maintenance ers associated Inhalation, ingestion and dermal contact with chemical parameters within			Medium	low likelihood	Moderate/Low Risk		Medium	Unlikely	Low Risk	Medium	Unlikely	Low Risk	



			Baseline			Construction w	vithout mitigatio	n		Construction w	vith mitigation		Operation		
Source	Receptor	Pathway	Consequence of risk	Probability of risk	Classification of risk (assuming reasonable worst case)	Consequence of risk	Probability of risk	Classification of risk	Mitigation measures	Consequence of risk	Probability of risk	Classification of risk	Consequence of risk	Probability of risk	Classification of risk
		shallow groundwater Migration and accumulation of ground gases and/or vapours followed by inhalation or ignition causing asphyxiation and/or explosion Inhalation,				Severe	Unlikely	Moderate/Low Risk		Severe	Unlikely	Moderate/Low Risk	Severe	Unlikely	Moderate/Low Risk
		ingestion and dermal contact with chemical parameters within surface water Leaching/ vertical migration of chemical parameters in soils to underlying groundwater Lateral migration of				Medium	low likelihood	Moderate/Low Risk		Medium	low likelihood	Moderate/Low Risk	Medium	unlikely	Low Risk
			Medium	Low likelihood	Moderate/Low Risk	Medium	Low likelihood	Moderate/Low Risk		Medium	Low likelihood	Moderate/Low Risk	Medium	Low likelihood	Moderate/Low Risk
	On-site groundwater (superficial Secondary A aquifer and Secondary Undifferentiated aquifer). Surface water features (Ingrebourne River and Weald Brook). Potential new surface water features including attenuation ponds and drainage features On-site underground services including the NG high pressure gas main and BPA pipeline, existing structures, piles and	On-site groundwater (superficial	Medium	Unlikely	Low Risk	Medium	Unlikely	Low Risk		Medium	Unlikely	Low Risk	Medium	Unlikely	Low Risk
		Medium	Low likelihood	Moderate/Low Risk	Medium	Low likelihood	Moderate/Low Risk	GI and controlled water risk	Medium	Low likelihood	Moderate/Low Risk	Medium	Low likelihood	Moderate/Low Risk	
		Undifferentiated equifer). Surface vater features lingrebourne River and Weald Brook). Potential new surface vater features and drainage eatures eatures eatures eatures entrained in surface water / run-off Lateral migration of chemical parameters in shallow groundwater / perched water to surface waters	Medium	Low likelihood	Moderate/Low Risk	Medium	Low likelihood	Moderate/Low Risk	assessment (including PRA) as necessary to define risks.	Medium	Low likelihood	Moderate/Low Risk	Medium	Low likelihood	Moderate/Low Risk
		perched / shallow groundwater and / or surface water via preferential pathways e.g.	Pathway not p	resent at baseli	ne	Medium	Low likelihood	Moderate/Low Risk		Medium	Unlikely	Low Risk	Medium	Unlikely	Low Risk
		Chemical attack of buried structures in contact with chemical parameters in soil or	Medium	Low likelihood	Moderate/Low Risk	Medium	Low likelihood	Moderate/Low Risk	GI and risk assessment as necessary to define risks. Appropriate assessment and design of services resistant to	Medium	Low likelihood	Moderate/Low Risk	Medium	Low likelihood	Moderate/Low Risk



			Baseline			Construction w	ithout mitigatio	n		Construction w	ith mitigation		Operation		
Source	Receptor	Pathway	Consequence of risk	Probability of risk	Classification of risk (assuming reasonable worst case)	Consequence of risk	Probability of risk	Classification of risk	Mitigation measures	Consequence of risk	Probability of risk	Classification of risk	Consequence of risk	Probability of risk	Classification of risk
	agricultural and commercial properties and future structures, services, piles and foundations	Migration of ground gases and/or vapours along preferential pathways including permeable ground, services trenches and service entry points and accumulation in enclosed spaces such as services ducts or access points	Medium	Unlikely	Low Risk	Medium	Unlikely	Low Risk	chemical attack if risk assessments deem necessary. Use of appropriate hazard signage and / or ground gas protection measures within below ground chambers and ducts if risk assessments deem necessary. See section 10.9 for further details.	Medium	Unlikely	Low Risk	Medium	Unlikely	Low Risk

Table 10.2: Land contamination assessment of effects

Source	Receptor	Pathway	Classification of risk (baseline)	Classification of risk (construction without mitigation)	Impact (construction without mitigation)	Classification of risk (construction with mitigation)	Impact (construction with mitigation)	Classification of risk (operation)	Impact (during operation phase assuming mitigation was implemented)							
Potentially impacted soil/groundwater and gases/vapours associated with		Inhalation, ingestion and/or dermal contact with chemical parameters in soil, soil-derived dust and ACM fibres*	Low (Moderate/Low Risk)	Moderate (High) Risk	Moderate Adverse	Low (Moderate/Low Risk)	Negligible	(Low) Low Risk	Negligible (Minor Beneficial)							
the following on site sources:	On-site members of the public in public	Inhalation, ingestion and/or dermal contact with chemical parameters within perched water and shallow groundwater	Low Risk	Moderate/Low Risk	Minor Adverse	Low Risk	Negligible	Low Risk	Negligible							
 Area of historical Brook Street landfill and recently deposited material (minor exceedence of 	spaces within the Scheme boundary	Migration and accumulation of ground gases and/or vapours followed by inhalation and/or ignition causing asphyxiation and/or explosion	Moderate Risk	Moderate Risk	Negligible	Moderate Risk	Negligible	Moderate/Low Risk	Minor Beneficial							
beryllium public open space GAC (park), asbestos and a		Inhalation, ingestion and/or dermal contact with chemical parameters within surface water	Moderate/Low Risk	Moderate/Low Risk	Negligible	Moderate/Low Risk	Negligible	Low Risk	Minor Beneficial							
number of EQS-f exceedences from soil-derived leachate); •Made Ground/infill of unknown		Inhalation, ingestion and/or dermal contact with chemical parameters in soil, soil-derived dust and ACM fibres*		Moderate/Low (Moderate) Risk		Low (Moderate/Low) Risk	(Impact predicted to be negligible given reduced	Low (Moderate/Low) Risk								
material expected beneath areas of existing development (i.e. along the M25, A12,	erial expected beneath s of existing development On-site future construction workers and	Inhalation, ingestion and/or dermal contact with chemical parameters within perched water and shallow groundwater	Receptor not present	Moderate Risk	(Impact predicted to be moderate	Moderate/Low Risk		Low Risk	(Impact predicted to be negligible given reduced likelihood of							
watercourses, embankments and Great Eastern Main Line railway) and potentially infilled	site maintenance workers associated with the Scheme	Migration and accumulation of ground gases and/or vapours followed by inhalation and/or ignition causing asphyxiation and/or explosion	at baseline	Moderate/Low Risk	adverse given sensitivity of receptor)	Moderate/Low Risk	likelihood of pathway being realised)	Moderate/Low Risk	pathway being realised)							
water features/pits; •On-site vehicle emissions,		Inhalation, ingestion and/or dermal contact with chemical parameters within surface water		Moderate Risk		Moderate/Low Risk		Low Risk								
unrecorded spills and leaks (including from drainage) from the long-term use of the roads;	e vehicle emissions, ded spills and leaks ing from drainage) from grown drainage) from grown use of the roads; ecorded pollution its; including those at Grove Farm (garden centre, RJ Waste Management Recycling, skip hire and rubbish clearance), agricultural land workers and residents including those at property on Grove Farm Matter Matter Management Matter Ma	Off-site workers/visitors/users at industrial, agricultural and commercial premises and recreational facilities including those at Grove Farm (garden centre, RJ Waste Management Recycling, skip hire and rubbish clearance), agricultural land workers and residents including those at property on Grove Farm	Off-site workers/visitors/users at industrial, agricultural and commercial	Off-site workers/visitors/users at industrial, agricultural and commercial	Inhalation, ingestion and dermal contact with chemical parameters in windblown soil-derived dust and ACM fibres*	Low (Moderate/Low) Risk	Moderate/Low (Moderate) Risk	Minor Adverse	Low (Moderate/Low) Risk	Negligible	Low (Low) Risk	Negligible (Minor Beneficial)				
•Four recorded pollution incidents;			Inhalation, ingestion and dermal contact with chemical parameters within perched water and shallow groundwater	Low Risk	Low Risk	Negligible	Low Risk	Negligible	Low Risk	Negligible						
substations, former aerodrome, railway line, agricultural activities: and			centre, RJ Waste Management Recycling, skip hire and rubbish clearance), agricultural land workers and residents including those at property on Grove Farm	centre, RJ Waste Management Recycling, skip hire and rubbish clearance), agricultural land workers and residents including those at property on Grove Farm	centre, RJ Waste Management Recycling, skip hire and rubbish clearance), agricultural land workers and	centre, RJ Waste Management Recycling, skip hire and rubbish clearance), agricultural land workers and	centre, RJ Waste Management Recycling, skip hire and rubbish clearance), agricultural land workers and	centre, RJ Waste Management Recycling, skip hire and rubbish clearance), agricultural land workers and	Migration and accumulation of ground gases and/or vapours followed by inhalation or ignition causing asphyxiation and/or explosion	Moderate/Low Risk	Moderate/Low Risk	Negligible	Moderate/Low Risk	Negligible	Moderate/Low Risk	Negligible
Possible leakage from BPA sub-surface pipeline.					Inhalation, ingestion and dermal contact with chemical parameters within surface water	Low Risk	Moderate/Low Risk	ate/Low Risk Minor Adverse	Low Risk	Negligible	Low Risk	Negligible				
Potential chemical parameters		Leaching/ vertical migration of chemical parameters in soils to underlying groundwater	Moderate/Low Risk	Moderate Risk	Minor Adverse	Moderate/Low Risk	Negligible	Low Risk	Minor Beneficial							
of concern including heavy metals, metalloids, PAH, TPH,		Lateral migration of chemical parameters in groundwater	Moderate/Low Risk	Moderate Risk	Minor Adverse	Moderate/Low Risk	Negligible	Low Risk	Minor Beneficial							



Source	Receptor	Pathway	Classification of risk (baseline)	Classification of risk (construction without mitigation)	Impact (construction without mitigation)	Classification of risk (construction with mitigation)	Impact (construction with mitigation)	Classification of risk (operation)	Impact (during operation phase assuming mitigation was implemented)
unleaded kerosene/naphthalene (associated with former	Brook). Potential new surface water features including attenuation ponds and	Migration of chemical parameters entrained in surface water / run-off	Moderate/Low Risk	Moderate Risk	Minor Adverse	Moderate/Low Risk	Negligible	Low Risk	Minor Beneficial
aerodrome), solvents, asbestos, PCBs, herbicides and pesticides and ground gases.	drainage features	Lateral migration of chemical parameters in shallow groundwater / perched water to surface waters	Moderate/Low Risk	Moderate Risk	Minor Adverse	Moderate/Low Risk	Negligible	Low Risk	Minor Beneficial
		Migration of perched / shallow groundwater and / or surface water via preferential pathways e.g. attenuation ponds (if unlined) and pond outfalls	Pathway not present a	t baseline	(Impact predicted to be minor adverse given sensitivity of receptor)	Moderate/Low Risk	(Impact predicted to be negligible given reduced likelihood of pathway being realised)	Low Risk	(Impact predicted to be negligible given reduced likelihood of pathway being realised)
		Leaching/ vertical migration of chemical parameters in soils to underlying groundwater	Moderate/Low Risk	Moderate Risk	Minor Adverse	Moderate/Low Risk	Negligible	Low Risk	Minor Beneficial
	Off-site groundwater (superficial Secondary A aquifer and Secondary	Lateral migration of chemical parameters in groundwater	Low Risk	Moderate/Low Risk	Minor Adverse	Low Risk	Negligible	Low Risk	Negligible
	Undifferentiated aquifer) and surface water features (Ingrebourne River and Weald Brook)	Migration of chemical parameters entrained in surface water / run-off	Moderate/Low Risk	Moderate Risk	Minor Adverse	Moderate/Low Risk	Negligible	Low Risk	Minor Beneficial
		Lateral migration of chemical parameters in shallow groundwater to surface waters	Low Risk	Moderate/Low Risk	Minor Adverse	Low Risk	Negligible	Low Risk	Negligible
	On-site underground services including the NG high pressure gas main and BPA	Chemical attack of buried structures in contact with chemical parameters in soil or groundwater	Moderate/Low Risk	Moderate/Low Risk	Negligible	Moderate/Low Risk	Negligible	Low Risk	Minor Beneficial
	pipeline, existing structures, piles and foundations associated with residential, industrial, agricultural and commercial properties and future structures, services, piles and foundations	Migration of ground gases and/or vapours along preferential pathways including permeable ground, services trenches and service entry points and accumulation in enclosed spaces such as services ducts or access points	Moderate/Low Risk	Moderate/Low Risk	Negligible	Moderate/Low Risk	Negligible	Low Risk	Minor Beneficial
	price and realisations	Chemical attack of buried structures in contact with chemical parameters in soil or groundwater	Moderate/Low Risk	Moderate/Low Risk	Negligible	Moderate/Low Risk	Negligible	Low Risk	Minor Beneficial
	Off-site existing structures, services piles	Migration of ground gases and/or vapours along preferential pathways including permeable ground, services trenches and service entry points and accumulation in enclosed spaces such as services ducts or access points	Low Risk	Low Risk	Negligible	Low Risk	Negligible	Low Risk	Negligible
	and foundations associated with residential, industrial, agricultural and commercial properties	Migration of contamination in shallow groundwater and uptake by crops	Very Low Risk	Very Low Risk	Negligible	Very Low Risk	Negligible	Very Low Risk	Negligible
		Inhalation, ingestion and dermal contact with contaminants in soil and windblown soil-derived dust by livestock	Very Low Risk	Very Low Risk	Negligible	Very Low Risk	Negligible	Very Low Risk	Negligible
Potentially impacted soil/groundwater and		Inhalation, ingestion and dermal contact with chemical parameters in soil, soil-derived dust and ACM fibres	Moderate/Low Risk	Moderate Risk	Minor Adverse	Moderate/Low Risk	Negligible	Low Risk	Minor Beneficial
gases/vapours associated with the following off site sources:	On-site members of the public in public	Inhalation, ingestion and dermal contact with chemical parameters within perched water and shallow groundwater	Moderate/Low Risk	Moderate Risk	Minor Adverse	Moderate/Low Risk	Negligible	Low Risk	Minor Beneficial
Made Ground/infill of unknown provenance associated with	spaces within the Scheme boundary	Migration and accumulation of ground gases and/or vapours followed by inhalation or ignition causing asphyxiation and/or explosion	Moderate/Low Risk	Moderate/Low Risk	Negligible	Moderate/Low Risk	Negligible	Moderate/Low Risk	Negligible
existing roads, off site development infilled pits/ponds/watercourses;		Inhalation, ingestion and dermal contact with chemical parameters within surface water	Moderate/Low Risk	Moderate Risk	Minor Adverse	Moderate/Low Risk	Negligible	Low Risk	Minor Beneficial
•Activities and land uses associated with Grove Farm,		Inhalation, ingestion and dermal contact with chemical parameters in soil, soil-derived dust and ACM fibres		Moderate/Low Risk		Moderate/Low Risk		Low Risk	
including a garden centre and RJ Waste Management Recycling, skip hire and rubbish	On-site future construction workers and site maintenance workers associated with	Inhalation, ingestion and dermal contact with chemical parameters within perched water and shallow groundwater	Receptor not	Moderate/Low Risk	(Impact predicted to be moderate adverse given	Low Risk	Impact predicted to be minor adverse	Low Risk	(Impact predicted to be negligible given reduced likelihood of
Recycling, skip hire and rubbish clearance; •Other land uses including fuel stations (former and active);	the Scheme	ssociated with Migration and accumulation of ground good and/or	present at baseline	Moderate/Low Risk	sensitivity of receptor)	Moderate/Low Risk Moderate/Low	given the mitigation measures	Moderate/Low Risk	reduced likelihood of
electricity substations, sewage treatment works, former	On aits ground water (average)	parameters within surface water		Moderate/Low Risk		Risk		Low Risk	
aerodrome (wider area from the Scheme boundary), vehicle	On-site groundwater (superficial Secondary A aquifer and Secondary	Leaching/ vertical migration of chemical parameters in soils to underlying groundwater	Moderate/Low Risk	Moderate/Low Risk	Negligible	Moderate/Low Risk	Negligible	Moderate/Low Risk	Negligible



Source	Receptor	Pathway	Classification of risk (baseline)	Classification of risk (construction without mitigation)	Impact (construction without mitigation)	Classification of risk (construction with mitigation)	Impact (construction with mitigation)	Classification of risk (operation)	Impact (during operation phase assuming mitigation was implemented)
service garages, garden centre, farms and associated agricultural activities, vehicle cleaning services; and •Eight recorded pollution incidents. Potential chemical parameters of concern include a range of organics and inorganics- heavy metals, metalloids, PAH, TPH, unleaded kerosene/naphthalene (associated with former aerodrome), solvents, asbestos, PCBs, herbicides and pesticides.	Undifferentiated aquifer). Surface water features (Ingrebourne River and Weald Brook). Potential new surface water features including attenuation ponds and drainage features	Lateral migration of chemical parameters in groundwater	Low Risk	Low Risk	Negligible	Low Risk	Negligible	Low Risk	Negligible
		Migration of chemical parameters entrained in surface water / run-off	Moderate/Low Risk	Moderate/Low Risk	Negligible	Moderate/Low Risk	Negligible	Moderate/Low Risk	Negligible
		Lateral migration of chemical parameters in shallow groundwater / perched water to surface waters	Moderate/Low Risk	Moderate/Low Risk	Negligible	Moderate/Low Risk	Negligible	Moderate/Low Risk	Negligible
		Migration of perched / shallow groundwater and / or surface water via preferential pathways e.g. via piling	Receptor not present	at baseline	Impact predicted to be moderate adverse given sensitivity of receptor)	Low Risk	Impact predicted to be minor adverse given the mitigation measures	Low Risk	(Impact predicted to be negligible given reduced likelihood of pathway being realised)
	On-site underground services including the NG high pressure gas main and BPA pipeline, existing structures, piles and foundations associated with residential, industrial, agricultural and commercial properties and future structures, services, piles and foundations	Chemical attack of buried structures in contact with chemical parameters in soil or groundwater	Moderate/Low Risk	Moderate/Low Risk	Negligible	Moderate/Low Risk	Negligible	Moderate/Low Risk	Negligible
		Migration of ground gases and/or vapours along preferential pathways including permeable ground, services trenches and service entry points and accumulation in enclosed spaces such as services ducts or access points	Low Risk	Low Risk	Negligible	Low Risk	Negligible	Low Risk	Negligible

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