

A20.7

Updated Conceptual Site Model

Source	Receptor	Pathway	Pollutant Linkage	Severity	Likelihood	Consequence
Construction						
Contaminants within soil and groundwater	Human health (construction workers)	Dermal contact, ingestion and inhalation of impacted soil, dust, fibres (asbestos) and waters	PL1	Medium Contaminants identified above residential GAC, mainly PAH and metals in multiple locations with occasional commercial GAC exceedances in primarily associated with made ground, along with asbestos fibres in some locations.	Likely Made ground and natural ground will be excavated for infrastructure including stations box locations and retained cut which will result in construction workers coming into direct contact with excavated material and mobilised dust and fibres.	Moderate
		Migration of ground gases and vapours to shallow pits or enclosed spaces	PL2	Medium Ground gas (carbon dioxide) above WELs in several locations. Methane also detected in some locations. Carbon dioxide can be present in sub-surface from both natural (e.g. organic decay, carbonate rocks) and anthropogenic sources.	Likely Construction will involve excavation of enclosed spaces in which ground gas is likely to build up to potentially hazardous concentrations, and in which construction workers will enter.	Moderate
	Human health (adjacent residents / workers, transient foot traffic)	Dermal contact, ingestion and inhalation of windblown soil, dust, fibres (asbestos) during construction	PL3	Medium Contaminants identified above residential GAC, mainly PAH and metals in multiple locations with occasional GAC exceedances primarily associated with made ground, along with asbestos fibres in some locations.	Likely Made ground will be excavated for infrastructure including stations and retained cut which has potential to mobilise dust and fibres which can spread beyond the immediate Works Area, particularly in dry 'dust generating' conditions.	Moderate
		Migration of ground gases into homes or workplaces via preferential pathways during construction	PL4	Mild Ground gas (carbon dioxide and methane) detected in sub surface in several areas, however, flow rates are generally low and initial C665 assessment indicates a Characteristic Situation (CS) of 1 (low risk potential source) with no gas protection measures necessary.	Unlikely Low risk gas source identified, unlikely that complete pollutant linkage will be present.	Negligible
	Groundwater	Leaching and migration of contaminants through natural deposits and made ground	PL5	Medium Various contaminants have been identified in the groundwater including metallic (mainly lead, arsenic, chromium, iron), inorganic (ammoniacal nitrogen, chloride) and organic (TPH, PAH) contaminants. The majority of the impact was observed within the Dublin Airport station location as well as Dublin city centre, where many of the contaminants cannot be attributed to a specific source. The majority of the groundwater across the route is considered to be of low vulnerability, with some smaller areas of higher vulnerability associated with higher permeability superficial deposits and limestone bedrock near the ground surface (Dublin Airport).	Low Likelihood Construction will involve excavation and removal of made ground (potential contaminant source) in station locations as well as retained cut sections. There will be some short-term potential for contaminant migration during construction as ground is disturbed however construction will include use of retaining walls (e.g. secant pile walls) in cut and station locations which will limit creation of new groundwater pathways.	Moderate / Low
		Surface water run-off from stockpiled excavated material	PL6	Medium Made ground contains potentially leachable metallic, inorganic and organic contaminants which have the potential to migrate to surrounding ground and water.	Low Likelihood While a pathway is potentially present the majority of groundwater throughout the proposed Project is considered to be of low vulnerability with areas of moderate to high at Dublin Airport Station (limestone at or near surface), near Tara Station and Griffith Park Station.	Moderate / Low
		Leaks and spills from site plant and materials storage	PL7	Severe Plant will be in use throughout construction of the proposed Project requiring storage of fuel and lubricants to operate. A worst-case scenario of a large-scale fuel spill could result in acute risks to human health or short-term pollution of sensitive groundwater receptors.	Low Likelihood Likelihood of the worst-case scenario occurring is considered low, however smaller spills could occur on a more regular basis.	Moderate
		Discharge of intercepted contaminated groundwater during passive or active dewatering	PL8	Considered under Hydrogeology (Chapter 19)	Considered under Hydrogeology (Chapter 19)	Not assessed

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	Surface water, ecological receptors	Migration / mobilisation of contaminated shallow groundwater through drift deposits / made ground	PL9	Mild Various contaminants have been identified in the groundwater including metallic (mainly lead, arsenic, chromium, iron), inorganic (ammoniacal nitrogen, chloride) and organic (TPH, PAH) contaminants. The majority of the impact was observed within the Dublin Airport station location as well as Dublin city centre, where many of the contaminants cannot be attributed to a specific source.	Low Likelihood Surface water present in some locations, generally not directly adjacent to surface works with some exceptions (e.g. Broad Meadow River), however a potential pathway remains. Construction will involve excavation and removal of made ground (potential source) in station locations as well as retained cut sections. There will be some short-term potential for contaminant migration as ground is disturbed however construction will include use of retaining walls (e.g. secant pile walls) which will limit creation of new groundwater pathways.	Low
		Surface water run-off from stockpiled excavated material	PL10	Medium Made ground contains potentially leachable metallic, inorganic and organic contaminants which have the potential to affect surrounding ground and water.	Low Likelihood While a pathway is potentially present surface watercourses are not widespread across the proposed Project, and pathway will only be present in small areas.	Moderate / Low
		Leaks and spills from site plant and materials storage	PL11	Severe Plant will be in use throughout construction of the proposed Project. A worst-case scenario of a large-scale fuel spill could result in acute risks to human health or short-term pollution of sensitive waters such as rivers.	Low Likelihood Likelihood of the worst-case scenario occurring is considered low, however smaller spills could occur on a more regular basis.	Moderate
		Discharge of intercepted contaminated groundwater during passive or active dewatering	PL12	Considered under Hydrogeology (Chapter 19)	Considered under Hydrogeology (Chapter 19)	Not assessed
	Property	Direct contact with sub-surface materials including made ground.	PL13	Mild Chemical attack / aggressive ground conditions resulting in damage and degradation to sub surface structures.	Likely Direct contact of construction materials with sub-surface likely.	Moderate / Low
		Migration of ground gases into property through preferential pathways posing a potential explosion risk from ignition of explosive gases	PL14	Mild No specific source identified with high methane potential according to the available information. Ground gas monitoring indicates methane concentrations below the LEL within the subsurface.	Unlikely C665 assessment based on the available data suggests CS1 (low risk) category with no gas protection measures necessary.	Negligible
		Operation				
Contaminants within soil and groundwater	Human health (maintenance workers)	Dermal contact, ingestion and inhalation of soil, dust, fibres (asbestos) and waters during routine maintenance	PL15	Medium Contaminants identified above residential GAC, mainly PAH and metals in multiple locations with occasional commercial GAC exceedances in primarily associated with made ground, along with asbestos fibres in some locations.	Low Likelihood Exposure to sub-surface materials will be more limited post-construction, however access may still be required to areas of the sub surface including areas that may contain made ground where it is not covered or enclosed.	Moderate / Low
		Migration of ground gases and vapours to enclosed spaces	PL16	Medium Ground gas (carbon dioxide) present above WELs in several locations. Methane also detected in some locations albeit at low concentrations. Carbon dioxide can be present in sub-surface from both natural sources (e.g. organic decay, carbonate rocks)	Low Likelihood Enclosed spaces will be present mainly in station and tunnel locations as well as service ducts. These structures will be fully sealed to prevent water ingress which will also limit potential for gas migration in addition to which these spaces will have air circulation / ventilation systems. However, some potential remains for maintenance workers to access service ducts or runs outside the main station areas which could be at risk of gas accumulations.	Moderate / Low
	Human health (end users, adjacent residents, workers)	Dermal contact, ingestion and inhalation of wind-blown soil, dust, fibres (asbestos) from retained surface soils	PL17	Medium Contaminants identified above residential GAC, mainly PAH and metals in multiple locations with occasional GAC exceedances	Unlikely Made ground will be excavated and removed from the site for infrastructure including stations and retained cut which will reduce the potential contaminant source in some areas and limit potential for exposure. Any residual made ground will mostly be	Low

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				primarily associated with made ground, along with asbestos fibres in some locations.	covered by hard standing and soft landscaping / planting which will further reduce potential for mobilising soil and dust. Small residual risk of exposure during operation.	
		Migration and accumulation of ground gases into homes or workplaces via preferential pathways created during construction	PL18	Mild Ground gas (carbon dioxide and methane) detected in sub surface in several areas, however, flow rates are generally low and initial C665 assessment indicates a Characteristic Situation (CS) of 1 (low risk potential source) with no gas protection measures necessary.	Unlikely Low risk gas source identified, unlikely that complete pollutant linkage will be present during operation.	Negligible
	Groundwater	Leaching and migration of contaminants	PL19	Mild Various contaminants have been identified in the groundwater including metallic (mainly lead, arsenic, chromium, iron), inorganic (ammoniacal nitrogen, chloride) and organic (TPH, PAH) contaminants. The majority of the impact was observed within the Dublin Airport station location as well as Dublin city centre, where many of the contaminants cannot be attributed to a specific source. The majority of the groundwater across the route is considered to be of low vulnerability, with some smaller areas of higher vulnerability associated with higher permeability superficial deposits and limestone bedrock near the ground surface (Dublin Airport).	Unlikely Construction will involve excavation and removal of made ground (potential source) in station locations as well as retained cut sections reducing potential contaminant input in many areas. Operation will not result in further disturbance to the ground and subsequent additional mobilisation of contaminants is considered unlikely	Negligible
		Surface water runoff from placed excavated material	PL20	Medium Made ground contains potentially leachable metallic, inorganic and organic contaminants which have the potential to affect surrounding ground and water.	Low Likelihood If excavated material containing contaminants is reused within the scheme there is the potential for new migration pathways to be introduced, albeit the majority of groundwater throughout the proposed Project is considered to be of low vulnerability with areas of moderate to high at Dublin Airport Station (limestone at or near surface), near Tara Station and Griffith Park Station.	Moderate / Low
		Migration of contaminated shallow groundwater through drainage channels and associated granular bedding materials	PL21	Medium Made ground contains potentially leachable metallic, inorganic and organic contaminants which have the potential to affect surrounding ground and water.	Low Likelihood New pathways may be introduced via construction of drainage runs and channels required to enable operation of the scheme.	Moderate / Low
		Discharge of intercepted contaminated groundwater	PL22	Considered under Hydrogeology (Chapter 19)	Considered under Hydrogeology (Chapter 19)	Not assessed
		Leaks / spills from trains and other operational plant	PL23	Mild While trains are electrically powered, they will still require lubricants and maintenance; in addition other maintenance plant will be hydrocarbon powered with the potential for leaks and spills during operation, fuelling and maintenance.	Unlikely Likelihood of the worst-case leak / spill scenario occurring is considered low, however smaller spills could occur on a more regular basis. The scheme includes a track drainage system which will capture emissions from the track, and the depot and station areas also include drainage systems and provision for safe storage and transfer of materials.	Negligible
	Surface water, ecological receptors	Leaching and migration of contaminants	PL24	Mild Various contaminants have been identified in the groundwater including metallic (mainly lead, arsenic, chromium, iron), inorganic (ammoniacal nitrogen, chloride) and organic (TPH, PAH) contaminants. The majority of the impact was observed within the Dublin Airport station location as well as Dublin city centre, where many of the contaminants cannot be attributed to a specific source.	Unlikely Construction will involve excavation and removal of made ground (potential source) in station locations as well as retained cut sections reducing contaminant input in many areas. Operation will not result in further disturbance to the ground and subsequent additional mobilisation of contaminants is considered unlikely.	Negligible

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		Surface water runoff from placed excavated material	PL25	Medium Made ground contains potentially leachable metallic, inorganic and organic contaminants which have the potential to affect surface water.	Low Likelihood If excavated material containing contaminants is reused within the scheme there is the potential for new migration pathways to be introduced, albeit the majority of the proposed Project is not adjacent to surface water.	Moderate / Low
		Migration of contaminated shallow groundwater through drainage channels and associated granular bedding materials	PL26	Medium Made ground contains potentially leachable metallic, inorganic and organic contaminants which have the potential to affect surrounding surface water.	Low Likelihood New pathways may be introduced via construction of drainage runs and channels required to enable operation of the scheme.	Moderate / Low
		Discharge of intercepted contaminated groundwater	PL27	Considered under Hydrogeology (Chapter 19)	Considered under Hydrogeology (Chapter 19)	Not assessed
		Leaks / spills from trains and other operational plant	PL28	Mild While trains are electrically powered they will still require lubricants and maintenance; in addition other maintenance plant will be hydrocarbon powered with the potential for leaks and spills during operation, fuelling and maintenance.	Unlikely Likelihood of the worst-case leak / spill scenario occurring is considered low, however smaller spills could occur on a more regular basis. The scheme includes a track drainage system which will capture emissions from the track, and the depot and station areas also include drainage systems and provision for safe storage and transfer of materials.	Negligible
	Property	Direct contact with sub-surface materials including made ground.	PL29	Mild Chemical attack / aggressive ground conditions resulting in damage and degradation to sub surface structures.	Likely Direct contact of construction materials with sub-surface likely.	Moderate / Low
		Migration of ground gases into property through preferential pathways posing a potential explosion risk from ignition of explosive gases	PL30	Mild No specific source identified with high methane potential. Ground gas monitoring indicates methane concentrations below the LEL within the subsurface.	Unlikely C665 assessment suggests CS1 (low risk) category with no gas protection measures necessary.	Negligible