

**A66 Northern Trans-Pennine Project
TR010062**

**3.4 Environmental Statement
Appendix 9.3 Geology and Soils
Detailed Risk Assessment and
Conceptual Site Models**

APFP Regulations 5(2)(a)

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Procedure) Regulations 2009**

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**3.4 ENVIRONMENTAL STATEMENT
APPENDIX 9.3 GEOLOGY AND SOILS DETAILED RISK
ASSESSMENT AND CONCEPTUAL SITE MODELS**

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9.3 Geology and Soils Detailed Risk Assessment and Conceptual Site Models

9.3.1 Methodology tables

9.3.1.1 The potential contamination sources inside 250m of the proposed scheme have been assigned an impact score. The impact scores have been defined for potential contamination sources using the following criteria proximity zones, potentially contaminative land use, and the proposed vertical alignment. Professional judgement has been applied for determining the criteria used to assign the impact scores.

Table 1: Proximity zone definition

Zone No	Definition
Zone 1	All land on or within the footprint of the route alignment and including a 10m margin either side, and including side shoots such as road realignments, spoil borrow or storage areas etc.
Zone 2	All land within 50m of the edge of Zone 1 land.
Zone 3	All land from between 50 and 250m from the edge of Zone 1 land.

Table 2: Potentially contaminative land uses

Class	Generic Description	Typical Land Uses
1	Low risk of potential contamination, or less hazardous chemicals in use	Farms (ancillary buildings and areas for storing chemicals, fuel, slurry ponds etc.)
		Warehouses
		Goods yards
		Hospitals
		Artificial modified ground
		Builders yards
		Retail and business parks
2	Medium risk of potential contamination, more hazardous chemicals in possible use	Engineering workshops
		Railways/ disused railway lines
		Brick works
		Dry cleaners (retail)
		Sewage works
		Former clay pits and quarries
		Cement/ asphalt works
		Car breakers
		Garage workshops
		Waste transfer facilities
		Paper works
		Power stations
Glass works		

Class	Generic Description	Typical Land Uses
		Timber treatment works
		Foot and mouth burials
		Metal manufacturing and plating
		Depots
		Scrap yards
		Cemetery
		British Gypsum Tip
3	High risk of potential contamination, hazardous chemicals likely to be present	Gas and coke works
		Landfills and historic landfills
		Petrol filling stations
		Oil depots
		Iron and steel works
		Historical foundries
		Chemical works

Table 3: Site Rating Method

Contamination risk / class	Proximity to Route	Vertical Alignment	Impact score
1 – low risk	Zone 1	Viaduct / Embankment	2
		Cutting / At grade / Land Take/ Attenuation Ponds	3
	Zone 2	Viaduct / Embankment	1
		Cutting / At grade / Land Take/ Attenuation Ponds	2
	Zone 3	Viaduct / Embankment	0
		Cutting / At grade / Land Take/ Attenuation Ponds	1
2- medium risk	Zone 1	Viaduct / Embankment	3
		Cutting / At grade / Land Take/ Attenuation Ponds	4
	Zone 2	Viaduct / Embankment	2
		Cutting / At grade / Land Take/ Attenuation Ponds	3
	Zone 3	Viaduct / Embankment	1
		Cutting / At grade / Land Take/ Attenuation Ponds	2
3 – high risk	Zone 1	Viaduct / Embankment	4
		Cutting / At grade / Land Take/ Attenuation Ponds	5
	Zone 2	Viaduct / Embankment	3
		Cutting / At grade / Land Take/ Attenuation Ponds	4
	Zone 3	Viaduct / Embankment	2
		Cutting / At grade / Land Take/ Attenuation Ponds	3

Table 4: Summary of sites scoped in for Detailed Risk Assessment based on baseline Impact score 1 and 2

Source ID ¹	Description	Scheme	Proximity zone ²	Land use class	Vertical Alignment	Impact score
CL01-02	Quarry	M6 Junction 40 to Kemplay Bank	Zone 3	1	Cutting and attenuation pond	1
CL01-03	Dismantled Railway (North Eastern Railway, Penrith)	M6 Junction 40 to Kemplay Bank	Zone 3	2	Cutting and attenuation pond	2
CL01-04	Dismantled Railway - Penrith Loop	M6 Junction 40 to Kemplay Bank	Zone 3	2	Cutting and attenuation pond	2
CL01-07	Penrith Industrial Estate	M6 Junction 40 to Kemplay Bank	Zone 2	1	At grade	2
CL01-08	Transport Service Area	M6 Junction 40 to Kemplay Bank	Zone 3	2	At grade and Embankment	2
CL01-09	Historic rail line	M6 Junction 40 to Kemplay Bank	Zone 3	2	At grade	2
CL01-12	Historic rail line	M6 Junction 40 to Kemplay Bank	Zone 3	2	At grade	2
CL02-01	Farm Outbuildings	M6 Junction 40 to Kemplay Bank	Zone 3	1	At grade and embankment	1
CL02-03	Bleach Mill	M6 Junction 40 to Kemplay Bank	Zone 3	2	At grade	2
CL02-04	Beacon Farm	M6 Junction 40 to Kemplay Bank	Zone 3	1	Embankment	1
CL02-05	Depot	M6 Junction 40 to Kemplay Bank	Zone 3	2	At grade	2

¹ All land over 250m from the edge of Zone 1 land have not been considered for the detailed risk assessment. The source IDs listed in Table 4: Summary of sites scoped in for Detailed Risk Assessment based on baseline Impact score 1 and 2 Table 4 are those identified within 250m from the edge of Zone 1, sites outside of 250m have been scoped out therefore source IDs may not be sequential.

Source ID ¹	Description	Scheme	Proximity zone ²	Land use class	Vertical Alignment	Impact score
CL02-06	Heap (Potential infilled ground)	M6 Junction 40 to Kemplay Bank	Zone 3	1	At grade	1
CL02-08	Ambulance and Fire Station	M6 Junction 40 to Kemplay Bank	Zone 3	1	At grade	1
CL02-13	Electric Sub Station	M6 Junction 40 to Kemplay Bank	Zone 3	2	At grade and cutting	2
CL02-14	Electrical Sub Station	M6 Junction 40 to Kemplay Bank	Zone 3	2	Embankment	2
CL02-17	Carleton Hill Farm	M6 Junction 40 to Kemplay Bank	Zone 3	1	Cutting	1
CL03-01	Farm (Brougham Castle Lodge)	Penrith to Temple Sowerby	Zone 3	1	At grade and embankment	1
CL03-02	Flagstaff Rifle Range	Penrith to Temple Sowerby	Zone 3	1	At grade and embankment	1
CL03-08	Historic Tank	Penrith to Temple Sowerby	Zone 3	1	At grade and embankment	1
CL03-15	Whinfell House Farm	Penrith to Temple Sowerby	Zone 2	1	Cutting	2
CL03-17	Winderwath Farm	Penrith to Temple Sowerby	Zone 2	1	Embankment	2
CL04-01	Farm (Skygarth Farm)	Temple Sowerby to Appleby	Zone 3	1	Land take	1
CL04-06	Possible quarried/landfilled area	Temple Sowerby to Appleby	Zone 3	1	At grade	1
CL04-07	Farm (Halefield Farm)	Temple Sowerby to Appleby	Zone 3	1	At grade	1

Source ID ¹	Description	Scheme	Proximity zone ²	Land use class	Vertical Alignment	Impact score
CL04-09	Sewage	Temple Sowerby to Appleby	Zone 3	2	At grade	2
CL04-15	Rectory Farm	Temple Sowerby to Appleby	Zone 3	1	Land take	1
CL04-16	Crossfell House Farm	Temple Sowerby to Appleby	Zone 3	1	Land take	1
CL04-17	Cemetery	Temple Sowerby to Appleby	Zone 3	2	At grade	2
CL04-18	Farm (Kirby Thore Hall)	Temple Sowerby to Appleby	Zone 3	1	At grade	1
CL04-20	Commercial industry units	Temple Sowerby to Appleby	Zone 2	1	At grade	2
CL04-29	Wood Processing Works (Westmorland Woodfuel)	Temple Sowerby to Appleby	Zone 3	1	Cutting	1
CL04-30	British Gypsum Tip	Temple Sowerby to Appleby	Zone 3	2	Land take	2
CL04-36	Holme Farm	Temple Sowerby to Appleby	Zone 3	1	At grade	1
CL04-40	Farm (Roger Head/ Crackenthorpe Stud)	Temple Sowerby to Appleby	Zone 3	1	At grade	1
CL04-41	Farm (Colby Laithes)	Temple Sowerby to Appleby	Zone 3	1	At grade	1
CL04-45	Old Quarry (now infilled)	Temple Sowerby to Appleby	Zone 3	1	Cutting	1
CL04-48	Farm (Uptop)	Temple Sowerby to Appleby	Zone 3	1	Cutting	1

Source ID ¹	Description	Scheme	Proximity zone ²	Land use class	Vertical Alignment	Impact score
CL04-50	Railways	Temple Sowerby to Appleby	Zone 3	2	Embankment	2
CL04-53	Slurry storage area	Temple Sowerby to Appleby	Zone 2	1	At grade and embankment	2
CL04-54	Slurry storage area	Temple Sowerby to Appleby	Zone 3	1	At grade and land take	1
CL04-55	Farm (Roman Vale)	Temple Sowerby to Appleby	Zone 3	1	At grade and embankment	1
CL04-56	Farm (Chapel Hill)	Temple Sowerby to Appleby	Zone 2	1	Cutting	2
CL04-61	Slurry pond	Temple Sowerby to Appleby	Zone 3	1	At grade	1
CL04-63	Farm depot	Temple Sowerby to Appleby	Zone 2	1	At grade	2
CL06-01	Farm (Far End Bank)	Appleby to Brough	Zone 3	1	Cutting	1
CL06-02	Farm (New Hall)	Appleby to Brough	Zone 3	1	Cutting	1
CL06-03	Historic Gravel Pit (1.5 Ha)	Appleby to Brough	Zone 2	1	Cutting	2
CL06-07	Farm (Platts)	Appleby to Brough	Zone 3	1	Cutting	1
CL06-10	Farm (Eden Vale)	Appleby to Brough	Zone 3	1	At grade and embankment	1
CL06-19	Former Coal Depot	Appleby to Brough	Zone 3	2	Cutting	2
CL06-20	Heron's Trucking	Appleby to Brough	Zone 3	2	Cutting	2

Source ID ¹	Description	Scheme	Proximity zone ²	Land use class	Vertical Alignment	Impact score
CL06-21	Farm (Toddygill Hall & tank)	Appleby to Brough	Zone 2	1	Land take and cutting	2
CL06-22	Farm (East Field Farm and Sheep Dip)	Appleby to Brough	Zone 2	1	Cutting	2
CL06-24	Farm (Fithholme Farm)	Appleby to Brough	Zone 2	1	Land take and At grade	2
CL06-25	Farm (Landrigg farm)	Appleby to Brough	Zone 3	1	Land take	1
CL06-30	Slurry Pond	Appleby to Brough	Zone 3	1	Settlement pond	1
CL06-36	Sewage Works	Appleby to Brough	Zone 3	2	At grade	2
CL06-40	Farm (Row end)	Appleby to Brough	Zone 3	1	Land take	1
CL06-42	Historic sewage works	Appleby to Brough	Zone 3	2	At grade	2
CL06-52	Farm (The Warren)	Appleby to Brough	Zone 2	1	Cutting	2
CL06-53	Brough Industrial Estate	Appleby to Brough	Zone 3	1	Cutting	1
CL07-02	Quarry (Clint)	Bowes Bypass	Zone 3	1	Cutting	1
CL07-04	Cemetery	Bowes Bypass	Zone 3	2	Cutting	2
CL07-10	Low Field Farm	Bowes Bypass	Zone 3	1	Land take	1
CL07-13	High Broats Farm	Bowes Bypass	Zone 3	1	At grade	1
CL07-15	Hulands quarry (active)	Bowes Bypass	Zone 3	1	At grade and embankment	1
CL07-20	Farm (Lyndale House)	Bowes Bypass	Zone 3	1	Cutting	1

Source ID ¹	Description	Scheme	Proximity zone ²	Land use class	Vertical Alignment	Impact score
CL07-23	Swinholme Farm	Bowes Bypass	Zone 3	1	At grade	1
CL07-24	Disused garage	Bowes Bypass	Zone 3	2	Cutting	2
CL08-02	Poultry House	Cross Lanes to Rokeby	Zone 2	1	At grade	2
CL08-05	Birk House Farm	Cross Lanes to Rokeby	Zone 3	1	At grade	1
CL08-07	Birk House Farm	Cross Lanes to Rokeby	Zone 3	1	At grade	1
CL08-09	Birk House Farm	Cross Lanes to Rokeby	Zone 3	1	Cutting	1
CL08-10	Tank	Cross Lanes to Rokeby	Zone 3	1	Cutting	1
CL08-11	Electricity Substation	Cross Lanes to Rokeby	Zone 3	2	At grade	2
CL08-15	North Bitts Farm	Cross Lanes to Rokeby	Zone 3	1	At grade and embankment	1
CL08-17	Slurry Pond	Cross Lanes to Rokeby	Zone 3	1	At grade	1
CL08-18	Dent House Farm	Cross Lanes to Rokeby	Zone 3	1	Embankment	1
CL09-03	Browson Bank Farm	Stephen Bank to Carkin Moor	Zone 3	1	Embankment	1
CL09-06	Old quarries	Stephen Bank to Carkin Moor	Zone 2	1	Cutting and At grade	2
CL09-07	General quarrying (disused)	Stephen Bank to Carkin Moor	Zone 3	1	Cutting	1
CL09-08	Quarry (disused)	Stephen Bank to Carkin Moor	Zone 3	1	Cutting and At grade	1
CL09-11	Tank	Stephen Bank to Carkin Moor	Zone 2	1	Cutting	2
CL09-14	Mainsgill Farm	Stephen Bank to Carkin Moor	Zone 3	1	Land take and attenuation pond	1

Source ID ¹	Description	Scheme	Proximity zone ²	Land use class	Vertical Alignment	Impact score
CL09-15	Carkin Moor Farm	Stephen Bank to Carkin Moor	Zone 3	1	Cutting and At grade	1
CL09-16	Disused quarry	Stephen Bank to Carkin Moor	Zone 3	1	Cutting	1
CL09-19	Unnamed depot	Stephen Bank to Carkin Moor	Zone 3	2	Cutting	2
CL09-20	Foxhill Caravan	Stephen Bank to Carkin Moor	Zone 3	1	Land take	2
CL09-21	Unnamed depot	Stephen Bank to Carkin Moor	Zone 3	1	At grade	1
CL09-23	Farm (Greenbank)	Stephen Bank to Carkin Moor	Zone 3	1	Attenuation pond	1
CL11-01	Scotch Corner Autos	A1(M) Junction 53 Scotch Corner	Zone 3	2	At grade	2
CL11-02	Farm/ outbuildings	A1(M) Junction 53 Scotch Corner	Zone 3	1	At grade	1
CL11-04	Scrap yard	A1(M) Junction 53 Scotch Corner	Zone 3	1	At grade	1
CL11-06	Electrical Sub Station	A1(M) Junction 53 Scotch Corner	Zone 3	1	At grade	1
CL11-07	Caravan Park (Scotch Corner)	A1(M) Junction 53 Scotch Corner	Zone 3	1	Land take	1
FM05	Foot and mouth Burial Site (Warcop Range)	06	Zone 3	2	Land Take	2
FM12	Foot and mouth Burial Site (Warcop Range)	06	Zone 3	2	Land Take	2
FM13	Foot and mouth Burial Site	06	Zone 3	2	Land Take	2

Source ID ¹	Description	Scheme	Proximity zone ²	Land use class	Vertical Alignment	Impact score
FM22	Foot and mouth Burial Site (Bedlands Bank) 152 Cattle, 16 Sheep, 800 Pigs	04	Zone 3 – (scoped in as zone 3 as only postcode is provided and not size of site)	2	Land Take	2
FM27	Foot and mouth Burial Site (Linden House) 556 Pigs	04	Zone 3	2	Land Take	2

Table 5: Summary of sites scoped in for Detailed Risk Assessment based on baseline Impact score 3, 4 and 5

Source ID	Description	Scheme	Proximity zone	Land use class	Vertical Alignment	Impact score
CL01-05	Railway Line	M6 Junction 40 to Kemplay Bank	Zone 1	2	Cutting	4
CL01-06	Skirsgill Farm Historic Landfill	M6 Junction 40 to Kemplay Bank	Zone 1	3	At grade and embankment	5
CL01-13	Depot	M6 Junction 40 to Kemplay Bank	Zone 1	2	Embankment and cutting	3
CL02-02	Farm (Happy Horse Riding Centre)	M6 Junction 40 to Kemplay Bank	Zone 1	1	Embankment and cutting	3
CL02-07	Petrol Filling Station	M6 Junction 40 to Kemplay Bank	Zone 3	3	At grade	3
CL02-09	Penrith Hospital	M6 Junction 40 to Kemplay Bank	Zone 1	1	Cutting	3
CL02-10	New Penrith Fire Station training area	M6 Junction 40 to Kemplay Bank	Zone 1	1	Cutting	3
CL02-11	Storage yard	M6 Junction 40 to Kemplay Bank	Zone 1	1	Cutting	3

Source ID	Description	Scheme	Proximity zone	Land use class	Vertical Alignment	Impact score
CL02-15	Winters Park Landfill	M6 Junction 40 to Kemplay Bank	Zone 3	3	At grade	3
CL03-07	Farm (Whinfell Park Cottages)	Penrith to Temple Sowerby	Zone 1	1	At grade and embankment	3
CL03-09	Farm outbuilding	Penrith to Temple Sowerby	Zone 1	1	Cutting and embankment	3
CL03-11	High Barn Farm	Penrith to Temple Sowerby	Zone 1	1	At grade and embankment	3
CL04-02	Dismantled railway	Temple Sowerby to Appleby	Zone 1	2	At grade	4
CL04-03	Farm (JM & SM Dairy Farm)	Temple Sowerby to Appleby	Zone 1	1	Cutting and At grade	3
CL04-05	Farm (Eden View)	Temple Sowerby to Appleby	Zone 1	1	At grade	3
CL04-08	Farm (Street House)	Temple Sowerby to Appleby	Zone 1	1	At grade	3
CL04-10	Garage/ Haulage Yard	Temple Sowerby to Appleby	Zone 1	2	At grade	4
CL04-12	Farm (Bridge End Farm)	Temple Sowerby to Appleby	Zone 1	1	At grade	3
CL04-14	Petrol Filling Station (BP)	Temple Sowerby to Appleby	Zone 1	3	At grade	5
CL04-31	Railways	Temple Sowerby to Appleby	Zone 1	2	At grade	4
CL04-33	Farm (Powis House)	Temple Sowerby to Appleby	Zone 1	1	Cutting	3

Source ID	Description	Scheme	Proximity zone	Land use class	Vertical Alignment	Impact score
CL04-39	Russell Hogg Concrete Supplier	Temple Sowerby to Appleby	Zone 1	1	At grade	3
CL04-42	Midland Railway Line	Temple Sowerby to Appleby	Zone 1	2	Cutting	4
CL04-51	Depot	Temple Sowerby to Appleby	Zone 1	2	At grade	4
CL04-59	Kirkby Thore Industrial Estate	Temple Sowerby to Appleby	Zone 1	1	At grade, embankment and attenuation pond	3
CL04-60	Slurry pond	Temple Sowerby to Appleby	Zone 1	1	Cutting and embankment	3
CL06-04	Railway (Eden Valley Railway)	Appleby to Brough	Zone 1	2	Land take and cutting	4
CL06-06	Construction equipment (Dyke Nook)	Appleby to Brough	Zone 1	1	Land take and cutting	3
CL06-13	Tank (Historical)	Appleby to Brough	Zone 1	1	Cutting	3
CL06-14	Farm (Wheat Sheaf Farm)	Appleby to Brough	Zone 1	1	Cutting	3
CL06-16	Warcop Cemetery	Appleby to Brough	Zone 1	2	At grade	4
CL06-17	Military land/coal storage	Appleby to Brough	Zone 3	3	Embankment	3
CL06-27	Farm (Broomrigg House)	Appleby to Brough	Zone 1	1	Embankment	3
CL06-29	Farm (outhouses)	Appleby to Brough	Zone 1	1	Settlement pond	3
CL06-32	Farm (Apple tree)	Appleby to Brough	Zone 1	1	Cutting	3

Source ID	Description	Scheme	Proximity zone	Land use class	Vertical Alignment	Impact score
CL06-34	Farm stables (Grey Horse)	Appleby to Brough	Zone 1	1	Cutting	3
CL06-35	Landfill	Appleby to Brough	Zone 3	3	At grade	3
CL06-37	Garage workshop and waste oil transfer	Appleby to Brough	Zone 2	2	Cutting	4
CL06-39	Brough Mill Landfill (Eden)	Appleby to Brough	Zone 2	3	Cutting	4
CL06-43	MoD Diesel Tanks and Maintenance Yard	Appleby to Brough	Zone 1	2	Embankment	3
CL06-45	Former Good Shed	Appleby to Brough	Zone 1	1	Settlement pond	3
CL06-47	Walk Mill (former saw mill)	Appleby to Brough	Zone 2	2	Cutting	3
CL06-49	MoD land (unknown)	Appleby to Brough	Zone 1	2	Cutting	4
CL06-50	MoD land (depot)	Appleby to Brough	Zone 1	2	Cutting	4
CL06-51	Air Ambulance Helipad	Appleby to Brough	Zone 1	1	Embankment and At grade	3
CL06-55	Depot and silos	Appleby to Brough	Zone 1	2	Cutting	4
CL07-05	Transport depot (dis.)	Bowes Bypass	Zone 2	2	Embankment	3
CL07-06	Disused railway	Bowes Bypass	Zone 1	2	Cutting	4
CL07-07	Disused train station	Bowes Bypass	Zone 1	2	Cutting	4
CL07-08	Quarry (Barf Hill)	Bowes Bypass	Zone 1	2	Cutting	4
CL07-11	Stone Bridge Farm	Bowes Bypass	Zone 1	1	Embankment	3

Source ID	Description	Scheme	Proximity zone	Land use class	Vertical Alignment	Impact score
CL07-12	Low Broats Farm	Bowes Bypass	Zone 1	1	Embankment	3
CL07-16	Hulands landfill (inert)	Bowes Bypass	Zone 2	2	At grade and embankment	3
CL07-17	The Old Armoury and outbuildings	Bowes Bypass	Zone 1	2	At grade and embankment	4
CL07-18	Quarry	Bowes Bypass	Zone 2	2	At grade and cutting	3
CL07-21	Farm (West End Farm)	Bowes Bypass	Zone 1	1	At grade and cutting	3
CL07-22	Paint depot/workshop	Bowes Bypass	Zone 1	2	At grade and cutting	4
CL07-26	Disused garage	Bowes Bypass	Zone 2	2	At grade and cutting	3
CL08-01	Waste storage/ Cross Lane farm	Cross Lanes to Rokeby	Zone 1	1	At grade	3
CL08-04	Street Side Farm	Cross Lanes to Rokeby	Zone 1	1	At grade	3
CL08-06	Tutta Beck Farm	Cross Lanes to Rokeby	Zone 1	1	At grade	3
CL08-08	Cemetery	Cross Lanes to Rokeby	Zone 1	2	At grade	4
CL08-13	Farm (North Bitts)	Cross Lanes to Rokeby	Zone 1	1	At grade and embankment	3
CL08-14	Farm outbuildings	Cross Lanes to Rokeby	Zone 1	1	At grade and embankment	3
CL08-16	Farm (The cottage)	Cross Lanes to Rokeby	Zone 1	1	At grade and embankment	3

Source ID	Description	Scheme	Proximity zone	Land use class	Vertical Alignment	Impact score
CL09-09	Anaerobic digestion facility	Stephen Bank to Carkin Moor	Zone 1	2	Cutting and At grade	4
CL09-12	Fox Grove Farm	Stephen Bank to Carkin Moor	Zone 1	1	At grade	3
CL09-13	Monks Rest Farm	Stephen Bank to Carkin Moor	Zone 1	1	At grade and cutting	3
CL11-05	Petrol Filling Station (ESSO)	A1(M) Junction 53 Scotch Corner	Zone 3	3	At grade	3
FM03	Foot and mouth Burial Site (Land at west view) 146 Sheep	04	Zone 2	2	Cutting	3
FM04	Foot and mouth Burial Site (Land at west view) 1900 Sheep	04	Zone 2	2	Cutting	3
FM14	Foot and mouth Burial Site	06	Zone 2	2	Cutting	3
FM17	Foot and mouth Burial Site	03	Zone 2	2	Land Take	3

9.3.2 Detailed Risk Assessment

- 9.3.2.1 All sites with an impact score of 4 and 5 have been scoped into a detailed risk assessment, irrespective of nearby receptor sensitivity. For sites with a potential impact score of 3, if the potentially contaminative land use is within 50m of sensitive land use and/or overlies a principal aquifer, the site has been scoped into the detailed risk assessment. All sites with a potential impact score of 1 or 2 have not been considered in the detailed risk assessment.
- 9.3.2.2 Following each group of detailed risk assessment an impact assessment has been carried out. The significance of the effects of land contamination is assessed by comparing the difference in risk of each contaminant linkage at baseline to those at construction and at operation. This provides a way of assessing both the adverse and beneficial effects during construction and the operational period. Table 6 Significance criteria defines how the probability of risk applies to the DMRB significance criteria.

Table 6 Significance criteria

Significance Criteria	Definition
Very large adverse effect	An increase in contamination risk of 5 risk levels in the risk matrix, e.g., from land that has a very low contamination risk in the baseline becomes a very high risk
Large adverse effect	An increase in contamination risk of 4 or 5 risk levels in the risk matrix, e.g., from land that has a very low contamination risk in the baseline becomes a high or very high risk
Moderate adverse effect	An increase in contamination risk of 2 or 3 risk levels in the risk matrix, e.g., land that has a low contamination risk in the baseline becomes a moderate or high risk
Slight adverse effect	An increase in contamination risk of 1 risk level in the risk matrix, e.g., land that has a low contamination risk in the baseline becomes a moderate/low risk
No change	No change in contaminated land risks
Slight beneficial effect	A reduction in contamination risk of 1 risk level in the risk matrix, e.g., land that has a moderate/low contamination risk in the baseline becomes a low risk
Moderate beneficial effect	A reduction in contamination risk of 2 or 3 risk levels in the risk matrix, e.g., land that has a high contamination risk in the baseline becomes a moderate/low or low risk
Large beneficial effect	A reduction in contamination risk of 4 or 5 risk levels in the risk matrix, e.g. land that has a very high contamination risk in the baseline becomes a low or very low risk
Very large beneficial effect	A reduction in contamination risk of 5 risk levels in the risk matrix, e.g. from land that has a very high contamination risk in the baseline becomes a very low risk

Detailed risk assessment – MOD Land

Table 7: Detailed risk assessment – MoD land in the study area

Site ID (IDS)		CL06-17, CL06-43, CL06-49, CL06-50				
Site Group		MoD sites located within the study area				
Site title (Site ID) and land use class		Military land/coal storage (CL06-17) (embankment) MoD Diesel Tanks and Maintenance Yard (CL06-43) (embankment) MoD land (unknown) (CL06-49) (cutting) MoD land (depot) (CL06-50) (cutting)				
Receptors						
Site title (Site ID)	Sensitive land use (human receptor) (adjacent and/or <50m)	Aquifer designation	Surface watercourse (adjacent and/or <50m)	Geological, including minerals designation or ecological designation (adjacent and/or <50m)	Property e.g. buildings and structures (adjacent and/or <50m)	Other

Table 8: Baseline CSM and Qualitative Risk Assessment: MoD land located within the study area

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate and groundwater contamination . Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, organic compounds, inorganic	On-site users – residential None	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	N/A	N/A	N/A
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	N/A	N/A	N/A
		Inhalation of ground gases.	N/A	N/A	N/A

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
compounds, hydrocarbons, PAH, solvents, fuel oils, alkalis.-	On-site users - commercial/public open space Commercial	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely to Low	Medium	Low to Moderate/Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low
		Inhalation of ground gases.	Unlikely	Medium	Low
	Off-site users – residential None	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	N/A	N/A	N/A
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	N/A	N/A	N/A
		Inhalation of ground gases.	N/A	N/A	N/A
	On-site users - commercial/public open space	Direct contact, ingestion, inhalation of dust/vapour with/from	Unlikely to Low	Medium	Low to Moderate/Low

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
	Commercial	contaminated soils.			
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low
		Inhalation of ground gases.	Unlikely	Medium	Low
	Off-site users – residential None	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	N/A	N/A	N/A
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	N/A	N/A	N/A
		Inhalation of ground gases.	N/A	N/A	N/A
	Off-site users - commercial/public open space Farm/commercial	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely to Low	Medium	Low to Moderate/Low
		Direct contact, ingestion, inhalation of vapour	Unlikely	Medium	Low

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
		with/from contaminated waters.			
		Inhalation of ground gases.	Unlikely	Medium	Low
	Controlled waters – groundwater – Principal Aquifer	Vertical and lateral migration.	Likely	Medium	Moderate
	Controlled waters – surface waters Moor Beck	Groundwater migration, direct run-off from site	Unlikely	Medium	Low
	Property receptors – buildings, foundations, and services	Exposure to explosive gases	Unlikely	Medium	Low
		Aggressive Ground Conditions	N/A	N/A	N/A
	Ecological/geological designations UNESCO Global Geopark	Vertical and lateral migration, direct contact.	Unlikely	Medium	Low
Notes / assumptions					
Sites assessed prior to construction.					
N/A is not applicable where there are no receptors present					

Table 9: Construction CSM and Qualitative Risk Assessment: MoD land within the study area

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate and groundwater contamination.	On-site users – residential None	Direct contact, ingestion, inhalation of dust/vapour with/from	N/A	N/A	N/A

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, organic compounds, inorganic compounds, hydrocarbons, PAH, solvents, fuel oils, alkalis.		contaminated soils.			
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	N/A	N/A	N/A
		Inhalation of ground gases.	N/A	N/A	N/A
	On-site users - commercial/public open space Commercial	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Likely	Medium	Moderate
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Likely	Medium	Moderate
		Inhalation of ground gases.	Low	Medium	Moderate/Low
	Off-site users – residential None	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	N/A	N/A	N/A
		Direct contact, ingestion, inhalation of vapour	N/A	N/A	N/A

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
		with/from contaminated waters.			
		Inhalation of ground gases.	N/A	N/A	N/A
	Off-site users - commercial/public open space Farm/commercial	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Medium	Moderate/Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Medium	Moderate/Low
		Inhalation of ground gases.	Low	Medium	Moderate/Low
	Controlled waters – groundwater – Principal Aquifer Secondary A aquifer	Vertical and lateral migration.	Likely	Medium	Moderate
	Controlled waters – surface waters Moor Beck	Groundwater migration, direct run-off from site	Unlikely	Medium	Low
	Property receptors – buildings, foundations, and services	Exposure to explosive gases	Unlikely	Medium	Low
		Aggressive Ground Conditions	N/A	N/A	N/A
	Ecological/geological	Vertical and lateral	Likely	Medium	Moderate

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
	designations UNESCO Global Geopark	migration, direct contact.			

Notes / assumptions

During construction, standard best practice mitigation procedures shall be implemented as set out in Chapter 9: Geology and Soils.

Construction workers have been excluded from assessment due to the use of PPE and risk management.

N/A is not applicable as there are no residential or commercial receptors or properties on or adjacent to the site.

The implementation of the measures set out in the Environmental Management Plan (EMP) (Appendix 4.1) generally results in a low to unlikely probability of a consequence, but in some cases the actual consequence may temporarily increase from that defined at baseline.

Assumes construction phase will include remediation that may be required in the event that contamination is discovered. A range may be given as remediation strategies will vary in design to focus on specific contaminative risks at each site. Remediation strategies may involve source removal or pathway intervention as appropriate.

Table 10: Operation CSM and Qualitative Risk Assessment: MoD land located within the study area

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Soil, leachate and groundwater contamination . Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, organic compounds, inorganic compounds,	On-site users – residential None	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	N/A	N/A	N/A
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	N/A	N/A	N/A
		Inhalation of ground gases.	N/A	N/A	N/A

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
hydrocarbons, PAH, solvents, fuel oils, alkalis.	On-site users - commercial/public open space Commercial	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor to Medium	Low to moderate/low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor to Medium	Very Low to Low
		Inhalation of ground gases.	Unlikely	Minor to Medium	Very Low to Low
	Off-site users - residential None	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	N/A	N/A	N/A
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	N/A	N/A	N/A
		Inhalation of ground gases.	N/A	N/A	N/A
	Off-site users - commercial/public open space	Direct contact, ingestion, inhalation of dust/vapour with/from	Unlikely	Minor to Medium	Very Low to Low

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
	Farm/commercial	contaminated soils.			
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor to Medium	Very Low to Low
		Inhalation of ground gases.	Unlikely	Minor to Medium	Very Low to Low
	Controlled waters – groundwater – Principal Aquifer Secondary A aquifer	Vertical and lateral migration.	Likely	Medium	Moderate
	Controlled waters – surface waters Moor Beck	Groundwater migration, direct run-off from site	Unlikely	Medium	Low
	Property receptors – buildings, foundations, and services	Exposure to explosive gases	Unlikely	Medium	Low
		Aggressive Ground Conditions	N/A	N/A	N/A
	Ecological/geological designations UNESCO Global Geopark	Vertical and lateral migration, direct contact.	Unlikely	Medium	Low

Notes / assumptions

N/A is not applicable as there are no receptors on or adjacent to the site.

Assumes remediation required has been undertaken and construction works are complete if contamination is discovered. A range may be given as remediation strategies will vary in design to focus on specific contaminative risks at each site. Remediation strategies may involve source removal or pathway intervention as appropriate.

Table 11: Impact Assessment (Comparison of baseline against construction and Operation): MoD land located within the study area

Contaminant linkage	Baseline risk	Construction risk	Operation risk	Construction significance	Operation significance
Exposure to soil contamination on-site users (residential)	N/A	N/A	N/A	N/A	N/A
Exposure to groundwater contamination On-site users (residential).	N/A	N/A	N/A	N/A	N/A
Exposure to ground gas On-site users (residential).	N/A	N/A	N/A	N/A	N/A
Exposure to soil contamination On-site users (commercial/ public open space)	Low to Moderate/Low	Moderate	Low to moderate/low	Moderate adverse effect	Neutral effect
Exposure to groundwater contamination On-site users (commercial/ public open space)	Low	Moderate	Very Low to low	Moderate adverse effect	Slight beneficial effect
Exposure to ground gas On-site users (commercial/ public open space)	Low	Moderate/Low	Very Low to low	Moderate adverse effect	Slight beneficial effect

Contaminant linkage	Baseline risk	Construction risk	Operation risk	Construction significance	Operation significance
Exposure to soil contamination off-site users (residential)	N/A	N/A	N/A	N/A	N/A
Exposure to groundwater contamination Off-site users (residential)	N/A	N/A	N/A	N/A	N/A
Exposure to ground gas Off-site users (residential)	N/A	N/A	N/A	N/A	N/A
Exposure to soil contamination Off-site users (commercial/ public open space)	Low	Moderate/Low	Low	Slight adverse effect	Neutral effect
Exposure to groundwater contamination Off-site users (commercial/ public open space)	Low	Moderate/Low	Very Low to Low	Slight adverse effect	Slight beneficial effect
Exposure to ground gas Off-site users (commercial/ public open space)	Low	Moderate/Low	Very Low to Low	Slight adverse effect	Slight beneficial effect
Contaminated soil, leachate/ groundwater and pollution of	Moderate	Moderate	Moderate	Neutral effect	Neutral effect

Contaminant linkage	Baseline risk	Construction risk	Operation risk	Construction significance	Operation significance
aquifers					
Contaminated soil, leachate/ groundwater and impact on surface watercourses	Low	Low	Low	Neutral effect	Neutral effect
Impact on property receptors	Low	Low	Low	Neutral effect	Neutral effect
Impact on ecological/ geological designations	Low	Moderate	Low	Moderate adverse effect	Neutral effect
Overall significance				Moderate adverse effect	Neutral to slight beneficial effect
Notes / assumptions Assumes remediation required has been undertaken and construction works are complete.					

Detailed risk assessment – Petrol Filling stations

Table 12: Detailed risk assessment for – Petrol Filling stations in the study area

Site ID (IDS)	CL02-07, CL11-05, CL04-14,					
Site group	Petrol Filling station located inside the study area					
Site title (Site ID) and land use class	Petrol Filling Station (CL02-07) Petrol Filling Station (BP) (CL04-14) Petrol Filling Station (ESSO) (CL11-05)					
Receptors						
Site title (Site ID)	Sensitive land use (human receptor)	Aquifer designation	Surface watercourse (adjacent)	Geological, including minerals designation	Property e.g. buildings and	Other

	(adjacent and/or <50m)		and/or <50m)	or ecological designation (Adjacent and/or <50m)	structures (Adjacent and/or <50m)	
Petrol Filling Station (CL02-07)	Residential Housing and Commercial Properties Cricket Ground (public open space)	Principal Bedrock Secondary undifferentiated Superficial Deposits	None	None	Residential Housing Commercial Properties	None
Petrol Filling Station (BP) (CL04-14)	None		None	None	None	None
Petrol Filling Station (ESSO) (CL11-05)	Residential and commercial properties	Secondary A Bedrock Secondary undifferentiated Superficial Deposits	None	None	Residential Housing	None
Operation development description						
CL02-07 - At grade CL04-14 - At grade CL11-05 - At grade						

Table 13: Baseline CSM and Qualitative Risk Assessment: Petrol Filling stations within the study area

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate and groundwater contamination. Ground gas.	On-site users – residential housing and public open space	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, organic compounds, inorganic compounds, hydrocarbons, PAH, solvents, fuel oils, alkalis.		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low
		Inhalation of ground gases.	N/A	N/A	N/A
	On-site users - commercial	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low
		Inhalation of ground gases.	N/A	N/A	N/A
	Off-site users – residential	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low
		Inhalation of ground gases.	N/A	N/A	N/A
	Off-site users -	Direct contact, ingestion, inhalation of dust/vapour	Unlikely	Mild	Very Low

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
	commercial/public open space	with/from contaminated soils.			
	Farm/commercial	Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Mild	Very Low
		Inhalation of ground gases.	N/A	N/A	N/A
	Controlled waters – groundwater – Principal Aquifer and Secondary A aquifer	Vertical and lateral migration.	Low	Medium	Moderate/low risk
	Controlled waters – surface waters None	Groundwater migration, direct run-off from site	N/A	N/A	N/A
	Property receptors – buildings, foundations, and services	Exposure to explosive gases	Unlikely	Medium	Low
		Aggressive Ground Conditions	N/A	N/A	N/A
	Ecological/geological designations None	Vertical and lateral migration, direct contact.	N/A	N/A	N/A
	Notes / assumptions Sites assessed prior to construction N/A is not applicable where there are no receptors present.				

Table 14: Construction CSM and Qualitative Risk Assessment: Petrol Filling stations located within the study area.

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation	
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, organic compounds, inorganic compounds, hydrocarbons, PAH, solvents, fuel oils, alkalis.	On-site users – residential None	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low	
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low	
		Inhalation of ground gases.	N/A	N/A	N/A	
	On-site users - commercial/public open space Commercial	On-site users - commercial/public open space Commercial	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	N/A	N/A	N/A
			Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	N/A	N/A	N/A
			Inhalation of ground gases.	N/A	N/A	N/A
	Off-site users – residential None	Off-site users – residential None	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low
			Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low
			Inhalation of ground gases.	N/A	N/A	N/A
	Off-site users - commercial/public open space Farm/commercial	Off-site users - commercial/public open space Farm/commercial	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Mild	Very Low
			Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Mild	Very Low
			Inhalation of ground gases.	Low Likelihood	Mild	Very Low

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
	Controlled waters – groundwater – Principal Aquifer Secondary A aquifer	Vertical and lateral migration.	Likely	Medium	Moderate
	Controlled waters – surface waters None	Groundwater migration, direct run-off from site	N/A	N/A	N/A
	Property receptors – buildings, foundations, and services	Exposure to explosive gases	Unlikely	Medium	Low
		Aggressive Ground Conditions	N/A	N/A	N/A
	Ecological/geological designations None	Vertical and lateral migration, direct contact.	N/A	N/A	N/A

Notes / assumptions

During construction mitigation procedures shall be implemented.

Construction workers have been excluded from assessment due to the use of PPE and risk management.

N/A is not applicable as there are no residential or commercial receptors or properties on or adjacent to the site.

The implementation of the measures set out in the Environmental Management Plan (EMP) (Appendix 4.1) generally results in a low to unlikely probability of a consequence, but in some cases the actual consequence may temporarily increase from that defined at baseline.

Assumes construction phase will include remediation that may be required in the event that contamination is discovered. A range may be given as remediation strategies will vary in design to focus on specific contaminative risks at each site. Remediation strategies may involve source removal or pathway intervention as appropriate.

Table 15: Operation CSM and Qualitative Risk Assessment: Petrol Filling stations located within the study area

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation	
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, organic compounds, inorganic compounds, hydrocarbons, PAH, solvents, fuel oils, alkalis.	On-site users – residential None	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low	
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low	
		Inhalation of ground gases.	N/A	N/A	N/A	
	On-site users - commercial/public open space Commercial	Commercial	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	N/A	N/A	N/A
			Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	N/A	N/A	N/A
			Inhalation of ground gases.	N/A	N/A	N/A
	Off-site users – residential None	residential None	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low
			Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low
			Inhalation of ground gases.	N/A	N/A	N/A
	Off-site users - commercial/public	Commercial/public	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Mild	Very Low

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
	open space Farm/commercial	Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Mild	Very Low
		Inhalation of ground gases.	N/A	N/A	N/A
	Controlled waters – groundwater – Principal Aquifer Secondary A aquifer	Vertical and lateral migration.	Low	Medium	Moderate/low risk
	Controlled waters – surface waters None	Groundwater migration, direct run-off from site	N/A	N/A	N/A
	Property receptors – buildings, foundations, and services	Exposure to explosive gases	Unlikely	Medium	Low
		Aggressive Ground Conditions	N/A	N/A	N/A
	Ecological/geological designations None	Vertical and lateral migration, direct contact.	N/A	N/A	N/A

Notes / assumptions

N/A is not applicable as there are no receptors on or adjacent to the site.

Assumes remediation required has been undertaken and construction works are complete. A range may be given as remediation strategies will vary in design to focus on specific contaminative risks at each site. Remediation strategies may involve source removal or pathway intervention as appropriate.

Table 16: Impact Assessment (Comparison of baseline against construction and Operation): Petrol Filling stations located within the study area.

Contaminant linkage	Baseline	Construction	Operation	Construction impact	Operation significance
	risk	risk	risk	Significance	significance
Exposure to soil contamination on-site users (residential)	N/A	N/A	N/A	N/A	N/A
Exposure to groundwater contamination On-site users (residential).	N/A	N/A	N/A	N/A	N/A
Exposure to ground gas On-site users (residential).	N/A	N/A	N/A	N/A	N/A
Exposure to soil contamination On-site users (commercial/ public open space)	Low	Low	Low	Neutral Effect	Neutral Effect
Exposure to groundwater contamination On-site users (commercial/ public open space)	Low	Low	Low	Neutral Effect	Neutral Effect
Exposure to ground gas On-site users (commercial/ public open space)	N/A	N/A	N/A	N/A	N/A
Exposure to soil contamination off-site users (residential)	Low	Low	Low	Neutral Effect	Neutral Effect
Exposure to groundwater contamination Off-site users (residential)	Low	Low	Low	Neutral Effect	Neutral Effect
Exposure to ground gas Off-site users (residential)	N/A	N/A	N/A	N/A	N/A
Exposure to soil contamination Off-site users (commercial/ public	Very Low	Very Low	Very Low	Neutral Effect	Neutral Effect

Contaminant linkage	Baseline	Construction	Operation	Construction impact	Operation significance
	risk	risk	risk	Significance	significance
open space)					
Exposure to groundwater contamination Off-site users (commercial/ public open space)	Very Low	Very Low	Very Low	Neutral Effect	Neutral Effect
Exposure to ground gas Off-site users (commercial/ public open space)	N/A	N/A	N/A	N/A	N/A
Contaminated soil, leachate/ groundwater and pollution of aquifers	Moderate/low risk	Moderate	Moderate/low risk	Slight adverse effect	Neutral effect
Contaminated soil, leachate/ groundwater and impact on surface watercourses	N/A	N/A	N/A	N/A	N/A
Impact on property receptors	Low	Low	Low	Neutral Effect	Neutral Effect
Impact on ecological/ geological designations	N/A	N/A	N/A	N/A	N/A
Overall significance				Slight adverse to Neutral Effect	Neutral Effect
Notes / assumptions Assumes remediation required has been undertaken and construction works are complete.					

Detailed risk assessment – Farms

Table 17: Detailed risk assessment for – Farms in the study area

Site ID (IDS)	CL02-02, CL02-11, CL03-07, CL03-09, CL03-11, CL04-03, CL04-05, CL04-08, CL04-33, CL04-60, CL06-13, CL06-14, CL06-27, CL06-29, CL06-32, CL06-34, CL07-11, CL07-12, CL07-17, CL07-21, CL08-01, CL08-04, CL08-06, CL08-13, CL08-14, CL08-16, CL09-12, CL09-13
Site group	Farms located within the study area
Site title (Site ID) and land use class	Farm (Happy Horse-Riding Centre) (CL02-02) Storage yard (CL02-11) Farm (Whinfell Park Cottages) (CL03-07) Farm outbuilding (CL03-09) High Barn Farm (CL03-11) JM & SM Dairy Farm (CL04-03) Eden View Farm (CL04-05) Street House Farm (CL04-08) Bridge End Farm (CL04-12) Farm (Powis House) (CL04-33) Slurry pond (CL04-60) Old Station Yard Farm Tank (Historical) (CL06-13) Farm (Wheat Sheaf Farm) (CL06-14) Farm Broomrigg House (CL06-27) Farm Outhouses (CL06-29) Apple Tree Farm (CL06-32) Farm stables (Grey Horse) (CL06-34) Stone Bridge Farm (CL07-11) Low Broats Farm (CL07-12) The Old Armoury and outbuildings (CL07-17) Farm (West End Farm) (CL07-21)

Site ID (IDS)	CL02-02, CL02-11, CL03-07, CL03-09, CL03-11, CL04-03, CL04-05, CL04-08, CL04-33, CL04-60, CL06-13, CL06-14, CL06-27, CL06-29, CL06-32, CL06-34, CL07-11, CL07-12, CL07-17, CL07-21, CL08-01, CL08-04, CL08-06, CL08-13, CL08-14, CL08-16, CL09-12, CL09-13					
	Waste Storage Cross Lane Farm (CL08-01) Side Street Farm (CL08-04) Tutta Beck Farm (CL08-06) Farm (North Bitts) (CL08-13) Farm outbuildings (CL08-14) Farm (The cottage) (CL08-16) Fox Grove Farm (CL09-12) Monks Rest Farm (CL09-13)					
Receptors						
Site title (Site ID)	Sensitive land use (human receptor) (adjacent and/or <50m)	Aquifer designation	Surface watercourse (adjacent and/or <50m)	Geological, including minerals designation or ecological designation (Adjacent and/or <50m)	Property e.g. buildings and structures (Adjacent and/or <50m)	Other
Farm (Happy Horse Riding Centre) (CL02-02)	Residential Housing	Secondary A Bedrock and Secondary A Deposits	SSSI River Eamont	SSSI River Eamont	Residential Housing	None
Storage yard (CL02-11)	Commercial Properties	Principal Bedrock and Secondary Deposits	None	None	Commercial Properties	None

Site ID (IDS)	CL02-02, CL02-11, CL03-07, CL03-09, CL03-11, CL04-03, CL04-05, CL04-08, CL04-33, CL04-60, CL06-13, CL06-14, CL06-27, CL06-29, CL06-32, CL06-34, CL07-11, CL07-12, CL07-17, CL07-21, CL08-01, CL08-04, CL08-06, CL08-13, CL08-14, CL08-16, CL09-12, CL09-13					
Farm (Whinfell Park Cottages) (CL03-07)	Residential Housing Commercial/ Farm Properties	Bedrock -Principal aquifer Superficial Deposits -Secondary aquifer undifferentiated and A	None	None	Residential Housing Commercial/ Farm Properties	None
Farm outbuilding (CL03-09)	None		None	None	None	None
High Barn Farm (CL03-11)	Residential Housing Commercial/industrial		None	None	Residential Housing Commercial/industrial	None
JM & SM Dairy Farm (CL04-03)	Residential housing and Farm		None	Groundwater abstraction well	Farm/Residential property	None
Eden View Farm (CL04-05)	Farm		None	None	Farm	None
Street House Farm (CL04-08)	None		None	None	None	None
Birdge End Farm (CL04-12)	Residential housing and Farm		SSI Trout Beck	Groundwater abstraction well	Farm/Residential property	None
Farm (Powis House) (CL04-33)	None		Unnamed water course	None	None	None
Slurry pond (CL04-60)	None		None	None	None	None
Tank (Historical) (CL06-13)	Farm/residential		Ordinary watercourse	UNESCO Global Geopark	Farm/residential	None
Farm (Wheat Sheaf Farm) (CL06-14)	Farm/residential		Ordinary watercourse	UNESCO Global Geopark	Farm/residential	None
Farm Broomrigg House (CL06-27)	Residential Housing		Unnamed water courses	Lowgill Beck Broom Beck	Residential Housing	None

Site ID (IDS)	CL02-02, CL02-11, CL03-07, CL03-09, CL03-11, CL04-03, CL04-05, CL04-08, CL04-33, CL04-60, CL06-13, CL06-14, CL06-27, CL06-29, CL06-32, CL06-34, CL07-11, CL07-12, CL07-17, CL07-21, CL08-01, CL08-04, CL08-06, CL08-13, CL08-14, CL08-16, CL09-12, CL09-13					
Farm Outhouses (CL06-29)	None		Spring	None	None	None
Apple Tree Farm (CL06-32)	Residential housing and Farm		Watercourse (Lowgill Beck)	UNESCO Global Geopark Groundwater abstraction well	Farm/Residential property	None
Farm stables (Grey Horse) (CL06-34)	None		None	UNESCO Global Geopark	None	None
Old Station Yard Farm	None		None	None	None	None
Stone Bridge Farm (CL07-11)	Residential Housing	Secondary A Bedrock	Ordinary watercourse	None	Residential Housing	None
Low Broats Farm (CL07-12)	Farm/residential property	Secondary undifferentiated Superficial Deposits	None	None	Farm/residential property	None
The Old Armoury and outbuildings (CL07-17)	None		None	None	None	None
Farm (West End Farm) (CL07-21)	Residential Housing		None	None	Residential Housing	None
Side Street Farm (CL08-04)	Residential Housing Farm/commercial property		Manyfold Beck	None	Residential Housing Farm/commercial property	None
Waste Storage Cross Lane Farm (CL08-01)	Farm/commercial property		None	None	Farm/commercial property	None

Site ID (IDS)	CL02-02, CL02-11, CL03-07, CL03-09, CL03-11, CL04-03, CL04-05, CL04-08, CL04-33, CL04-60, CL06-13, CL06-14, CL06-27, CL06-29, CL06-32, CL06-34, CL07-11, CL07-12, CL07-17, CL07-21, CL08-01, CL08-04, CL08-06, CL08-13, CL08-14, CL08-16, CL09-12, CL09-13					
Tutta Beck Farm (CL08-06)	Farm/Residential property		Tutta Beck	None	Farm/Residential property	None
Farm (North Bitts) (CL08-13)	None		None	None	None	None
Farm outbuildings (CL08-14)	None		None	None	None	None
Farm (The cottage) (CL08-16)	None		Tutta Beck	None	None	None
Fox Grove Farm (CL09-12)	Residential property/commercial		Ordinary Watercourse	None	Residential property/commercial	None
Monks Rest Farm (CL09-13)	Residential/farm		Ordinary Watercourse	None	Residential/farm	None
Contamination exceedances						
<p>CL02-02 - Soil Leachate exceedances of pH, arsenic, nickel, and lead found near to low potential contaminated sources.</p> <p>CL03-07 - Soil Leachate exceedances of pH, copper, lead, and zinc, molybdenum, arsenic found near to low potential contaminated sources. Groundwater exceedances of Copper, TPH CWG-Aromatic >C12-C16 and Aromatic>C16-C21 found near to low potential contaminated sources.</p> <p>CL04-03 - Soil leachate exceedances of arsenic and lead found near to low potential contaminated sources.</p> <p>CL06-27 - Soil leachate exceedances of Arsenic, chromium, lead, and nickel found near to low potential contaminated sources.</p> <p>CL06-29 - Groundwater exceedance of TPH CWG, arsenic, conductivity, nitrite, nitrate, sodium and chloride found near to moderate low potential contaminated sources.</p> <p>CL08-16 - Groundwater exceedances of ammoniacal nitrogen, acenaphthene, fluorene, phenanthrene and pyrene, pyrene, Benzo(k)fluoranthene, chrysene and copper found near to low potential contaminated sources.</p>						
Operation development description						
<p>CL02-02 – Cutting and embankment</p> <p>CL02-11 – Cutting</p>						

Site ID (IDS)	CL02-02, CL02-11, CL03-07, CL03-09, CL03-11, CL04-03, CL04-05, CL04-08, CL04-33, CL04-60, CL06-13, CL06-14, CL06-27, CL06-29, CL06-32, CL06-34, CL07-11, CL07-12, CL07-17, CL07-21, CL08-01, CL08-04, CL08-06, CL08-13, CL08-14, CL08-16, CL09-12, CL09-13
	CL03-07 - At grade and embankment CL03-09 - Cutting and embankment CL03-11 - At grade and embankment (Source to be removed during construction) CL04-03 - Cutting and at grade CL04-05 - At grade CL04-08 - At grade CL04-12 - At grade CL04-33 - Cutting CL04-60 - Cutting and At grade CL06-13 - Cutting CL06-14 - Cutting CL06-27 - Embankment CL06-29 - Settlement Pond CL06-32 – Cutting CL06-34 - Cutting CL07-11 - Embankment CL07-12 - Embankment CL07-17 - At grade and embankment CL07-21 - At grade and cutting CL08-01 - At grade CL08-04 - At grade CL08-06 - At grade CL08-13 - At grade and embankment CL08-14 - At grade and embankment CL08-16- At grade and embankment CL09-12 - Land take, At grade and attenuation pond

Site ID (IDS)	CL02-02, CL02-11, CL03-07, CL03-09, CL03-11, CL04-03, CL04-05, CL04-08, CL04-33, CL04-60, CL06-13, CL06-14, CL06-27, CL06-29, CL06-32, CL06-34, CL07-11, CL07-12, CL07-17, CL07-21, CL08-01, CL08-04, CL08-06, CL08-13, CL08-14, CL08-16, CL09-12, CL09-13
CL09-13 - At grade and cutting	

Table 18: Baseline CSM and Qualitative Risk Assessment: Farms within the study area

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, organic compounds, inorganic compounds, hydrocarbons, PAH, solvents, fuel oils, alkalis.	On-site users – residential Residents Housing	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Minor	Low
		Inhalation of ground gases.	Unlikely	Minor	Very Low
	On-site users - commercial/public open space Commercial/industrial	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Minor	Low
		Inhalation of ground gases.	Unlikely	Minor	Very Low
	Off-site users – residential Residential	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Minor	Low
		Inhalation of ground gases.	Unlikely	Minor	Very Low
	Off-site users -	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Low

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
	commercial/public open space	Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Minor	Low
	Farm/commercial property	Inhalation of ground gases.	Unlikely	Minor	Very Low
	Controlled waters – groundwater – Principal Aquifer Groundwater abstraction well	Vertical and lateral migration.	Low	Medium	Moderate/Low
	Controlled waters – surface waters SSSI River Eamont Unnamed water courses Lowgill and Broom Rigg Beck	Groundwater migration, direct run-off from site	Low	Minor	Low
	Property receptors – buildings, foundations, and services (on-site and off-site)	Exposure to explosive gases	Unlikely	Medium	Low
		Aggressive Ground Conditions	Unlikely	Medium	Low
	Ecological/geological designations UNESCO Global Geopark SSSI River Eamont	Vertical and lateral migration, direct contact.	Unlikely	Medium	Low

Notes / assumptions

Sites assessed prior to construction.

N/A is not applicable where there are no receptors present.

Table 19: Construction CSM and Qualitative Risk Assessment: Farms located within the study area

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, organic compounds, inorganic compounds, hydrocarbons, PAH, solvents, fuel oils, alkalis.	On-site users – residential Housing	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Minor	Low
		Inhalation of ground gases.	Unlikely	Minor	Very Low
	On-site users - commercial/public open space Commercial/industrial	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Minor	Low
		Inhalation of ground gases.	Unlikely	Minor	Very Low
	Off-site users – residential Residential	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Minor	Low
		Inhalation of ground gases.	Unlikely	Minor	Very Low
	Off-site users - commercial/public	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Low

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
	open space Farm/commercial property	Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Minor	Low
		Inhalation of ground gases.	Unlikely	Minor	Very Low
	Controlled waters – groundwater – Principal Aquifer Groundwater abstraction well	Vertical and lateral migration.	Low	Medium	Moderate/Low
	Controlled waters – surface waters SSSI River Eamont Unnamed water courses Lowgill and Broom Rigg Beck	Groundwater migration, direct run-off from site	Low	Minor	Low
	Property receptors – buildings, foundations, and services (on-site and off-site)	Exposure to explosive gases	Unlikely	Medium	Low
		Aggressive Ground Conditions	Unlikely	Medium	Low
	Ecological/geological designations UNESCO Global Geopark SSSI River Eamont	Vertical and lateral migration, direct contact.	Likely	Medium	Moderate
	<p>Notes / assumptions</p> <p>During construction, standard best practice mitigation procedures shall be implemented as set out in Chapter 9: Geology and Soils.</p> <p>Construction workers have been excluded from assessment due to the use of PPE and risk management.</p>				

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
<p>N/A is not applicable as there are no residential or commercial receptors or properties on or adjacent to the site.</p> <p>The implementation of the measures set out in the Environmental Management Plan (EMP) (Appendix 4.1) generally results in a low to unlikely probability of a consequence, but in some cases the actual consequence may temporarily increase from that defined at baseline.</p> <p>Assumes construction phase will include remediation that may be required in the event that contamination is discovered. A range may be given as remediation strategies will vary in design to focus on specific contaminative risks at each site. Remediation strategies may involve source removal or pathway intervention as appropriate.</p>					

Table 20: Operation Operation CSM and Qualitative Risk Assessment: Farms located within the study area

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, organic compounds, inorganic compounds, hydrocarbons, PAH,	On-site users – residential Residents Housing	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Minor	Low
		Inhalation of ground gases.	Unlikely	Minor	Very Low
	On-site users - commercial/public open space Commercial/industrial	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Minor	Low
		Inhalation of ground gases.	Unlikely	Minor	Very Low

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
solvents, fuel oils, alkalis.	Off-site users – residential Residential	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Minor	Low
		Inhalation of ground gases.	Unlikely	Minor	Very Low
	Off-site users - commercial/public open space Farm/commercial property	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Minor	Low
		Inhalation of ground gases.	Unlikely	Minor	Very Low
	Controlled waters – groundwater – Principal Aquifer Groundwater abstraction well	Vertical and lateral migration.	Low	Medium	Moderate/Low
	Controlled waters – surface waters SSSI River Eamont Unnamed water courses Lowgill and Broom Rigg Beck	Groundwater migration, direct run-off from site	Low	Minor	Low
	Property receptors – buildings, foundations, and services (on-site and off-site)	Exposure to explosive gases	Unlikely	Medium	Low
		Aggressive Ground Conditions	Unlikely	Medium	Low

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
	Ecological/geological designations UNESCO Global Geopark SSSI River Eamont	Vertical and lateral migration, direct contact.	Unlikely	Medium	Low
<p>Notes / assumptions</p> <p>Notes / assumptions</p> <p>Assumes remediation required has been undertaken and construction works are complete.</p> <p>N/A is not applicable as there are no residential or commercial receptors or properties on or adjacent to the site. Gas source potentially present but no viable receptors.</p> <p>A range may be given as remediation strategies will vary in design to focus on specific contaminative risks at each site. Remediation strategies may involve source removal or pathway intervention as appropriate</p>					

Table 21: Impact Assessment (Comparison of baseline against construction and Operation): Farms located within the study area

Contaminant linkage	Baseline risk	Construction risk	Operation risk	Construction significance	Operation significance
Exposure to soil contamination on-site users (residential)	Low	Low	Low	Neutral effect	Neutral effect
Exposure to groundwater contamination On-site users (residential).	Low	Low	Low	Neutral effect	Neutral effect
Exposure to ground gas On-site users (residential).	Very Low	Very Low	Very Low	Neutral effect	Neutral effect
Exposure to soil contamination On-site users (commercial/ public open space)	Low	Low	Low	Neutral effect	Neutral effect

Contaminant linkage	Baseline risk	Construction risk	Operation risk	Construction significance	Operation significance
Exposure to groundwater contamination On-site users (commercial/ public open space)	Low	Low	Low	Neutral effect	Neutral effect
Exposure to ground gas On-site users (commercial/ public open space)	Very Low	Very Low	Very Low	Neutral effect	Neutral effect
Exposure to soil contamination off-site users (residential)	Low	Low	Low	Neutral effect	Neutral effect
Exposure to groundwater contamination Off-site users (residential)	Low	Low	Low	Neutral effect	Neutral effect
Exposure to ground gas Off-site users (residential)	Very Low	Very Low	Very Low	Neutral effect	Neutral effect
Exposure to soil contamination Off-site users (commercial/ public open space)	Low	Low	Low	Neutral effect	Neutral effect
Exposure to groundwater contamination Off-site users (commercial/ public open space)	Low	Low	Low	Neutral effect	Neutral effect
Exposure to ground gas Off-site users (commercial/ public open space)	Very Low	Very Low	Very Low	Neutral effect	Neutral effect
Contaminated soil, leachate/ groundwater and pollution of aquifers	Moderate/Low	Moderate/Low	Moderate/Low	Neutral effect	Neutral effect
Contaminated soil, leachate/ groundwater and impact on surface	Low	Low	Low	Neutral effect	Neutral effect

Contaminant linkage	Baseline risk	Construction risk	Operation risk	Construction significance	Operation significance
watercourses					
Impact on property receptors	Low	Low	Low	Neutral effect	Neutral effect
Impact on ecological/ geological designations	Low	Moderate	Low	Moderate adverse effect (for UNESCO geopark)	Neutral effect
Overall significance				Moderate adverse to Neutral effect	Neutral effect
Notes / assumptions Assumes remediation required has been undertaken and construction works are complete.					

Detailed risk assessment – Railways

Table 22: Detailed risk assessment for – Railway site in the study area

Site ID (IDS)	CL04-02, CL07-06, CL07-07, CL04-42, CL06-04, CL01-05, CL04-31					
Site group	Railway located within the study area					
Site title (Site ID) and land use class	CL01-05 Railway Line CL04-02 Dismantled railway CL04-31 Railways CL04-42 Midland Railway Line CL06-04 Railway (Eden Valley Railway) CL07-06 Disused railway CL07-07 Disused train station					
Receptors						
Site title (Site ID)	Sensitive land use (human receptor)	Aquifer designation	Surface watercourse (adjacent and/or	Geological, including minerals designation or ecological designation (Adjacent and/or	Property e.g. buildings and structures	Other

	(adjacent and/or <50m)		<50m)	<50m)	(Adjacent and/or <50m)	
Railway Line (CL01-05)	None	Principal and Secondary A Bedrock Secondary undifferentiated Superficial Deposits	Myers	None	None	None
Dismantled railway (CL04-02)	Farm and Residential Housing	Principal Bedrock Secondary undifferentiated	SSI River Eden	None	Farm and Residential Housing	None
Railways (CL04-31)	None	Superficial Deposits	Unnamed watercourse	None	None	None
Midland Railway Line (CL04-42)	School and Residential Housing		None	None	School and Residential Housing	None
Railway (Eden Valley Railway) (CL06-04)	Commercial Property		None	SSSI River Eamont	Commercial Property	None
Disused railway (CL07-06)	None	Secondary A Bedrock	None	None	None	None
Disused train station (CL07-07)	Farm and Residential Housing	Secondary undifferentiated Superficial Deposits	Watercourse (Lowgill Beck)	Groundwater abstraction well	Farm and Residential Housing	None

Contamination Exceedances
<p>CL04-02 - Soil leachate exceedances of arsenic and lead found near to low potential contaminated sources. Ground water exceedances of Ammoniacal nitrogen, sulphate, sodium, and TPH CWG found near to low potential contaminated sources. Ground water exceedances of Ammoniacal nitrogen, sulphate, sodium, and TPH CWG found near to low potential contaminated sources.</p> <p>CL06-04 - Soil leachate exceedances of Arsenic, chromium, lead, and nickel found near to low potential contaminated sources.</p> <p>CL07-07 Soil exceedances of arsenic found near to moderately low potential contaminated sources. Groundwater exceedance of zinc, copper, ammoniacal nitrogen and pyrene found near to moderately low potential contaminated sources.</p>
Operation development description
<p>CL01-05 - Cutting and attenuation pond</p> <p>CL04-02 –At gradeAt grade</p> <p>CL04-31 - At gradeAt grade</p> <p>CL04-42 - Cutting</p> <p>CL06-04 - Land take and cutting</p> <p>CL07-06 - Cutting and land take</p> <p>CL07-07 - Cutting and land take</p>

Table 23: Baseline CSM and Qualitative Risk Assessment: Railway sites within the study area

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including	On-site users – residential Residents Housing School	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Medium	Moderate/Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Medium	Moderate/Low
		Inhalation of ground gases.	Unlikely	Medium	Low
	On-site users -	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Medium	Moderate/Low

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation	
but not limited to: heavy metals, organic compounds, inorganic compounds, hydrocarbons, PAH, solvents, fuel oils, alkalis.	commercial/public open space commercial, and farms	Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Medium	Moderate/Low	
		Inhalation of ground gases.	Unlikely	Medium	Low	
	Off-site users – residential None	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	N/A	N/A	N/A	
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	N/A	N/A	N/A	
		Inhalation of ground gases.	N/A	N/A	N/A	
	Off-site users - commercial/public open space Farm/commercial property	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Medium	Moderate/Low	
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Medium	Moderate/Low	
		Inhalation of ground gases.	Unlikely	Medium	Low	
	Controlled waters – groundwater – Principal and Secondary A Aquifer Groundwater abstraction well	Vertical and lateral migration.	Unlikely	Medium	Low	
		Groundwater migration, direct run-off from site	Unlikely	Medium	Low	
	Controlled waters – surface waters River Eamont River Eden	Groundwater migration, direct run-off from site	Unlikely	Medium	Low	
		Property receptors – buildings, foundations, and services	Exposure to explosive gases	Unlikely	Medium	Low
			Aggressive Ground Conditions	N/A	N/A	N/A

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
	Ecological/geological designations SSSI River Eamont	Vertical and lateral migration, direct contact.	Unlikely	Medium	Low
Notes / assumptions Sites assessed prior to construction. N/A is not applicable where there are no receptors present.					

Table 24: Construction CSM and Qualitative Risk Assessment: Railways located within the study area

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, organic compounds, inorganic compounds, hydrocarbons, PAH,	On-site users – residential Residents Housing and school	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Likely	Medium	Moderate/Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Likely	Medium	Moderate/Low
		Inhalation of ground gases.	Low	Medium	Low
	On-site users - commercial/public open space and farms	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Likely	Medium	Moderate/Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Likely	Medium	Moderate/Low
		Inhalation of ground gases.	Low	Medium	Low
	Off-site users – residential	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	N/A	N/A	N/A

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation	
solvents, fuel oils, alkalis.	None	Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	N/A	N/A	N/A	
		Inhalation of ground gases.	N/A	N/A	N/A	
	Off-site users - commercial/public open space Farm property	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Likely	Medium	Moderate/Low	
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Likely	Medium	Moderate/Low	
		Inhalation of ground gases.	Low	Medium	Low	
	Controlled waters – groundwater – Principal Aquifer Groundwater abstraction well	Vertical and lateral migration.	Low	Medium	Moderate/Low	
	Controlled waters – surface waters River Eamont	Groundwater migration, direct run-off from site	Low	Medium	Moderate/Low	
	Property receptors – buildings, foundations, and services (on-site and off-site)	Exposure to explosive gases	Unlikely	Medium	Low	
		Aggressive Ground Conditions	N/A	N/A	N/A	
	Ecological/geological designations SSSI River Eamont	Vertical and lateral migration, direct contact.	Low	Medium	Moderate/Low	
	Notes/Assumptions During construction, standard best practice mitigation procedures shall be implemented as set out in Chapter 9: Geology and Soils.					

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Construction workers have been excluded from assessment due to the use of PPE and risk management.					
N/A is not applicable as there are no residential or commercial receptors or properties on or adjacent to the site.					
The implementation of the measures set out in the Environmental Management Plan (EMP) (Appendix 4.1) generally results in a low to unlikely probability of a consequence, but in some cases the actual consequence may temporarily increase from that defined at baseline.					
Assumes construction phase will include remediation that may be required in the event that contamination is discovered. A range may be given as remediation strategies will vary in design to focus on specific contaminative risks at each site. Remediation strategies may involve source removal or pathway intervention as appropriate.					

Table 25: Operation CSM and Qualitative Risk Assessment: Railway located within the study area

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, organic compounds, inorganic compounds, hydrocarbons, PAH,	On-site users – residential Residents Housing and school	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Medium	Moderate/Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Medium	Moderate/Low
		Inhalation of ground gases.	Unlikely	Medium	Low
	On-site users - commercial/public open space Commercial, I and farms	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Medium	Moderate/Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Medium	Moderate/Low
		Inhalation of ground gases.	Unlikely	Medium	Low
	Off-site users – residential	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	N/A	N/A	N/A

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
solvents, fuel oils, alkalis.	None	Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	N/A	N/A	N/A
		Inhalation of ground gases.	N/A	N/A	N/A
	Off-site users - commercial/public open space Farm/commercial property	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Medium	Moderate/Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Medium	Moderate/Low
		Inhalation of ground gases.	Unlikely	Medium	Low
	Controlled waters – groundwater – Principal Aquifer Groundwater abstraction well	Vertical and lateral migration.	Unlikely	Medium	Low
	Controlled waters – surface waters River Eamont	Groundwater migration, direct run-off from site	Unlikely	Medium	Low
	Property receptors – buildings, foundations, and services (on-site and off-site)	Exposure to explosive gases	Unlikely	Medium	Low
		Aggressive Ground Conditions	N/A	N/A	N/A
	Ecological/geological designations SSSI River Eamont	Vertical and lateral migration, direct contact.	Unlikely	Medium	Low
Notes / assumptions N/A is not applicable as there are no receptors on or adjacent to the site.					

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
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Assumes remediation required has been undertaken and construction works are complete. A range may be given as remediation strategies will vary in design to focus on specific contaminative risks at each site. Remediation strategies may involve source removal or pathway intervention as appropriate.

Table 26: Impact Assessment (Comparison of baseline against construction and Operation): Railways located within the study area

Contaminant linkage	Baseline risk	Construction risk	Operation risk	Construction significance	Operation significance
Exposure to soil contamination on-site users (residential)	Low	Moderate/Low	Low	Slight adverse effect	Neutral effect
Exposure to groundwater contamination On-site users (residential).	Low	Moderate/Low	Low	Slight adverse effect	Neutral effect
Exposure to ground gas On-site users (residential).	Very Low	Low	Very Low	Slight adverse effect	Neutral effect
Exposure to soil contamination On-site users (commercial/ public open space)	Low	Moderate/Low	Low	Slight adverse effect	Neutral effect
Exposure to groundwater contamination On-site users (commercial/ public open space)	Low	Moderate/Low	Low	Slight adverse effect	Neutral effect
Exposure to ground gas On-site users (commercial/ public open space)	Very Low	Low	Very Low	Slight adverse effect	Neutral effect
Exposure to soil contamination off-site users (residential)	N/A	N/A	N/A	N/A	N/A

Contaminant linkage	Baseline risk	Construction risk	Operation risk	Construction significance	Operation significance
Exposure to groundwater contamination Off-site users (residential)	N/A	N/A	N/A	N/A	N/A
Exposure to ground gas Off-site users (residential)	N/A	N/A	N/A	N/A	N/A
Exposure to soil contamination Off-site users (commercial/ public open space)	Low	Moderate/Low	Low	Slight adverse effect	Neutral effect
Exposure to groundwater contamination Off-site users (commercial/ public open space)	Low	Moderate/Low	Low	Slight adverse effect	Neutral effect
Exposure to ground gas Off-site users (commercial/ public open space)	Very Low	Low	Very Low	Slight adverse effect	Neutral effect
Contaminated soil, leachate/ groundwater and pollution of aquifers	Low	Moderate Low	Low	Slight adverse effect	Neutral effect
Contaminated soil, leachate/groundwater and impact on surface watercourses	Low	Moderate Low	Low	Slight adverse effect	Neutral effect
Impact on property receptors	Low	Low	Low	Neutral effect	Neutral effect
Impact on ecological/ geological designations	Low	Moderate Low	Low	Slight adverse effect	Neutral effect
Overall significance				Slight adverse effect	Neutral effect
Notes / assumptions Assumes remediation required has been undertaken and construction works are complete.					

Detailed risk assessment – Landfills

Table 27: Detailed risk assessment for – Landfill sites in the study area

Site ID (IDS)	CL01-06, CL02-15, CL06-35, CL06-39, CL07-16					
Site group	Landfills located within the study area					
Site title (Site ID) and land use class	Skirsgill Farm Historic Landfill (CL01-06) Winters Park Landfill (CL02-15) Landfill (CL06-35) Brough Mill Landfill (CL06-39) Hulands landfill (CL07-16)					
Receptors						
Site title (Site ID)	Sensitive land use (human receptor) (adjacent and/or <50m)	Aquifer designation	Surface watercourse (adjacent and/or <50m)	Geological, including minerals designation or ecological designation (Adjacent and/or <50m)	Property e.g. buildings and structures (Adjacent and/or <50m)	Other
Skirsgill Farm Historic Landfill (CL01-06)	Farm/commercial Property	Secondary A Bedrock Secondary undifferentiated Superficial Deposits	None	Groundwater abstraction	None	None
Winters Park Landfill (CL02-15)	Residential Housing	Principal Bedrock Secondary undifferentiated Superficial Deposits	None	None	Residential Housing	None
Landfill (CL06-35)	Warcop Camp		Moor Beck	None	Warcop Camp	None
Brough Mill Landfill (CL06-39)	None		None	None	None	None

Site ID (IDS)	CL01-06, CL02-15, CL06-35, CL06-39, CL07-16					
Hulands landfill (CL07-16)	None	Secondary A Bedrock Secondary undifferentiated Superficial Deposits	None	None	None	None
Operation development description						
CL01-06 - Cutting and Embankment CL02-15 – At grade CL06-35 –At grade CL06-39 - Land take and cutting CL07-16 - At grade and embankment						

Table 28: Baseline CSM and Qualitative Risk Assessment: Landfill sites within the study area

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, organic compounds, inorganic compounds, hydrocarbons, PAH,	On-site users – residential Residents Housing	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Medium	Moderate/low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Medium	Moderate/low risk
		Inhalation of ground gases.	Unlikely	Severe	Moderate/low risk
	On-site users - commercial/public open space Commercial Estates	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Medium	Moderate/low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Medium	Moderate/low risk
		Inhalation of ground gases.	Unlikely	Severe	Moderate/low risk

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
solvents, fuel oils, alkalis.	Off-site users – residential Residential/farm Residential Housing	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Medium	Moderate/low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Medium	Moderate/low risk
		Inhalation of ground gases.	Unlikely	Severe	Moderate/low risk
	Off-site users - commercial/public open space Farm/commercial Cattle Market Trading Estate	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Medium	Moderate/low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Medium	Moderate/low risk
		Inhalation of ground gases.	Unlikely	Severe	Moderate/low risk
	Controlled waters – groundwater – Principal Aquifer Controlled waters – surface waters Groundwater abstraction Property receptors – buildings, foundations, and services (on-site and off-site)	Vertical and lateral migration.	Low	Medium	Moderate/low risk
		Groundwater migration, direct run-off from site	Low	Medium	Moderate/low risk
		Exposure to explosive gases	Unlikely	Severe	Moderate/low risk
		Aggressive Ground Conditions	Unlikely	Medium	Low risk
		Ecological/geological designations None	Vertical and lateral migration, direct contact.	N/A	N/A

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Notes / assumptions					
Sites assessed prior to construction.					
N/A is not applicable where there are no receptors present.					

Table 29: Construction CSM and Qualitative Risk Assessment: Landfill sites located within the study area

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, organic compounds, inorganic compounds, hydrocarbons, PAH, solvents, fuel oils, alkalis.	On-site users – residential Residents Housing	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Medium	Moderate/low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Medium	Moderate/low risk
		Inhalation of ground gases.	Unlikely	Severe	Moderate/low risk
	On-site users - commercial/public open space Commercial Estates	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Medium	Moderate/low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Medium	Moderate/low risk
		Inhalation of ground gases.	Unlikely	Severe	Moderate/low risk
	Off-site users – residential Residential/farm Residential Housing	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Medium	Moderate/low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Medium	Moderate/low risk
		Inhalation of ground gases.	Unlikely	Severe	Moderate/low risk

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
	Off-site users - commercial/public open space	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Medium	Moderate/low risk
	Farm/commercial	Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Medium	Moderate/low risk
	Cattle Market	Inhalation of ground gases.	Unlikely	Severe	Moderate/low risk
	Trading Estate				
	Controlled waters – groundwater – Principal Aquifer	Vertical and lateral migration.	Likely	Medium	Moderate
	Groundwater abstraction				
	Controlled waters – surface waters	Groundwater migration, direct run-off from site	Likely	Medium	Moderate
Groundwater abstraction	Property receptors – buildings, foundations, and services (on-site and off-site)	Exposure to explosive gases	Unlikely	Severe	Moderate/low risk
		Aggressive Ground Conditions	Unlikely	Medium	Low risk
Ecological/geological designations	Vertical and lateral migration, direct contact.	N/A	N/A	N/A	N/A
None					

Notes / assumptions

During construction, standard best practice mitigation procedures shall be implemented as set out in Chapter 9: Geology and Soils.

Construction workers have been excluded from assessment due to the use of PPE and risk management.

N/A is not applicable as there are no residential or commercial receptors or properties on or adjacent to the site.

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
<p>The implementation of the measures set out in the Environmental Management Plan (EMP) (Appendix 4.1) generally results in a low to unlikely probability of a consequence, but in some cases the actual consequence may temporarily increase from that defined at baseline.</p> <p>Assumes construction phase will include remediation that may be required in the event that contamination is discovered. A range may be given as remediation strategies will vary in design to focus on specific contaminative risks at each site. Remediation strategies may involve source removal or pathway intervention as appropriate.</p>					

Table 30: Operation CSM and Qualitative Risk Assessment: Landfill sites located within the study area

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, organic compounds, inorganic compounds, hydrocarbons, PAH, solvents, fuel oils, alkalis.	On-site users – residential Residents Housing	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Medium	Moderate/low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Medium	Moderate/low risk
		Inhalation of ground gases.	Unlikely	Severe	Moderate/low risk
	On-site users - commercial/public open space Commerical Estates	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Medium	Moderate/low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Medium	Moderate/low risk
		Inhalation of ground gases.	Unlikely	Severe	Moderate/low risk
	Off-site users – residential Residential/farm	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Medium	Moderate/low risk

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
	Residential Housing	Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Medium	Moderate/low risk
		Inhalation of ground gases.	Unlikely	Severe	Moderate/low risk
	Off-site users - commercial/public open space Farm/commercial Cattle Market Trading Estate	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Medium	Moderate/low risk
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Medium	Moderate/low risk
		Inhalation of ground gases.	Unlikely	Severe	Moderate/low risk
	Controlled waters – groundwater – Principal Aquifer Groundwater abstraction	Vertical and lateral migration.	Low	Medium	Moderate/low risk
	Controlled waters – surface waters Groundwater abstraction	Groundwater migration, direct run-off from site	Low	Medium	Moderate/low risk
	Property receptors – buildings, foundations, and services (on-site and off-site)	Exposure to explosive gases	Unlikely	Severe	Moderate/low risk
		Aggressive Ground Conditions	Unlikely	Medium	Low risk
	Ecological/geological designations None	Vertical and lateral migration, direct contact.	N/A	N/A	N/A
Notes / assumptions Assumes remediation required has been undertaken and construction works are complete.					

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
<p>N/A is not applicable as there are no residential or commercial receptors or properties on or adjacent to the site. Gas source potentially present but no viable receptors.</p> <p>A range may be given as remediation strategies will vary in design to focus on specific contaminative risks at each site. Remediation strategies may involve source removal or pathway intervention as appropriate.</p>					

Table 31: Impact Assessment (Comparison of baseline against construction and Operation): Landfill sites located within the study area.

Contaminant linkage	Baseline risk	Construction risk	Operation risk	Construction significance	Operation significance
Exposure to groundwater contamination On-site users (residential)	Moderate/low risk	Moderate/low risk	Moderate/low risk	Neutral effect	Neutral effect
Exposure to ground gas On-site users (residential)	Moderate/low risk	Moderate/low risk	Moderate/low risk	Neutral effect	Neutral effect
Exposure to soil contamination On-site users (commercial/ public open space)	Moderate/low risk	Moderate/low risk	Moderate/low risk	Neutral effect	Neutral effect
Exposure to groundwater contamination On-site users (commercial/ public open space)	Moderate/low risk	Moderate/low risk	Moderate/low risk	Neutral effect	Neutral effect
Exposure to ground gas On-site users (commercial/ public open space)	Moderate/low risk	Moderate/low risk	Moderate/low risk	Neutral effect	Neutral effect
Exposure to soil contamination off-site users (residential)	Moderate/low risk	Moderate/low risk	Moderate/low risk	Neutral effect	Neutral effect

Contaminant linkage	Baseline risk	Construction risk	Operation risk	Construction significance	Operation significance
Exposure to groundwater contamination Off-site users (residential)	Moderate/low risk	Moderate/low risk	Moderate/low risk	Neutral effect	Neutral effect
Exposure to ground gas Off-site users (residential)	Moderate/low risk	Moderate/low risk	Moderate/low risk	Neutral effect	Neutral effect
Exposure to soil contamination Off-site users (commercial/ public open space)	Moderate/low risk	Moderate/low risk	Moderate/low risk	Neutral effect	Neutral effect
Exposure to groundwater contamination Off-site users (commercial/ public open space)	Moderate/low risk	Moderate/low risk	Moderate/low risk	Neutral effect	Neutral effect
Exposure to ground gas Off-site users (commercial/ public open space)	Moderate/low risk	Moderate/low risk	Moderate/low risk	Neutral effect	Neutral effect
Contaminated soil, leachate/ groundwater and pollution of aquifers	Moderate/low risk	Moderate/low risk	Moderate/low risk	Neutral effect	Neutral effect
Contaminated soil, leachate/ groundwater and impact on surface watercourses	Moderate/low risk	Moderate	Moderate/low risk	Slight adverse effect	Neutral effect
Impact on property receptors	Moderate/low risk	Moderate	Moderate/low risk	Slight adverse effect	Neutral effect
Impact on ecological/ geological designations	Low	Low	Low	Neutral effect	Neutral effect
Exposure to groundwater contamination On-site users (residential)	N/A	N/A	N/A	N/A	N/A

Contaminant linkage	Baseline risk	Construction risk	Operation risk	Construction significance	Operation significance
Overall significance				Neutral effect	Neutral effect
Notes / assumptions Assumes remediation required has been undertaken and construction works are complete.					

Detailed risk assessment – Quarries and infilled land

Table 32: Detailed risk assessment for – Quarries and infilled sites in the study area

Site ID (IDS)	CL07-08, CL07-18					
Site group	Infilled located within the study area					
Site title (Site ID) and land use class	Quarry (Barf Hill) (CL07-08) –1 Quarry (CL07-18)					
Receptors						
Site title (Site ID)	Sensitive land use (human receptor) (adjacent and/or <50m)	Aquifer designation	Surface watercourse (adjacent and/or <50m)	Geological, including minerals designation or ecological designation (Adjacent and/or <50m)	Property e.g. buildings and structures (Adjacent and/or <50m)	Other
Quarry (Barf Hill) (CL07-08)	Farm/commercial property	Secondary A Bedrock	None	None	Farm/commercial property	None
Quarry (CL07-18)	Residential Housing	Secondary undifferentiated Superficial Deposits	None	None	Residential Housing	None
Operation development description						
CL07-08 - Cutting and attenuation pond						

Site ID (IDS)	CL07-08, CL07-18
CL07-18 - Land take	

Table 33: Baseline CSM and Qualitative Risk Assessment: Quarries and infilled sites within the study area

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, organic compounds, inorganic compounds, hydrocarbons, PAH, solvents, fuel oils, alkalis.	On-site users – residential properties	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very low
		Inhalation of ground gases.	Unlikely	Minor	Very low
	On-site users - commercial/public open space commercial - Estates	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very low
		Inhalation of ground gases.	Unlikely	Minor	Very low
	Off-site users – residential Residential housing	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very low
		Inhalation of ground gases.	Unlikely	Minor	Very low
	Off-site users - commercial/public	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Low

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
	open space Farm/commercial property	Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very low
		Inhalation of ground gases.	Unlikely	Minor	Very low
	Controlled waters – groundwater –	Vertical and lateral migration.	N/A	N/A	N/A
	Controlled waters – surface waters Birk Sike Pond features Surface water abstraction	Groundwater migration, direct run-off from site	Low	Low	Low
	Property receptors – buildings, foundations, and services (on-site and off-site)	Exposure to explosive gases	Unlikely	Medium	Low
		Aggressive Ground Conditions	Unlikely	Medium	Low
	Ecological/geological designations UNESCO Global Geopark SSI Nature conservation	Vertical and lateral migration, direct contact.	Unlikely	Medium	Low
	Notes / assumptions Sites assessed prior to construction. N/A is not applicable where there are no receptors present.				

Table 34: Construction CSM and Qualitative Risk Assessment: Quarries and infilled sites located within the study area.

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, organic compounds, inorganic compounds, hydrocarbons, PAH, solvents, fuel oils, alkalis.	On-site users – residential Residents Housing	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very low
		Inhalation of ground gases.	Unlikely	Minor	Very low
	On-site users - commercial/public open space Commercial Estates	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very low
		Inhalation of ground gases.	Unlikely	Minor	Very low
	Off-site users – residential Residential housing	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very low
		Inhalation of ground gases.	Unlikely	Minor	Very low
	Off-site users - commercial/public open space Farm/commercial property	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very low
		Inhalation of ground gases.	Unlikely	Minor	Very low
	Controlled waters – groundwater	Vertical and lateral migration.	N/A	N/A	N/A
	Controlled waters – surface waters	Groundwater migration, direct run-off from site	Low	Low	Low

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
	Birk Sike Pond features Surface water abstraction				
	Property receptors – buildings, foundations, and services (on-site and off-site)	Exposure to explosive gases	Unlikely	Medium	Low
		Aggressive Ground Conditions	Unlikely	Medium	Low
	Ecological/geological designations UNESCO Global Geopark SSI Nature conservation	Vertical and lateral migration, direct contact.	Unlikely	Medium	Low

Notes / assumptions

Construction workers have been excluded from assessment due to the use of PPE and risk management.

N/A is not applicable as there are no residential or commercial receptors or properties on or adjacent to the site.

The implementation of the measures set out in the Environmental Management Plan (EMP) (Appendix 4.1) generally results in a low to unlikely probability of a consequence, but in some cases the actual consequence may temporarily increase from that defined at baseline.

Assumes construction phase will include remediation that may be required in the event that contamination is discovered. A range may be given as remediation strategies will vary in design to focus on specific contaminative risks at each site. Remediation strategies may involve source removal or pathway intervention as appropriate.

Table 35: Operation CSM and Qualitative Risk Assessment: Quarries and infilled sites located within the study area.

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation	
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, organic compounds, inorganic compounds, hydrocarbons, PAH, solvents, fuel oils, alkalis.	On-site users – residential Residents Housing	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Low	
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very low	
		Inhalation of ground gases.	Unlikely	Minor	Very low	
	On-site users - commercial/public open space Commercial Estates	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Low	
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very low	
		Inhalation of ground gases.	Unlikely	Minor	Very low	
	Off-site users – residential Residential housing	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Low	
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very low	
		Inhalation of ground gases.	Unlikely	Minor	Very low	
	Off-site users - commercial/public open space Farm/commercial property	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Low	
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very low	
		Inhalation of ground gases.	Unlikely	Minor	Very low	
	Controlled waters – groundwater –		Vertical and lateral migration.	N/A	N/A	N/A

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
	Controlled waters – surface waters Birk Sike Pond features Surface water abstraction	Groundwater migration, direct run-off from site	Low	Low	Low
	Property receptors – buildings, foundations, and services (on-site and off-site)	Exposure to explosive gases	Unlikely	Medium	Low
		Aggressive Ground Conditions	Unlikely	Medium	Low
	Ecological/geological designations UNESCO Global Geopark SSI Nature conservation	Vertical and lateral migration, direct contact.	Unlikely	Medium	Low
<p>Notes / assumptions</p> <p>N/A is not applicable as there are no receptors on or adjacent to the site.</p> <p>Assumes remediation required has been undertaken and construction works are complete. A range may be given as remediation strategies will vary in design to focus on specific contaminative risks at each site. Remediation strategies may involve source removal or pathway intervention as appropriate</p>					

Table 36: Impact Assessment (Comparison of baseline against construction and Operation): Railways located within the study area

Contaminant linkage	Baseline	Construction	Operation	Construction impact	Operation significance
	risk	risk	risk	Significance	Significance
Exposure to soil contamination	Low	Low	Low	Neutral Effect	Neutral Effect

Contaminant linkage	Baseline	Construction	Operation	Construction impact	Operation significance
	risk	risk	risk	Significance	Significance
on-site users (residential)					
Exposure to groundwater contamination On-site users (residential).	Very low	Very low	Very low	Neutral Effect	Neutral Effect
Exposure to ground gas On-site users (residential).	Very low	Very low	Very low	Neutral Effect	Neutral Effect
Exposure to soil contamination On-site users (commercial/ public open space)	Low	Low	Low	Neutral Effect	Neutral Effect
Exposure to groundwater contamination On-site users (commercial/ public open space)	Very low	Very low	Very low	Neutral Effect	Neutral Effect
Exposure to ground gas On-site users (commercial/ public open space)	Very low	Very low	Very low	Neutral Effect	Neutral Effect
Exposure to soil contamination off-site users (residential)	Low	Low	Low	Neutral Effect	Neutral Effect
Exposure to groundwater contamination Off-site users (residential)	Very low	Very low	Very low	Neutral Effect	Neutral Effect
Exposure to ground gas Off-site users (residential)	Very low	Very low	Very low	Neutral Effect	Neutral Effect
Exposure to soil contamination Off-site users (commercial/ public open space)	Low	Low	Low	Neutral Effect	Neutral Effect

Contaminant linkage	Baseline	Construction	Operation	Construction impact	Operation significance
	risk	risk	risk	Significance	Significance
Exposure to groundwater contamination Off-site users (commercial/ public open space)	Very low	Very low	Very low	Neutral Effect	Neutral Effect
Exposure to ground gas Off-site users (commercial/ public open space)	Very low	Very low	Very low	Neutral Effect	Neutral Effect
Contaminated soil, leachate/ groundwater and pollution of aquifers	N/A	N/A	N/A	N/A	N/A
Contaminated soil, leachate/ groundwater and impact on surface watercourses	Low	Low	Low	Neutral Effect	Neutral Effect
Impact on property receptors	Low	Low	Low	Neutral Effect	Neutral Effect
Impact on ecological/ geological designations	Low	Low	Low	Neutral Effect	Neutral Effect
Overall significance				Neutral Effect	Neutral Effect
Notes / assumptions Assumes remediation required has been undertaken and construction works are complete.					

Detailed risk assessment – Light industrial sites

Table 37: Detailed risk assessment for – Light Industrial sites in the study area

Site ID (IDS)		CL01-13, CL02-09, CL02-10, CL04-10, CL04-51, CL04-59, CL06-06, CL06-20, CL04-39, CL06-37, CL06-47, CL06-55, CL07-05, CL07-22, CL07-26, CL06-51, CL09-09				
Site group		Infilled located within the study area				
Site title (Site ID) and land use class		Depot (CL01-13) Penrith Hospital (CL02-09) New Penrith Fire Station training area (CL02-10) Garage/ Haulage Yard (CL04-10) Russell Hogg Concrete Supplier (CL04-39) Depot (CL04-51) Kirkby Thore Industrial Estate (CL04-59) Construction equipment (Dyke Nook (CL06-06) Heron's Trucking (CL06-20) Garage and waste oil transfer (CL06-37) Walk Mill (former saw mill) (CL06-47) Air Ambulance Helipad (CL06-51) Depot and silos (CL06-55) Transport depot (CL07-05) Paint depot/workshop (CL07-22) Disused garage (CL07-26) Anaerobic digestion facility (CL09-09)				
Receptors						
Site title (Site ID)	Sensitive land use (human receptor) (adjacent and/or <50m)	Aquifer designation	Surface watercourse (adjacent and/or	Geological, including minerals designation or	Property e.g. buildings and structures (Adjacent	Other

Site ID (IDS)			CL01-13, CL02-09, CL02-10, CL04-10, CL04-51, CL04-59, CL06-06, CL06-20, CL04-39, CL06-37, CL06-47, CL06-55, CL07-05, CL07-22, CL07-26, CL06-51, CL09-09			
			<50m)	ecological designation (Adjacent and/or <50m)	and/or <50m)	
Depot (CL01-13)	County Park Public open space (POS) Industrial/ commercial	Secondary A Bedrock Secondary A and undifferentiated Superficial Deposits	None	None	Industrial/commercial	None
Penrith Hospital (CL02-09)	Residential Housing	Principal Bedrock and Secondary Deposits	None	None	Residential Housing	None
New Penrith Fire Station training area (CL02-10)	Residential Housing		None	None	Residential Housing	None
Garage/ Haulage Yard (CL04-10)	None		None	None	None	None
Russell Hogg Concrete Supplier (CL04-39)	None		Unnamed watercourse	None	None	None
Kirkby Thore Industrial Estate (CL04-59)	Residential Housing Commercial property	Principal Bedrock and Secondary Deposits	None	Groundwater abstraction	Residential Housing Commercial property	None
Depot (CL04-51)	None		None	None	None	None

Site ID (IDS)			CL01-13, CL02-09, CL02-10, CL04-10, CL04-51, CL04-59, CL06-06, CL06-20, CL04-39, CL06-37, CL06-47, CL06-55, CL07-05, CL07-22, CL07-26, CL06-51, CL09-09			
Construction equipment (Dyke Nook (CL06-06))	Commercial property		None	None	Commercial property	None
Heron's Trucking (CL06-20)	None		None	None	None	None
Garage and waste oil transfer (CL06-37)	Residential Properties Brough	Secondary A Bedrock Secondary A and undifferentiated Superficial Deposits	None	UNESCO Global Geopark	Residential Properties	None
Walk Mill (former sawmill) (CL06-47)	None	Principal Bedrock Secondary Superficial Deposits	Moor Beck Watercourse	UNESCO Global Geopark	None	None
Depot and silos (CL06-55)	Common Land (POS)		None	None	None	None
Air Ambulance Helipad (CL06-51)	Residential Properties		Moor Beck	UNESCO Global Geopark	Residential Properties	None
Transport depot (CL07-05)	Residential Properties	Secondary A Bedrock	None	None	Residential Properties	None
Paint depot/ workshop (CL07-22)	None	Secondary undifferentiated Superficial Deposits	None	None	None	None
Disused garage (CL07-26)	Residential Properties		None	None	Residential Properties	None
Anaerobic digestion facility (CL09-09)	None		Ordinary watercourse	None	None	None

Site ID (IDS)	CL01-13, CL02-09, CL02-10, CL04-10, CL04-51, CL04-59, CL06-06, CL06-20, CL04-39, CL06-37, CL06-47, CL06-55, CL07-05, CL07-22, CL07-26, CL06-51, CL09-09
Containment Exceedances	
<p>CL01-13 - Low soil exceedance of TPH Aromatic C12-C26, TPH Aromatic C16–C21, and TPH Aromatic C21-C35 and soil leachates exceedances of pH and lead.</p> <p>CL02-10 - Soil leachates exceedance of pH, arsenic, nickel, and lead.</p> <p>CL04-51 - Soil leachate exceedances of arsenic and lead found near to low potential contaminated sources.</p> <p>CL04-59 - Soil leachate exceedances of arsenic and lead found near to low potential contaminated sources.</p> <p>CL06-06 - Soil leachate exceedances of Arsenic, chromium, lead, and nickel found near to low potential contaminated sources.</p> <p>CL06-51 - Soil leachate exceedances of Arsenic, chromium, lead, and nickel found near to moderate low potential contaminated sources. Groundwater exceedance of TPH CWG, arsenic, conductivity, nitrite, nitrate, sodium and chloride found near to moderate low potential contaminated sources.</p>	
Operation development description	
<p>CL01-1 Embankment and cutting</p> <p>CL02-09 - Cutting</p> <p>CL02-10 - Cutting</p> <p>CL04-10 - At grade</p> <p>CL04-39 - At grade</p> <p>CL04-52 - At grade and embankment</p> <p>CL04-59 - At grade and embankment</p> <p>CL06-06 - Cutting</p> <p>CL06-20 - Land take and cutting</p> <p>CL06-37 - Cutting</p> <p>CL06-47 - Cutting</p> <p>CL06-51 - Embankment and At grade</p> <p>CL06-55 - Cutting and attenuation pond</p> <p>CL07-05 - Attenuation Pond and embankment</p> <p>CL07-22 - At-grade and cutting</p>	

Site ID (IDS)	CL01-13, CL02-09, CL02-10, CL04-10, CL04-51, CL04-59, CL06-06, CL06-20, CL04-39, CL06-37, CL06-47, CL06-55, CL07-05, CL07-22, CL07-26, CL06-51, CL09-09
CL07-26 – At grade CL08-02 - At grade CL09-09 - Cutting and At grade	

Table 38: Baseline CSM and Qualitative Risk Assessment: Light Industrial sites in the study area.

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, organic compounds, inorganic compounds, hydrocarbons, PAH, solvents, fuel oils, alkalis.	On-site users – residential Residents Housing	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very Low
		Inhalation of ground gases.	Unlikely	Minor	Very Low
	On-site users - commercial/public open space Industrial/commercial County Park Common Land Farm Religious Building	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very Low
		Inhalation of ground gases.	Unlikely	Minor	Very Low
	Off-site users – residential Residential Housing	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very Low
		Inhalation of ground gases.	Unlikely	Minor	Very Low

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation	
	Off-site users - commercial/public open space Recreation Ground Farm property/commercial Hospital Park	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Low	
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very Low	
		Inhalation of ground gases.	Unlikely	Minor	Very Low	
	Controlled waters – groundwater – Principal Aquifer Secondary A aquifer Groundwater abstraction	Vertical and lateral migration.	Unlikely	Medium	Low	
	Controlled waters – surface waters Moor Beck Watercourse	Groundwater migration, direct run-off from site	Unlikely	Medium	Low	
	Property receptors – buildings, foundations, and services (on-site and off-site)	Exposure to explosive gases	Unlikely	Medium	Low	
		Aggressive Ground Conditions	Unlikely	Medium	Low	
	Ecological/geological designations UNESCO Global Geopark	Vertical and lateral migration, direct contact.	Unlikely	Medium	Low	
	Notes / assumptions					

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Sites assessed prior to construction.					
N/A is not applicable where there are no receptors present.					

Table 39: Construction CSM and Qualitative Risk Assessment: Light Industrial sites land located within the study area.

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation	
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, organic compounds, inorganic compounds, hydrocarbons, PAH, solvents, fuel oils, alkalis.	On-site users – residential Residents Housing	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Moderate/ Low	
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Minor	Low	
		Inhalation of ground gases.	Low	Minor	Low	
	On-site users - commercial/public open space Industrial/commercial Farm	On-site users - commercial/public open space Industrial/commercial Farm	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Moderate/ Low
			Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Minor	Low
			Inhalation of ground gases.	Low	Minor	Low
	Off-site users – residential Residential Housing	Off-site users – residential Residential Housing	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Moderate/ Low
			Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Minor	Low
			Inhalation of ground gases.	Low	Minor	Low
	Off-site users -	Off-site users -	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Moderate/ Low

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
	commercial/public open space	Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Minor	Low
	Farm property/commercial Hospital	Inhalation of ground gases.	Low	Minor	Low
	Controlled waters – groundwater – Principal Aquifer Secondary A aquifer Groundwater abstraction	Vertical and lateral migration.	Low	Medium	Moderate/Low
	Controlled waters – surface waters Moor Beck Watercourse	Groundwater migration, direct run-off from site	Low	Medium	Moderate/Low
	Property receptors – buildings, foundations, and services (on-site and off-site)	Exposure to explosive gases	Unlikely	Medium	Low
		Aggressive Ground Conditions	Unlikely	Medium	Low
	Ecological/geological designations UNESCO Global Geopark	Vertical and lateral migration, direct contact.	Likely	Medium	Moderate

Notes / assumptions

During construction, standard best practice mitigation procedures shall be implemented as set out in Chapter 9: Geology and Soils.

Construction workers have been excluded from assessment due to the use of PPE and risk management.

N/A is not applicable as there are no residential or commercial receptors or properties on or adjacent to the site.

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
<p>The implementation of the measures set out in the Environmental Management Plan (EMP) (Appendix 4.1) generally results in a low to unlikely probability of a consequence, but in some cases the actual consequence may temporarily increase from that defined at baseline.</p> <p>Assumes construction phase will include remediation that may be required in the event that contamination is discovered. A range may be given as remediation strategies will vary in design to focus on specific contaminative risks at each site. Remediation strategies may involve source removal or pathway intervention as appropriate.</p>					

Table 40: Operation CSM and Qualitative Risk Assessment: Light Industrial sites located within the study area.

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, organic compounds, inorganic compounds,	On-site users – residential Residents Housing	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very Low
		Inhalation of ground gases.	Unlikely	Minor	Very Low
	On-site users - commercial/public open space Industrial/commercial Farm	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Minor	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very Low
		Inhalation of ground gases.	Unlikely	Minor	Very Low
	Off-site users - commercial/public open space Industrial/commercial	Vertical and lateral migration.	Low	Minor	Low
		Groundwater migration, direct run-off from site	Unlikely	Minor	Very Low
		Exposure to explosive gases	Unlikely	Minor	Very Low
		Aggressive Ground Conditions	Low	Minor	Low

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation	
hydrocarbons, PAH, solvents, fuel oils, alkalis.	commercial/public open space	Vertical and lateral migration, direct contact.	Unlikely	Minor	Very Low	
	Farm property/commercial Hospital	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Minor	Very Low	
	Controlled waters – groundwater – Principal Aquifer Groundwater abstraction	Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low	
	Controlled waters – surface waters Swindale Brook Moor Beck	Inhalation of ground gases.	Unlikely	Medium	Low	
	On-site users - commercial/public open space Industrial/commercial Farm		Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low
			Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low
	Ecological/geological designations UNESCO Global Geopark	Inhalation of ground gases.	Unlikely	Medium	Low	

Notes / assumptions

Assumes remediation required has been undertaken and construction works are complete.

N/A is not applicable as there are no residential or commercial receptors or properties on or adjacent to the site. Gas source potentially present but no viable receptors.

A range may be given as remediation strategies will vary in design to focus on specific contaminative risks at each site. Remediation strategies may involve source removal or pathway intervention as appropriate.

Table 41: Impact Assessment (Comparison of baseline against construction and Operation): Light industrial sites located within the study area.

Contaminant linkage	Baseline risk	Construction risk	Operation risk	Construction significance	Operation significance
Exposure to soil contamination on-site users (residential)	Low	Moderate/Low	Very Low	Slight adverse effect	Slight beneficial effect
Exposure to groundwater contamination On-site users (residential).	Very Low	Low	Very Low	Slight adverse effect	Neutral effect
Exposure to ground gas On-site users (residential).	Very Low	Low	Very Low	Slight adverse effect	Neutral effect
Exposure to soil contamination On-site users (commercial/ public open space)	Low	Moderate/Low	Very Low	Slight adverse effect	Slight beneficial effect
Exposure to groundwater contamination On-site users (commercial/ public open space)	Very Low	Low	Very Low	Slight adverse effect	Neutral effect
Exposure to ground gas On-site users (commercial/ public open space)	Very Low	Low	Very Low	Slight adverse effect	Neutral effect
Exposure to soil contamination off-site users (residential)	Low	Moderate/Low	Very Low	Slight adverse effect	Slight beneficial effect

Contaminant linkage	Baseline risk	Construction risk	Operation risk	Construction significance	Operation significance
Exposure to groundwater contamination Off-site users (residential)	Very Low	Low	Very Low	Slight adverse effect	Neutral effect
Exposure to ground gas Off-site users (residential)	Very Low	Low	Very Low	Slight adverse effect	Neutral effect
Exposure to soil contamination Off-site users (commercial/ public open space)	Low	Moderate/Low	Very Low	Slight adverse effect	Slight beneficial effect
Exposure to groundwater contamination Off-site users (commercial/ public open space)	Very Low	Low	Very Low	Slight adverse effect	Neutral effect
Exposure to ground gas Off-site users (commercial/ public open space)	Very Low	Low	Very Low	Slight adverse effect	Neutral effect
Contaminated soil, leachate/ groundwater and pollution of aquifers	Low	Moderate/Low	Low	Slight adverse effect	Neutral effect
Contaminated soil, leachate/ groundwater and impact on surface watercourses	Low	Moderate/Low	Low	Slight adverse effect	Neutral effect

Contaminant linkage	Baseline risk	Construction risk	Operation risk	Construction significance	Operation significance
Impact on property receptors	Low	Low	Low	Neutral effect	Neutral effect
Impact on ecological/ geological designations	Low	Moderate	Low	Moderate adverse effect	Neutral effect
Overall significance				Slight adverse effect	Neutral effect
Notes / assumptions Assumes remediation required has been undertaken and construction works are complete.					

Detailed risk assessment – Cemeteries

Table 42: Detailed risk assessment for – Cemetery sites in the study area

Site ID (IDS)	CL06-16, CL08-08					
Site group	Infilled located within the study area					
Site title (Site ID) and land use class	Warcop Cemetery (CL06-16) Cemetery (CL08-08)					
Receptors						
Site title (Site ID)	Sensitive land use (human receptor) (adjacent and/or <50m)	Aquifer designation	Surface watercourse (adjacent and/or <50m)	Geological, including minerals designation or ecological designation (Adjacent and/or <50m)	Property e.g. buildings and structures (Adjacent and/or <50m)	Other
Warcop Cemetery (CL06-16)	None	Principal Bedrock Secondary undifferentiated Superficial Deposits	None	None	None	None
Cemetery (CL08-08)	Residential property Public Park	Secondary A Bedrock Secondary undifferentiated Superficial Deposits	None	None	Residential property	None
Operation development description						
CL08-08 – At grade CL06-16 - Adjacent to temporary land take and At grade						

Table 43: Baseline CSM and Qualitative Risk Assessment: Cemetery sites in the study area

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation	
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, organic compounds, inorganic compounds, hydrocarbons, PAH, solvents, fuel oils, alkalis.	On-site users – residential Residents Residential property	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Likely	Minor	Low	
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very Low	
		Inhalation of ground gases.	Unlikely	Medium	Low	
	On-site users - commercial/public open space Industrial/commercial Public Park	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Likely	Minor	Low	
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very Low	
		Inhalation of ground gases.	Unlikely	Medium	Low	
	Off-site users – residential None	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	N/A	N/A	N/A	
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	N/A	N/A	N/A	
		Inhalation of ground gases.	N/A	N/A	N/A	
	Off-site users - commercial/public open space None	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	N/A	N/A	N/A	
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	N/A	N/A	N/A	
		Inhalation of ground gases.	N/A	N/A	N/A	
	Controlled waters – groundwater		Vertical and lateral migration.	Low	Minor	Low

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
	Principal and secondary A Bedrock				
	Controlled waters – surface waters None	Groundwater migration, direct run-off from site	N/A	N/A	N/A
	Property receptors – buildings, foundations, and services (on-site and off-site)	Exposure to explosive gases	Unlikely	Medium	Low
		Aggressive Ground Conditions	Unlikely	Medium	Low
	Ecological/geological designations None	Vertical and lateral migration, direct contact.	N/A	N/A	N/A
Notes / assumptions Sites assessed prior to construction. N/A is not applicable where there are no receptors present.					

Table 44: Construction CSM and Qualitative Risk Assessment: Cemetery sites land located within the study area.

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic	On-site users – residential Residents Housing	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Likely	Minor	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very Low
		Inhalation of ground gases.	Unlikely	Medium	Low

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
contaminants including but not limited to: heavy metals, organic compounds, inorganic compounds, hydrocarbons, PAH, solvents, fuel oils, alkalis.	On-site users - commercial/public open space Public Park	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Likely	Minor	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very Low
		Inhalation of ground gases.	Unlikely	Medium	Low
	Off-site users – residential None	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	N/A	N/A	N/A
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	N/A	N/A	N/A
		Inhalation of ground gases.	N/A	N/A	N/A
	Off-site users - commercial/public open space None	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	N/A	N/A	N/A
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	N/A	N/A	N/A
		Inhalation of ground gases.	N/A	N/A	N/A
	Controlled waters – groundwater – Principal Aquifer Secondary A aquifer	Vertical and lateral migration.	Low	Minor	Low
	Controlled waters – surface waters	Groundwater migration, direct run-off from site	N/A	N/A	N/A
	Property receptors –	Exposure to explosive gases	Unlikely	Medium	Low

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
	buildings, foundations, and services (on-site and off-site)	Aggressive Ground Conditions	Unlikely	Medium	Low
	Ecological/geological designations None	Vertical and lateral migration, direct contact.	N/A	N/A	N/A

Notes / assumptions

During construction, standard best practice mitigation procedures shall be implemented as set out in Chapter 9: Geology and Soils.

Construction workers have been excluded from assessment due to the use of PPE and risk management.

N/A is not applicable as there are no residential or commercial receptors or properties on or adjacent to the site.

The implementation of the measures set out in the Environmental Management Plan (EMP) (Application Document 2.7) generally results in a low to unlikely probability of a consequence, but in some cases the actual consequence may temporarily increase from that defined at baseline.

Assumes construction phase will include remediation that may be required in the event that contamination is discovered. A range may be given as remediation strategies will vary in design to focus on specific contaminative risks at each site. Remediation strategies may involve source removal or pathway intervention as appropriate.

Table 45: Operation CSM and Qualitative Risk Assessment: Cemetery sites located within the study area.

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Soil, leachate and groundwater contamination. Ground gas.	On-site users – residential Residents Residential property	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Likely	Minor	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very Low

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Potential for a range of inorganic and organic contaminants including but not limited to: heavy metals, organic compounds, inorganic compounds, hydrocarbons, PAH, solvents, fuel oils, alkalis.		Inhalation of ground gases.	Unlikely	Medium	Low
	On-site users - commercial/public open space	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Likely	Minor	Low
	Industrial/commercial Public Park	Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Minor	Very Low
		Inhalation of ground gases.	Unlikely	Medium	Low
	Off-site users – residential	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	N/A	N/A	N/A
	None	Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	N/A	N/A	N/A
		Inhalation of ground gases.	N/A	N/A	N/A
	Off-site users - commercial/public open space	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	N/A	N/A	N/A
	None	Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	N/A	N/A	N/A
		Inhalation of ground gases.	N/A	N/A	N/A
	Controlled waters – groundwater – Principal and Secondary A Bedrock	Vertical and lateral migration.	Low	Minor	Low
	Controlled waters – surface waters	Groundwater migration, direct run-off from site	N/A	N/A	N/A

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
	None				
	Property receptors – buildings, foundations, and services (on-site and off-site)	Exposure to explosive gases	Unlikely	Medium	Low
		Aggressive Ground Conditions	Unlikely	Medium	Low
	Ecological/geological designations None	Vertical and lateral migration, direct contact.	N/A	N/A	N/A

Notes / assumptions

N/A is not applicable as there are no receptors on or adjacent to the site.

Assumes remediation required has been undertaken and construction works are complete. A range may be given as remediation strategies will vary in design to focus on specific contaminative risks at each site. Remediation strategies may involve source removal or pathway intervention as appropriate.

Table 46: Impact Assessment (Comparison of baseline against construction and Operation): Cemetery sites located within the study area.

Contaminant linkage	Baseline risk	Construction risk	Operation risk	Construction significance	Operation significance
Exposure to soil contamination on-site users (residential)	Low	Low	Low	Neutral effect	Neutral effect
Exposure to groundwater contamination On-site users (residential).	Very Low	Very Low	Very Low	Neutral effect	Neutral effect
Exposure to ground gas On-site users (residential).	Low	Low	Low	Neutral effect	Neutral effect

Contaminant linkage	Baseline risk	Construction risk	Operation risk	Construction significance	Operation significance
Exposure to soil contamination On-site users (commercial/ public open space)	Low	Low	Low	Neutral effect	Neutral effect
Exposure to groundwater contamination On-site users (commercial/ public open space)	Very Low	Very Low	Very Low	Neutral effect	Neutral effect
Exposure to ground gas On-site users (commercial/ public open space)	Low	Low	Low	Neutral effect	Neutral effect
Exposure to soil contamination off-site users (residential)	N/A	N/A	N/A	N/A	N/A
Exposure to groundwater contamination Off-site users (residential)	N/A	N/A	N/A	N/A	N/A
Exposure to ground gas Off-site users (residential)	N/A	N/A	N/A	N/A	N/A
Exposure to soil contamination Off-site users (commercial/ public open space)	N/A	N/A	N/A	N/A	N/A
Exposure to groundwater contamination Off-site users (commercial/ public open space)	N/A	N/A	N/A	N/A	N/A
Exposure to ground gas Off-site users (commercial/ public open space)	N/A	N/A	N/A	N/A	N/A
Contaminated soil, leachate/ groundwater and pollution of aquifers	Low	Low	Low	Neutral effect	Neutral effect

Contaminant linkage	Baseline risk	Construction risk	Operation risk	Construction significance	Operation significance
Contaminated soil, leachate/ groundwater and impact on surface watercourses	N/A	N/A	N/A	N/A	N/A
Impact on property receptors	Low	Low	Low	Neutral effect	Neutral effect
Impact on ecological/ geological Designations	N/A	N/A	N/A	N/A	N/A
Overall significance				Neutral effect	Neutral effect
Notes / assumptions					
Assumes remediation required has been undertaken and construction works are complete.					

Detailed risk assessment – Foot and Mouth burial sites

Table 47 : Detailed risk assessment for – Foot and mouth burial sites in the study area

Site ID (IDS)	FM03, FM04, FM14, FM17					
Site group	Infilled located within the study area					
Site title (Site ID) and land use class	FM03 - Foot and mouth Burial Site (Land at west view) 146 Sheep FM04- Foot and mouth Burial Site (Land at west view) 1900 Sheep FM14 - Foot and mouth Burial Site FM17- Foot and mouth Burial Site					
Receptors						
Site title (Site ID)	Sensitive land use (human receptor) (adjacent and/or <50m)	Aquifer designation	Surface watercourse (adjacent and/or <50m)	Geological, including minerals designation or ecological designation (Adjacent and/or <50m)	Property e.g. buildings and structures (Adjacent and/or <50m)	Other
Foot and mouth Burial Site (Land at west	None	Bedrock -Principal aquifer	None	None	None	None

Site ID (IDS)	FM03, FM04, FM14, FM17					
view) 146 Sheep (FM03)		Superficial Deposits - Secondary aquifer undifferentiated				
Foot and mouth Burial Site (Land at west view) 1900 Sheep (FM04)						
Foot and mouth Burial Site (FM14)	None		None	UNESCO Global Geopark	None	None
Foot and mouth Burial Site (FM17)	Residential housing Farm/commercial properties		None	None	Residential housing Residential housing Farm/commercial properties	None
Operation development description						
FM03 – Cutting FM04 – Cutting FM14 – Cutting FM17 – Land take						

Table 48: Baseline CSM and Qualitative Risk Assessment: Foot and mouth burial sites in the study area

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Soil, leachate and groundwater contamination.	On-site users – residential Residential housing	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: pathogens, metal compounds, solvents and fuel oils, alkalis and animal carcasses		Inhalation of ground gases.	Unlikely	Medium	Low
	On-site users - commercial/public open space Farm/commercial properties	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Medium	Moderate/Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Medium	Moderate/Low
		Inhalation of ground gases.	Unlikely	Medium	Low
	Off-site users – residential Residential housing	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low
		Inhalation of ground gases.	Unlikely	Medium	Low
	Off-site users - commercial/public open space None	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	N/A	N/A	N/A
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	N/A	N/A	N/A
		Inhalation of ground gases.	N/A	N/A	N/A
	Controlled waters – groundwater Principal aquifer	Vertical and lateral migration.	Unlikely	Medium	Low
	Controlled waters – surface waters None	Groundwater migration, direct run-off from site	N/A	N/A	N/A
	Property receptors – buildings, foundations, and services (on-site	Exposure to explosive gases	Unlikely	Medium	Low
		Aggressive Ground Conditions	Unlikely	Medium	Low

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
	and off-site)				
	Ecological/geological designations UNESCO Global Geopark	Vertical and lateral migration, direct contact.	Unlikely	Medium	Low
Notes / assumptions Sites assessed prior to construction. N/A is not applicable where there are no receptors present.					

Table 49: Construction CSM and Qualitative Risk Assessment: Foot and mouth burial sites land located within the study area.

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: pathogens, metal compounds,	On-site users – residential Residents Housing	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	/Low
		Inhalation of ground gases.	Unlikely	Medium	Low
	On-site users - commercial/public open space Farm/commercial properties	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Medium	Moderate/Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Medium	Moderate/Low
		Inhalation of ground gases.	Low	Medium	Moderate/Low

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
solvents and fuel oils, alkalis and animal carcasses	Off-site users – residential Residents Housing	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low
		Inhalation of ground gases.	Unlikely	Medium	Low
	Off-site users - commercial/public open space None	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	N/A	N/A	N/A
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	N/A	N/A	N/A
		Inhalation of ground gases.	N/A	N/A	N/A
	Controlled waters – groundwater – Principal Aquifer	Vertical and lateral migration.	Low	Medium	Moderate/Low
	Controlled waters – surface waters None	Groundwater migration, direct run-off from site	N/A	N/A	N/A
	Property receptors – buildings, foundations, and services (on-site and off-site)	Exposure to explosive gases	Unlikely	Medium	Low
		Aggressive Ground Conditions	Unlikely	Medium	Low
	Ecological/geological designations UNESCO Global Geopark	Vertical and lateral migration, direct contact.	Low	Medium	Moderate/Low

Source	Receptor	Pathway	Probability	Consequence	Risk with construction stage mitigation
<p>Notes / assumptions</p> <p>During construction, standard best practice mitigation procedures shall be implemented as set out in Chapter 9: Geology and Soils.</p> <p>Construction workers have been excluded from assessment due to the use of PPE and risk management.</p> <p>N/A is not applicable as there are no residential or commercial receptors or properties on or adjacent to the site.</p> <p>The implementation of the measures set out in the Environmental Management Plan (EMP) (Application Document 2.7) generally results in a low to unlikely probability of a consequence, but in some cases the actual consequence may temporarily increase from that defined at baseline.</p> <p>Assumes construction phase will include remediation that may be required in the event that contamination is discovered. A range may be given as remediation strategies will vary in design to focus on specific contaminative risks at each site. Remediation strategies may involve source removal or pathway intervention as appropriate.</p>					

Table 50: Operation CSM and Qualitative Risk Assessment: Foot and mouth burial sites located within the study area.

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
Soil, leachate and groundwater contamination. Ground gas. Potential for a range of inorganic and organic contaminants including but not limited to: pathogens,	On-site users – residential Residents Housing	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low
		Inhalation of ground gases.	Unlikely	Medium	Low
	On-site users - commercial/public	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Low	Medium	Moderate/Low

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
metal compounds, solvents and fuel oils, alkalis and animal carcasses	open space Farm/commercial properties	Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Low	Medium	Moderate/Low
		Inhalation of ground gases.	Unlikely	Medium	Low
	Off-site users – residential Residents Housing	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	Unlikely	Medium	Low
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	Unlikely	Medium	Low
		Inhalation of ground gases.	Unlikely	Medium	Low
	Off-site users - commercial/public open space None	Direct contact, ingestion, inhalation of dust/vapour with/from contaminated soils.	N/A	N/A	N/A
		Direct contact, ingestion, inhalation of vapour with/from contaminated waters.	N/A	N/A	N/A
		Inhalation of ground gases.	N/A	N/A	N/A
	Controlled waters – groundwater – Principal aquifer	Vertical and lateral migration.	Unlikely	Medium	Low
	Controlled waters – surface waters None	Groundwater migration, direct run-off from site	N/A	N/A	N/A
	Property receptors –	Exposure to explosive gases	Unlikely	Medium	Low

Source	Receptor	Pathway	Probability	Consequence	Risk with permanent works mitigation
	buildings, foundations, and services (on-site and off-site)	Aggressive Ground Conditions	Unlikely	Medium	Low
	Ecological/geological designations UNESCO Global Geopark	Vertical and lateral migration, direct contact.	Unlikely	Medium	Low

Notes / assumptions

N/A is not applicable as there are no receptors on or adjacent to the site.

Assumes remediation required has been undertaken and construction works are complete. A range may be given as remediation strategies will vary in design to focus on specific contaminative risks at each site. Remediation strategies may involve source removal or pathway intervention as appropriate.

Table 51: Impact Assessment (Comparison of baseline against construction and Operation): Foot and mouth burial sites located within the study area.

Contaminant linkage	Baseline risk	Construction risk	Operation risk	Construction impact Significance	Operation significance
Exposure to soil contamination on-site users (residential)	Low	Low	Low	Neutral effect	Neutral effect
Exposure to groundwater contamination On-site users (residential).	Low	Low	Low	Neutral effect	Neutral effect
Exposure to ground gas On-site users (residential).	Low	Low	Low	Neutral effect	Neutral effect
Exposure to soil contamination On-site users (commercial/ public open space)	Moderate/Low	Moderate/Low	Moderate/ Low	Neutral effect	Neutral effect

Contaminant linkage	Baseline risk	Construction risk	Operation risk	Construction impact Significance	Operation significance
Exposure to groundwater contamination On-site users (commercial/ public open space)	Moderate/Low	Moderate/Low	Moderate/ Low	Neutral effect	Neutral effect
Exposure to ground gas On-site users (commercial/ public open space)	Low	Moderate/Low	Low	Slight adverse effect	Neutral effect
Exposure to soil contamination off-site users (residential)	Low	Low	Low	Neutral effect	Neutral effect
Exposure to groundwater contamination Off-site users (residential)	Low	Low	Low	Neutral effect	Neutral effect
Exposure to ground gas Off-site users (residential)	Low	Low	Low	Neutral effect	Neutral effect
Exposure to soil contamination Off-site users (commercial/ public open space)	N/A	N/A	N/A	N/A	N/A
Exposure to groundwater contamination Off-site users (commercial/ public open space)	N/A	N/A	N/A	N/A	N/A
Exposure to ground gas Off-site users (commercial/ public open space)	N/A	N/A	N/A	N/A	N/A
Contaminated soil, leachate/ groundwater and pollution of aquifers	Low	Moderate/Low	Low	Slight adverse effect	Neutral effect
Contaminated soil, leachate/ groundwater and impact on surface watercourses	N/A	N/A	N/A	N/A	N/A
Impact on property receptors	Low	Low	Low	Neutral effect	Neutral effect

Contaminant linkage	Baseline risk	Construction risk	Operation risk	Construction impact Significance	Operation significance
Impact on ecological/ geological designations	Low	Moderate /Low	Low	Slight adverse effect	Neutral effect
Overall significance				Slight adverse to Neutral effect	Neutral effect
Notes / assumptions Assumes remediation required has been undertaken and construction works are complete.					