



**Haweswater Aqueduct Resilience Programme - Proposed Bowland  
Section**

**Environmental Statement**

**Volume 4**

**Appendix 7.6: Earthworks Dewatering and Groundwater Flow  
Disruption**

June 2021



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## Haweswater Aqueduct Resilience Programme - Proposed Bowland Section

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Location	Phase of works	Type of works	Name / Ref	Excavation works deeper than 1m (Y, N)	Depth excavation (m)	Max anticipated GW level (m bg)	Dewatering expected (Y, N)	K (m/s)	Length excavation (m)	Width excavation (m)	Drawdown	Ro	Re	Zone of influence	SPZ Identify	SPZ Impact	SPZ Value	SPZ Magnitude	SPZ Significance	PWS Identify	PWS Impact	PWS Value	PWS Magnitude	PWS Significance	GWDE Identify	GWDE Impact	GWDE Value		
Lower Houses	Enabling works phase	Lagoon	Lower Houses Compound Attenuation Ponds	Y	2	1	Y	2.00E-06	20	20	1	4.24	11.28	15.53	No SPZ identified within zone of influence.	none	n/a	n/a	n/a	No PWS are within the zone of influence. However, PWS3-12 and PWS3-16 are located approximately 350 m and 200 m down gradient respectively.	PWS3-12 is expected to be a borehole, but exact location and depth have not been confirmed. The type of supply for PWS3-16 is unknown. Potential flow impacts on both supplies are unlikely, however uncertainties remain.	Medium	Negligible	Neutral	Lower House Cottage West - approx. 100m west, upgradient and located on other side of Cod Gill. No impacts predicted.	n/a	n/a		
																									Lower House Cottage - moderate groundwater dependent habitat 160m downgradient.	Loss of groundwater flow due to dewatering.	Medium (moderate gw dependence, not designated)		
	Enabling works phase	Access road	Lower Houses Compound Access Track/ Haul Road	N	1	1	N	2.00E-06		5					No SPZ identified within zone of influence.	none	n/a	n/a	n/a	No PWS exist within the footprint of the construction.	None	n/a	n/a	n/a	Lower House Cottage West - approx. 65m north, cross-gradient and located on other side of Cod Gill. No impacts predicted.	n/a	n/a		
																										Lower House Cottage - moderate groundwater dependent habitat 230m downgradient.	Interception of groundwater flows in the short term.	Medium (moderate gw dependence, not designated)	
																										Lower House Cottage - moderate groundwater dependent habitat 230m downgradient.	Accidental leaks / spills, of fuels and chemicals, including cement and sewage.	Medium (moderate gw dependence, not designated)	
																											Lower House Cottage - moderate groundwater dependent habitat 230m downgradient.	Mobilisation of suspended solids.	Medium (moderate gw dependence, not designated)
	Enabling works phase	Access road	Lower Houses Compound Permanent Access Track	N	1	1	N	2.00E-06		5						No SPZ identified within zone of influence.	none	n/a	n/a	n/a	No PWS exist within the footprint of the construction.	None	n/a	n/a	n/a	Lower House Cottage - approx. 25m northwest, cross-/downgradient.	Interception of groundwater flows in the short term.	Medium (moderate gw dependence, not designated)	
																											Lower House Cottage - approx. 25m northwest, cross-/downgradient.	Accidental leaks / spills, of fuels and chemicals, including cement and sewage.	Medium (moderate gw dependence, not designated)
																											Lower House Cottage - approx. 25m northwest, cross-/downgradient.	Mobilisation of suspended solids.	Medium (moderate gw dependence, not designated)
																											Park House Lane - moderate groundwater dependence habitat adjacent to end of access track.	Interception of groundwater flows in the short term.	Medium (moderate gw dependence, not designated)
																											Park House Lane - moderate groundwater dependence habitat adjacent to end of access track.	Accidental leaks / spills, of fuels and chemicals, including cement and sewage.	Medium (moderate gw dependence, not designated)
																											Park House Lane - moderate groundwater dependence habitat adjacent to end of access track.	Mobilisation of suspended solids.	Medium (moderate gw dependence, not designated)
																											Park House Lane - low groundwater dependence habitat 20m northeast of end of access track.	Interception of groundwater flows in the short term.	Low (low gw dependence, not designated)
																											Park House Lane - low groundwater dependence habitat 20m northeast of end of access track.	Accidental leaks / spills, of fuels and chemicals, including cement and sewage.	Low (low gw dependence, not designated)
																											Park House Lane - low groundwater dependence habitat 20m northeast of end of access track.	Mobilisation of suspended solids.	Low (low gw dependence, not designated)
	Enabling works phase	Building	Lower Houses Compound Permanent Building	N	0	1	N	2.00E-06								No SPZ identified within zone of influence.	none	n/a	n/a	n/a	No PWS exist within the footprint of the construction.	None	n/a	n/a	n/a	n/a	n/a	n/a	
	Construction phase	Open-cut	Lower Houses Compound Multi-line Connection - open cut section connecting the existing pipeline to the tunnel	Y	5	1	Y	2.00E-06		42	50	4	16.97	n/a	16.97	No SPZ identified within zone of influence.	none	n/a	n/a	n/a	No PWS are within the zone of influence. However PWS3-12 and PWS3-16 are located approximately 200 m down gradient.	PWS3-12 is expected to be a borehole, but exact location and depth have not been confirmed. The supply type for PWS3-16 is unknown. Potential flow impacts on these supplies are unlikely, however uncertainties remain.	Medium	Negligible	Neutral	Lower House Cottage - approx. 20m downgradient of open cut.	Loss of groundwater flow due to dewatering.	Medium (moderate gw dependence, not designated)	
																											Lower House Cottage - approx. 20m downgradient of open cut.	Interception of groundwater flows in the short term.	Medium (moderate gw dependence, not designated)
																											Lower House Cottage - approx. 20m downgradient of open cut.	Accidental leaks / spills, of fuels and chemicals, including cement and sewage.	Medium (moderate gw dependence, not designated)
																											Lower House Cottage - approx. 20m downgradient of open cut.	Mobilisation of suspended solids.	Medium (moderate gw dependence, not designated)
Construction phase	Open-cut	Lower Houses Compound Single-line Connection - open cut section connecting the existing pipeline to the Proposed Bowland Tunnel	Y	5	1	Y	2.00E-06		125	5	4	16.97	n/a	16.97	No SPZ identified within zone of influence.	none	n/a	n/a	n/a	No PWS are within the potential zone of influence.	None	n/a	n/a	n/a	n/a	n/a	n/a		
Enabling works phase and construction phase	Compaction	Lower Houses Compound Area	N												No SPZ identified within zone of influence.	none	n/a	n/a	n/a	PWS3-16 is situated within the compound area.	Direct disruption of source by construction activities.	Medium	Major Adverse	Large	Lower House Cottage West - approx. 25m northwest, cross-gradient of compound area. Located on other side of Cod Gill. No impacts predicted.	n/a	n/a		
																										Lower House Cottage - approx. 5m northeast, downgradient of compound area.	Interception of groundwater flows in the short term.	Medium (moderate gw dependence, not designated)	
																										Lower House Cottage - approx. 5m northeast, downgradient of compound area.	Accidental leaks / spills, of fuels and chemicals, including cement and sewage.	Medium (moderate gw dependence, not designated)	
																										Lower House Cottage - approx. 5m northeast, downgradient of compound area.	Mobilisation of suspended solids.	Medium (moderate gw dependence, not designated)	

Location	Phase of works	Type of works	Name / Ref	Excavation works deeper than 1m (Y, N)	Depth excavation (m)	Max anticipated GW level (m bg)	Dewatering expected (Y, N)	K (m/s)	Length excavation (m)	Width excavation (m)	Drawdown	Ro	Re	Zone of influence	SPZ identify	SPZ impact	SPZ Value	SPZ Magnitude	SPZ Significance	PWS identify	PWS impact	PWS Value	PWS Magnitude	PWS Significance	GWDE identify	GWDE impact	GWDE Value		
Lower Houses																									Park House Lane - moderate groundwater dependence habitat adjacent to end of access track.	Interception of groundwater flows in the short term.	Medium (moderate gw dependence, not designated)		
																									Park House Lane - moderate groundwater dependence habitat adjacent to end of access track.	Accidental leaks / spills, of fuels and chemicals, including cement and sewage.	Medium (moderate gw dependence, not designated)		
																										Park House Lane - moderate groundwater dependence habitat adjacent to end of access track.	Mobilisation of suspended solids.	Medium (moderate gw dependence, not designated)	
	Enabling works phase and construction phase	Compaction	Lower Houses Compound Area	N												No SPZ identified within zone of influence.	none	n/a	n/a	n/a	PWS3-16 is situated within the compound area.	Direct disruption of source by construction activities expected.	Medium	Major Adverse	Large	n/a	n/a	n/a	
Newton-in-Bowland	Enabling works phase	Access road	Access track/ haul road within Newton-in-Bowland Compound	N	1	1	N	2.00E-06	1000	5	0	0.00	n/a	0.00	No SPZ identified within zone of influence.	none	n/a	n/a	n/a	No PWS are within the potential zone of influence.	None	n/a	n/a	n/a	Gamble Hole Farm Pasture in footprint of access track.	Direct interception of groundwater flows in the short term.	High (high gw dependence, non-stat designated)		
																									Gamble Hole Farm Pasture in footprint of access track.	Accidental leaks / spills, of fuels and chemicals, including cement and sewage.	High (high gw dependence, non-stat designated)		
																										Gamble Hole Farm Pasture in footprint of access track.	Mobilisation of suspended solids.	High (high gw dependence, non-stat designated)	
																										The Coach House - moderate groundwater dependent habitat approx. 80m downgradient.	Interception of groundwater flows in the short term.	Medium (moderate gw dependence, not designated)	
																										The Coach House - moderate groundwater dependent habitat approx. 80m downgradient.	Accidental leaks / spills, of fuels and chemicals, including cement and sewage.	Medium (moderate gw dependence, not designated)	
																										The Coach House - moderate groundwater dependent habitat approx. 80m downgradient.	Mobilisation of suspended solids.	Medium (moderate gw dependence, not designated)	
	Enabling works phase	Access road	Construction Access route to/from Newton-in-Bowland Compound	N												No SPZ identified within zone of influence.	none	n/a	n/a	n/a	No PWS identified within zone of influence.	None	n/a	n/a	n/a	River Hodder North - highly groundwater dependent habitat within footprint of access track.	Direct interception of groundwater flows in the short term.	Medium (high gw dependence, not designated)	
																										River Hodder North - highly groundwater dependent habitat within footprint of access track.	Accidental leaks / spills, of fuels and chemicals, including cement and sewage.	Medium (high gw dependence, not designated)	
																											River Hodder North - highly groundwater dependent habitat within footprint of access track.	Mobilisation of suspended solids.	Medium (high gw dependence, not designated)
	Construction phase	Open-cut	Multi-line Connection within Newton-in-Bowland Compound	Y	3	1	Y	6.00E-06	155	50	2	14.70	n/a	14.70	No SPZ identified within zone of influence.	none	n/a	n/a	n/a	PWS3-8 is within range, approximately 7 m from the construction footprint.	PWS3-8 is in range of the potential zone of influence of groundwater drawdown. Therefore, a reduction in capacity of the PWS is expected.	Medium	Major Adverse	Large	Gamble Hole Farm Pasture - eastern part of site is within dewatering zone of influence.	Loss of groundwater flow due to dewatering.	High (high gw dependence, non-stat designated)		
																					Fober farm spring (PWS3-15) and PWS3-14 are outside the zone of influence but located 30 m down gradient.	Potential flow disruption due to groundwater drawdown. Therefore, a reduction in capacity of the PWS is expected.	Medium	Moderate Adverse	Moderate	Gamble Hole Farm Pasture - eastern corner of site is within footprint of open cut.	Direct interception of groundwater flows in the short term.	High (high gw dependence, non-stat designated)	
																										Gamble Hole Farm Pasture - eastern corner of site is within footprint of open cut.	Accidental leaks / spills, of fuels and chemicals, including cement and sewage.	High (high gw dependence, non-stat designated)	
																										Gamble Hole Farm Pasture - eastern corner of site is within footprint of open cut.	Mobilisation of suspended solids.	High (high gw dependence, non-stat designated)	
	Construction phase	Open-cut	Single-line overflow within Newton-in-Bowland Compound	Y	3	1	Y	6.00E-06	110	5	2	14.70	n/a	14.70	No SPZ identified within zone of influence.	none	n/a	n/a	n/a	PWS3-8 is within the potential zone of influence and located within the construction footprint.	PWS3-8 is in range of the potential zone of influence of groundwater drawdown. Therefore, a reduction in capacity of the PWS is expected. Direct disruption of source by construction activities possible.	Medium	Major Adverse	Large	Gamble Hole Farm Pasture - immediately downgradient of dewatering zone of influence.	Loss of groundwater flow due to dewatering.	High (high gw dependence, non-stat designated)		
																					Fober farm spring (PWS3-15) and PWS3-14 are outside the zone of influence but located 30 m down gradient.	Potential flow disruption due to groundwater drawdown. Therefore, a reduction in capacity of these PWS is expected.	Medium	Moderate Adverse	Moderate	Gamble Hole Farm Pasture - downgradient of open cut.	Interception of groundwater flows in the short term.	High (high gw dependence, non-stat designated)	
																										Gamble Hole Farm Pasture - downgradient of open cut.	Accidental leaks / spills, of fuels and chemicals, including cement and sewage.	High (high gw dependence, non-stat designated)	
																									Gamble Hole Farm Pasture - downgradient of open cut.	Mobilisation of suspended solids.	High (high gw dependence, non-stat designated)		

Location	Phase of works	Type of works	Name / Ref	Excavation works deeper than 1m (Y, N)	Depth excavation (m)	Max anticipated GW level (m bg)	Dewatering expected (Y, N)	K (m/s)	Length excavation (m)	Width excavation (m)	Drawdown	Ro	Re	Zone of influence	SPZ identify	SPZ impact	SPZ Value	SPZ Magnitude	SPZ Significance	PWS identify	PWS impact	PWS Value	PWS Magnitude	PWS Significance	GWDE identify	GWDE impact	GWDE Value									
Newton-in-Bowland	Enabling works phase	Lagoon	Newton-in-Bowland Compound Attenuation Pond	Y	2	1	Y	2.00E-06	35.1	14.7	1	4.24	12.82	17.06	No SPZ identified within zone of influence.	none	n/a	n/a	n/a	No PWS identified within zone of influence.	None	n/a	n/a	n/a	None identified.	n/a	n/a									
	Enabling works phase and construction phase	Compaction	Newton-in-Bowland Compound Envelope	N												No SPZ identified within zone of influence.	none	n/a	n/a	n/a	Fober Farm spring supply (PWS3-15) is within the construction envelope.	Direct disruption of source by construction activities.	Medium	Major Adverse	Large	Gamble Hole Farm Pasture - highly groundwater dependent habitat within footprint of compound area.	Direct interception of groundwater flows in the short term.	High (high gw dependence, non-stat designated)								
																						PWS3-8 is within the construction envelope.	Direct disruption of source by construction activities.	Medium	Major Adverse	Large	Gamble Hole Farm Pasture - highly groundwater dependent habitat within footprint of compound area.	Accidental leaks / spills, of fuels and chemicals, including cement and sewage.	High (high gw dependence, non-stat designated)							
																							PWS3-14 is within the construction envelope.	Direct disruption of source by construction activities.	Medium	Major Adverse	Large	Gamble Hole Farm Pasture - highly groundwater dependent habitat within footprint of compound area.	Mobilisation of suspended solids.	High (high gw dependence, non-stat designated)						
																														The Coach House - moderate groundwater dependent habitat (SE sub-site) approx. 5m downgradient of compound area.	Interception of groundwater flows in the short term.	Medium (moderate gw dependence, not designated)				
																															The Coach House - moderate groundwater dependent habitat (SE sub-site) approx. 5m downgradient of compound area.	Accidental leaks / spills, of fuels and chemicals, including cement and sewage.	Medium (moderate gw dependence, not designated)			
																																The Coach House - moderate groundwater dependent habitat (SE sub-site) approx. 5m downgradient of compound area.	Mobilisation of suspended solids.	Medium (moderate gw dependence, not designated)		
																																Dunsop Bridge Road - highly groundwater dependent habitat adjacent to compound area access.	Interception of groundwater flows in the short term.	Medium (high gw dependence, not designated)		
																																	Dunsop Bridge Road - highly groundwater dependent habitat adjacent to compound area access.	Accidental leaks / spills, of fuels and chemicals, including cement and sewage.	Medium (high gw dependence, not designated)	
																																		Dunsop Bridge Road - highly groundwater dependent habitat adjacent to compound area access.	Mobilisation of suspended solids.	Medium (high gw dependence, not designated)
																																		River Hodder North - highly groundwater dependent habitats within the footprint of compound area access.	Direct interception of groundwater flows in the short term.	Medium (high gw dependence, not designated)
																																		River Hodder North - highly groundwater dependent habitats within the footprint of compound area access.	Accidental leaks / spills, of fuels and chemicals, including cement and sewage.	Medium (high gw dependence, not designated)
																																			River Hodder North - highly groundwater dependent habitats within the footprint of compound area access.	Mobilisation of suspended solids.
																															River Hodder South - approx. 45m south of compound area access, downgradient but located on other side of River Hodder.	No impacts predicted.	n/a			

Location	GWDE Magnitude	GWDE Significance	Surface Water identify	Surface Water impact	Surface Water Value	Surface Water Magnitude	Surface Water Significance	Infrastructure / Building identify	Infrastructure / Building impact	Infra / Building Value	Infra / Building Magnitude	Infra / Building Significance	Cultural Heritage identify	Cultural Heritage impact	Heritage Value	Heritage Magnitude	Heritage Significance	Contaminated Land identify	Contaminated Land impact	Aquifer Value	Contamination Magnitude	Contamination Significance	
Lower Houses	n/a	n/a	No surface water feature lies within zone of influence .	None	n/a	n/a	n/a	Lunesdale North Well building (10 m in length) is within zone of influence.	Potential settlement effects due to dewatering during construction.	Medium	Minor Adverse	Slight	No Heritage features identified within the zone of influence.	None	n/a	n/a	n/a	No areas of contaminated land exist within the construction footprint.	None	n/a	n/a	n/a	
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
	n/a	n/a	Watercourse 169 crosses the footprint of the construction.	No groundwater dewatering activity is required. Therefore there will be no impact on watercourse 169 as a result of groundwater flow disruption.	Medium	n/a	n/a	n/a	No infrastructure or buildings exist at the footprint of the construction	None	n/a	n/a	n/a	No Heritage features identified within the footprint of construction.	None	n/a	n/a	n/a	No areas of contaminated land exist within the construction footprint.	None	n/a	n/a	n/a
	Moderate Adverse	Moderate	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
	Minor Adverse	Slight	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
	Minor Adverse	Slight	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Moderate Adverse	Moderate	No surface water feature crosses the construction footprint.	None	n/a	n/a	n/a	n/a	Minor road (unnamed road) between Park House Lane and Helks Brow joins the access track.	No dewatering proposed at this location therefore no significant impact anticipated.	n/a	n/a	n/a	No Heritage features identified within the footprint of construction.	None	n/a	n/a	n/a	No areas of contaminated land exist within the construction footprint.	None	n/a	n/a	n/a
	Minor Adverse	Slight	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Minor Adverse	Slight	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Minor Adverse	Neutral	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Minor Adverse	Neutral	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Minor Adverse	Neutral	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Negligible	Neutral	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Negligible	Neutral	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Negligible	Neutral	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	No surface water feature crosses the construction footprint.	None	n/a	n/a	n/a	n/a	No infrastructure or buildings exist at the footprint of the construction	None	n/a	n/a	n/a	No Heritage features identified within the footprint of construction.	None	n/a	n/a	n/a	No areas of contaminated land exist within the construction footprint.	None	n/a	n/a	n/a
	Negligible	Neutral	Cod Gill watercourse (W206) lies within zone of influence.	Reduced contribution to baseflow during dewatering.	Medium	Minor Adverse	Slight	n/a	One small building (3.5 m in length) is within the zone of influence of groundwater drawdown, approx. 3 m from construction footprint	Potential settlement effects due to dewatering during construction.	Medium	Minor Adverse	Slight	No Heritage features identified within the zone of influence.	None	n/a	n/a	n/a	No areas of contaminated land exist within the construction footprint.	None	n/a	n/a	n/a
	Negligible	Neutral	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Minor Adverse	Slight	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Minor Adverse	Slight	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	No surface water feature lies within zone of influence.	None	n/a	n/a	n/a	n/a	No infrastructure or buildings exist at the footprint of the construction	None	n/a	n/a	n/a	No Heritage features identified within the zone of influence.	None	n/a	n/a	n/a	No areas of contaminated land exist within the construction footprint.	None	n/a	n/a	n/a	
n/a	n/a	Cod Gill watercourse (W206) runs close to the compound.	No groundwater dewatering activity is required. Therefore there will be no impact on Cod Gill watercourse as a result of groundwater flow disruption.	n/a	n/a	n/a	n/a	The existing Lunesdale North Well building (10 m in length) is within the Compound	No dewatering proposed at this location therefore no significant impact anticipated.	n/a	n/a	n/a	No Heritage features identified within the footprint of construction.	None	n/a	n/a	n/a	No areas of contaminated land exist within the construction footprint.	None	n/a	n/a	n/a	
Moderate Adverse	Moderate	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Minor Adverse	Slight	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Minor Adverse	Slight	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	

Location	GWDE Magnitude	GWDE Significance	Surface Water identify	Surface Water impact	Surface Water Value	Surface Water Magnitude	Surface Water Significance	Infrastructure / Building identify	Infrastructure / Building impact	Infra / Building Value	Infra / Building Magnitude	Infra / Building Significance	Cultural Heritage identify	Cultural Heritage impact	Heritage Value	Heritage Magnitude	Heritage Significance	Contaminated Land identify	Contaminated Land impact	Aquifer Value	Contamination Magnitude	Contamination Significance	
Lower Houses	Minor Adverse	Neutral	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
	Minor Adverse	Neutral	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
	Minor Adverse	Neutral	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
	n/a	n/a	Watercourse 169 lies within the compound.	Compaction from construction activities within the envelope could cause a barrier to groundwater flow and reduce the contribution of baseflow to the watercourse.	n/a	n/a	n/a	n/a	One small building (3.5 m in length) is within the Compound.	No dewatering proposed at this location therefore no significant impact anticipated.	n/a	n/a	n/a	No Heritage features identified within the footprint of construction.	None	n/a	n/a	n/a	No areas of contaminated land exist within the construction footprint.	n/a	n/a	n/a	n/a
Newton-in-Bowland	Major Adverse	Large	Watercourse 384 & 385 crosses the access track construction location.	No flow or dewatering impact assumed according to currently available information.	Low	n/a	n/a	No infrastructure or buildings exist at the construction.	none	n/a	n/a	n/a	No Heritage features identified within the zone of influence.	none	n/a	n/a	n/a	A historic stockpile location approximately 10,000 m2 in size, is shown crossing the proposed the access track (Geotech study). During the construction of the existing Haweswater Aqueduct, excavation materials were placed at various locations along the route corridor.	No excavation or dewatering associated with this activity. Therefore, no contaminant plume migration is expected.	n/a	n/a	n/a	
	Moderate Adverse	Moderate	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
	Moderate Adverse	Moderate	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
	Moderate Adverse	Moderate	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Minor Adverse	Slight	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Minor Adverse	Slight	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Major Adverse	Large	The River Hodder crosses the access envelope.	No flow or dewatering impact assumed according to currently available information.	Medium	n/a	n/a	No infrastructure or buildings exist at the construction.	n/a	n/a	n/a	n/a	n/a	No Heritage features identified within the footprint of construction.	n/a	n/a	n/a	n/a	No areas of contaminated land exist within the construction footprint.	n/a	n/a	n/a	n/a
	Moderate Adverse	Moderate	Watercourses 384, 386 & 1312 cross the access envelope.	No flow or dewatering impact assumed according to currently available information.	Low	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Moderate Adverse	Moderate	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Major Adverse	Large	Watercourse 384 downgradient of zone of influence.	Watercourse is out of range of the zone of influence of drawdown. However, due to the surface water feature being down gradient of the dewatering activity, contribution to baseflow may be reduced if groundwater flows through superficial deposits.	Low	Minor Adverse	Slight	One small building (6 m in length) is within the zone of influence of groundwater drawdown, approx. 10 m from construction footprint.	Potential settlement effects due to dewatering during construction.	Medium	Minor Adverse	Slight	No Heritage features identified within the zone of influence.	none	n/a	n/a	n/a	n/a	A historical valve house (Geotech Study no.12) is within the potential zone of influence of groundwater drawdown.	The drawdown effect could cause a potential contaminant plume to move towards the site of dewatering and potentially cause the abstracted water to be contaminated.	Bedrock aquifer - High sensitivity on BGS mapping, 1.7m thickness recorded in BH021 PWS3-8 Medium sensitivity	Moderate Adverse	Moderate (potential effect on PWS3-8)
	Major Adverse	Large	Watercourse 385 downgradient of zone of influence.	Watercourse is out of range of the zone of influence of drawdown. However, it is down gradient of the dewatering activity, contribution to baseflow may be reduced if groundwater flows through superficial deposits.	Medium	Moderate Adverse	Moderate	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Minor Adverse	Slight	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Minor Adverse	Slight	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Moderate Adverse	Moderate	Closest watercourses 384 & 385 are downgradient of zone of influence.	Watercourses are out of range of the zone of influence of drawdown. However, they are down gradient of the dewatering activity, contribution to baseflow may be reduced if groundwater flows through superficial deposits.	Low	Minor Adverse	Slight	One small building (6 m in length) is within the zone of influence of groundwater drawdown, approx. 10 m from construction footprint.	Potential settlement effects due to dewatering during construction.	Medium	Minor Adverse	Slight	No Heritage features identified within the zone of influence.	none	n/a	n/a	n/a	n/a	A historical valve house (Geotech Study no.12) is within the potential zone of influence of groundwater drawdown.	The drawdown effect could cause a potential contaminant plume to move towards the site of dewatering and potentially cause the abstracted water to be contaminated.	Bedrock aquifer - High sensitivity on BGS mapping, 1.7m thickness recorded in BH021 PWS3-8 Medium sensitivity	Moderate Adverse	Moderate (potential effect on PWS3-8)
	Moderate Adverse	Moderate	Watercourse 385 out of range	Watercourse is out of range of the zone of influence of drawdown. However, it is down gradient of the dewatering activity, contribution to baseflow may be reduced if groundwater flows through superficial deposits.	Medium	Moderate Adverse	Moderate	The existing Hodder North Well building (10 m in length) is within the zone of influence of groundwater drawdown.	Potential settlement effects due to dewatering during construction.	Medium	Minor Adverse	Slight	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Minor Adverse	Slight	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Minor Adverse	Slight	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	

Location	GWDE Magnitude	GWDE Significance	Surface Water identify	Surface Water impact	Surface Water Value	Surface Water Magnitude	Surface Water Significance	Infrastructure / Building identify	Infrastructure / Building impact	Infra / Building Value	Infra / Building Magnitude	Infra / Building Significance	Cultural Heritage identify	Cultural Heritage impact	Heritage Value	Heritage Magnitude	Heritage Significance	Contaminated Land identify	Contaminated Land impact	Aquifer Value	Contamination Magnitude	Contamination Significance			
Newton-in-Bowland	n/a	n/a	Watercourse 384	Watercourses 384 approx. 10m from pond and within the zone of influence of drawdown.	Low	Moderate Adverse	Slight	No infrastructure or buildings exist at the footprint of the construction	none	n/a	n/a	n/a	No Heritage features identified within the zone of influence.	none	n/a	n/a	n/a	No contaminated land features are identified within the zone of influence of drawdown at the lagoon. However, a historical stockpile is located approximately 50 m to the east.	The drawdown effect has the potential to change the groundwater flow gradient such that the contaminant plume is mobilised. Potentially causing contaminant migration towards the site of dewatering and the abstracted water to be contaminated.	Bedrock aquifer - High sensitivity Superficial deposits: None / Till - medium sensitivity	Minor Adverse	Slight potential effect on bedrock aquifer and Till.			
	Major Adverse	Large	Watercourses 384 & 385 are located within the envelope.	Compaction from construction activities within the envelope could cause a barrier to groundwater flow and reduce the contribution of baseflow to the watercourse.	Low	Minor Adverse	Neutral	No infrastructure or buildings exist at the footprint of the construction	none	n/a	n/a	n/a	No Heritage features identified within the footprint of construction.	none	n/a	n/a	n/a	A historic stockpile >10,000 m2 in size is located within the envelope.	No excavation or dewatering associated with this activity. Therefore, no contaminant plume migration is expected as a result of this activity.	Bedrock aquifer - High sensitivity Superficial deposits: None/ Till - medium sensitivity	n/a	n/a			
	Moderate Adverse	Moderate	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	A historic Valve House (Geotech Study no.12) is located within the construction footprint.	No excavation or dewatering associated with this activity. Therefore, no contaminant plume migration is expected as a result of this activity.	Bedrock aquifer - High sensitivity Superficial deposits: None/ Till - medium sensitivity	n/a	n/a			
	Moderate Adverse	Moderate	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	A historic limestone quarry (Geotech Study no.3) is shown within the construction footprint.	No excavation or dewatering associated with this activity. Therefore, no contaminant plume migration is expected as a result of this activity.	Bedrock aquifer - High sensitivity Superficial deposits: None/ Till - medium sensitivity	n/a	n/a			
	Moderate Adverse	Moderate	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
	Minor Adverse	Slight	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
	Minor Adverse	Slight	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
	Minor Adverse	Slight	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Negligible	Neutral	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
	Negligible	Neutral	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
	Major Adverse	Large	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
	Moderate Adverse	Moderate	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
	Moderate Adverse	Moderate	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	