A1 in Northumberland: Morpeth to Ellingham

Scheme Number: TR010041

6.7 Environmental Statement – Appendix 11.5 Geology and Soils DMRB Sensitivity Test

Part A

APFP Regulation 5(2)(a)

Planning Act 2008

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

June 2020

Infrastructure Planning

Planning Act 2008

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

The A1 in Northumberland: Morpeth to Ellingham Development Consent Order 20[xx]

Environmental Statement - Appendix

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TABLES

1. INTRODUCTION

1.1.1. The Design Manual for Roads and Bridges (DMRB) LA 109 Geology and Soils Revision 0 (LA 109) (**Ref. 1.1**) was released in October 2019 and supersedes the former DMRB Volume 11 Section 3, Part 11: Geology and Soils (1993) (**Ref. 1.2**) and former DMRB Volume 11 Section 3, Part 6: Land Use (2001) (**Ref. 1.3**) for assessment of agricultural land quality only.

1.1.2. The purpose of this Appendix is to report the potential changes to the Geology and Soils assessment presented in **Chapter 11: Geology and Soils, Volume 2** of this Environmental Statement (ES) (**Application Document Reference: TR010041/APP/6.2**) for Part A: Morpeth to Felton (Part A), as a result of the updated guidance.

1.1.3. **Section 2** of this Appendix highlights the key changes in the new LA 109, with discussion on the implications for the assessment in **Chapter 11: Geology and Soils, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**). **Section 3** presents a brief appraisal of the potential for additional significant effects as a result of applying the new LA 109 guidance. A summary is included in **Section 4** of this Appendix.

2. KEY UPDATES

2.1. SIGNIFICANCE CRITERIA – SENSITIVITY / MAGNITUDE

2.1.1. The former DMRB guidance did not contain any defined sensitivity and magnitude criteria for use in the assessment of geology and soils.

2.1.2. LA 109 contains defined sensitivity and magnitude criteria to be used in the geology and soils assessment as detailed **Table 2-1** and **Table 2-2**.

Table 2-1 - Geology and Soil Sensitivity Criteria

Sensitivity	Description	Example
Very High	Geology: - Very rare and of international importance with no potential for replacement - Geology meeting international designation citation criteria which is not designated as such. Soils: - Soils directly supporting an EU designated site, and / or; - Agricultural land classification (ALC) Grades 1 and 2. Contamination: - Human health: very high sensitivity land uses; - Surface water and Groundwater: nationally significant	Geology: - UNESCO World Heritage Sites - UNESCO Global Geoparks - Sites of Special Scientific Interest (SSSI) - Geological Conservation Review (GCR) sites where citations include features of international importance Soils: - Soils directly supporting Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Ramsar sites. Contamination - Human health: Residential or allotments end use - Surface water: Watercourse having a Water Framework Directive (WFD) classification shown in a River Basin Management Plan (RBMP) and Q95[1] greater than or equal to 1.0 m^3/s. Site protected / designated under EC or UK legislation (SAC, SPA, SSSI, Ramsar site, salmonid water). Species protected by EC legislation Ecology and Nature Conservation. - Groundwater: Principal aquifer providing a regionally important resource and / or supporting a site protected under EC

[1] Q_{95} – The flow equalled or exceeded in a watercourse 95% of the time and is an indicator of low flow conditions

Sensitivity	Description	Example
	attribute of high importance	and UK legislation. Groundwater locally supports Groundwater Dependent Terrestrial Ecosystem (GWDTE). Source Protection Zone (SPZ) 1.
High	Geology: - Rare and of national importance with little potential for replacement. - Geology meeting national designation citation criteria which is not designated as such. Soils: - Soils directly supporting a UK designated site and / or; - ALC Grade 3a or LCA Grade 3.1 Contamination: - Human Health: high sensitivity land uses - Surface water and Groundwater: locally significant attribute of high importance	Geology: - Geological SSSI, Area of Special Scientific Interest (ASSI), National Nature Reserves (NNR). Geology meeting national designation citation criteria which is not designated as such. Soils: - Soils supporting a SSSI Contamination: - Human Health: Public open space - Surface water: Watercourse having a WFD classification shown in a RBMP and Q95 less than 1.0 m^3/s. Species protected under EC or UK legislation. - Groundwater: Principal aquifer providing locally important resource or supporting a river ecosystem. Groundwater supports a GWDTE. SPZ 2.
Medium	Geology: - Geology of regional importance with limited potential for replacement - Geology meeting regional designation citation criteria which is not designated as such. Soils:	Geology: - Regionally important geological sites (RIGS) Soils: - Soils supporting Local Nature Reserves (LNR), Sites of Nature Conservation Importance (SNCI) and Local Geological Sites (LGS) Contamination

Sensitivity	Description	Example
	- Soils supporting non-statutory designated sites and / or; - ALC Grade 3b or LCA grade 3.2 Contamination: - Human Health: medium sensitivity land uses - Surface water and Groundwater: of moderate quality and rarity.	- Human Health: Commercial or industrial land uses - Surface water: Watercourses not having a WFD classification shown in a RBMP and Q95 greater than 0.001 m^3/s. - Groundwater: Aquifer providing water for agricultural or industrial use with limited connection to surface water. SPZ 3.
Low	Geology: - Geology of local importance / interest with potential for replacement Soils: - Soils supporting non-statutory notable or priority habitats, and / or; - ALC Grade 4 and 5 or LCA grade 4.1 to 7 Contamination: - Human Health: low sensitivity land uses - Surface water and Groundwater: of lower quality.	Geology: - Non designated geological exposures - Former quarry / mining sites Contamination - Human Health: land use such as highways and - Surface water: Watercourses not having a WFD classification shown in a RBMP and Q95 less than 0.001 m^3/s. - Groundwater: Unproductive strata
Negligible	Geology: - No geological exposures, little or no local interest Soils:	N/A

Sensitivity	Description	Example
	- Previously developed land formerly in 'hard uses' with little potential to return to agriculture Contamination: - Human Health: undeveloped surplus land / no sensitive land use proposed.	

Table 2-2 - Geology and Soils Magnitude Impact Criteria

Magnitude	Description
Major Adverse	Geology: Loss of geological feature / designation and / or quality and integrity, severe damage to key characteristics, features or elements. Soil: Physical removal or permanent sealing of greater than 20 hectares of soil resource or agricultural land. Contamination: - Human health: Significant contamination identified. Contamination levels significantly exceed background levels and relevant screening criteria (e.g. Category 4 screening levels (C4SLs)) with potential for significant harm to human health. Contamination heavily restricts future use of land. - Surface Water: Loss of regionally important public water supply, loss or extensive change to a designated nature conservation site, reduction in water body WFD classification. - Groundwater: Loss of or extensive change to an aquifer, loss of regionally important water supply, reduction in water body WFD classification.
Moderate Adverse	Geology: Partial loss of geological feature / designation, potentially adversely affecting the integrity; partial loss of / damage to key characteristics, features or elements. Soil: Permanent loss of between 1 and 20 hectares of agricultural land and / or reduction of one or soil function(s) and restriction to current or approved future use through degradation, compaction, erosion of soil resource. Contamination:

Magnitude	Description
	- Human health: Contaminant concentrations exceed background levels and are in line with limits of relevant screening criteria (e.g. C4SLs). Significant contamination can be present. Control / remediation measures are required to reduce risks to human health / make land suitable for intended use. - Surface Water: Degradation of regionally important public water supply or loss of major commercial / industrial / agricultural supplies; contribution to reduction in water body WFD classification. - Groundwater: Partial loss or change to an aquifer; degradation of a regionally important public water supply or loss of significant commercial / industrial / agricultural supplies; contribution to reduction in water body WFD classification.
Minor Adverse	Geology: Minor measurable change in geological feature / designation attributes, quality or vulnerability; minor loss of, or alteration to, one (or more) key characteristics, features or elements. Soil: Temporary loss / reduction of one or more soil function(s) and restriction to current or approved future use through degradation, compaction, erosion of soil resource. Contamination: - Human health: Contaminant concentrations are below relevant screening criteria (e.g. C4SLs). Significant contamination is unlikely with a low risk to human health. Best practice measures can be required to minimise risks to human health. - Surface Water: Minor effects on water supplies. - Groundwater: Minor effects on aquifer, GWDTEs and abstractions.
Negligible Adverse	Geology: Very minor loss or detrimental alteration to one or more characteristics, features or elements of geological feature / designation. Overall integrity of resource not affected. Soil: No discernible loss (i.e. less than 1 hectare of agricultural land) / reduction of soil function(s) that restrict current or approved future use. Contamination: - Human health: Contaminant concentrations substantially below levels outlined in relevant screening criteria (C4SLs). No requirement for control measures to reduce the risks to human health / make land suitable for intended use. - Surface Water and Groundwater: The proposed project is unlikely to affect the integrity of the water environment.

Magnitude	Description
No Change	Geology: No temporary or permanent loss / disturbance of characteristics, features or elements. Soil: No loss / reduction of soil function(s) that restrict current or approved future use. Contamination: - Human health: Reported contaminant concentrations below background levels. - Surface Water and Groundwater: No loss or alteration of characteristics, features or elements; no observable impact in either direction.

2.1.3. It is noted that that there is no magnitude assigned to beneficial impacts to Geology and Soils within LA 109, it is noted however that improvements from baseline conditions should be identified and reported. Where applicable the magnitude of impact (e.g. in relation to surface water and groundwater), may be reported in line with the magnitudes estimated in Table 3.71 of LA 113, road drainage and the water environment (**Ref. 1.4**).

SIGNIFICANCE OF EFFECTS

2.1.4. The matrix to determine the significance of effects based on criteria set out in **Table 2-1** and **Table 2-2** is set out in LA 104 Environmental assessment and monitoring (**Ref. 1.5**) and is presented in **Table 2-3.**Significant effects typically comprise effects that remain within the moderate, large or very large categories once mitigation has been taken into account. This remains the same as the previous DMRB guidance.

Table 2-3 - Matrix for Determining Significance

Sensitivity	Magnitude of impact				
	No Change	**Negligible**	**Minor**	**Moderate**	**Major**
Very High	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large
High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

3. APPRAISAL

3.1.1. This section presents the findings of a sensitivity test to determine the potential implications of the change in DMRB guidance with respect to geology and soils receptors and significance of effects.

3.1.2. The appraisal has involved applying the newly defined sensitivity and magnitude criteria to the Part A geology and soils receptors and the potential impacts identified in **Chapter 11: Geology and Soils, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**).

3.1.3. The results from the appraisal of likely significant effects from construction and operation, applying the updated guidance, are presented within **Table 3-1** and **Table 3-2**.

Table 3-1 – Appraisal of Likely Significant Effects - Construction

Receptor	Impact	Sensitivity	Magnitude	Significance of Effects	Commentary – Change from in Chapter 11: Geology and Soils, Volume 2 of this ES (Application Document Reference: TR010041/APP/6.2)
Agricultural Soil – Grade 2	Reduction of agricultural soil quality	Very High	Negligible adverse	Slight adverse (not significant)	No change in overall significance from ES chapter, remains not significant.
Agricultural Soil – Grade 3a		High	Negligible adverse	Slight adverse (not significant)	
Agricultural Soil – Grade 3b		Medium	Negligible adverse	Neutral (not significant)	
Agricultural Soil – Grade 4		Low	Negligible adverse	Neutral (not significant)	
Agricultural Soil – Grade 2	Permanent loss of agricultural soil	Very High	Negligible Adverse	Slight adverse (not significant)	No change in overall significance from ES chapter, remains significant.
Agricultural Soil – Grade 3a		High	Moderate adverse	Moderate adverse (significant)	
Agricultural Soil – Grade 3b		Medium	Major adverse	Moderate adverse (significant)	
Agricultural Soil – Grade 4		Low	Major adverse	Slight adverse (not significant)	
Current and future site users (including adjacent users), construction workers, maintenance workers	Detriment to human health	Low	Moderate adverse[2]	Slight adverse (not significant)	Increase in significance from ES chapter to slight adverse but remains not significant.
Underlying aquifers (groundwater)	Pollution of Controlled Water Bodies	Medium	Negligible adverse	Neutral (not significant)	No change in significance from ES chapter, remains not significant.
Surface water bodies – Cotting Burn, River Lyne, Earsdon Burn and Longdike Burn		High	Negligible adverse	Slight adverse (not significant)	No change in significance from ES chapter, remains not significant.

[2] Moderate adverse based on the presence of benzo(a)pyrene concentrations in excess of GAC

Receptor	Impact	Sensitivity	Magnitude	Significance of Effects	Commentary – Change from in Chapter 11: Geology and Soils, Volume 2 of this ES (Application Document Reference: TR010041/APP/6.2)
Surface water bodies – Floodgate Burn and unnamed tributary of Thirston Burn		Medium	Negligible adverse	Neutral (not significant)	
Surface water bodies – Shieldhill Burn and Fenrother Burn		Low	Negligible adverse	Neutral (not significant)	
Existing highway infrastructure, surrounding houses and commercial premises	Migration of hazardous ground gas causing explosion and asphyxiation	Buildings and associated infrastructure are not included as potential geology and soils receptors as part of the updated DMRB guidance.			
	Ground instability	It is stated that risks associated with geotechnical hazards and land stability should be assessed via the guidance within CD 622: Managing Geotechnical Risk.			
SSSI– River Coquet	Contamination of water and soil resources	Very High	Negligible adverse	Slight adverse (not significant)	No change in significance from ES chapter, remains not significant.

Table 3-2 - Appraisal of Likely Significant Effects - Operation

Receptor	Impact	Sensitivity	Magnitude	Significance of Effects	Commentary – Change from in Chapter 11: Geology and Soils, Volume 2 of this ES (Application Document Reference: TR010041/APP/6.2)
Controlled water bodies (surface water courses and groundwater)	Pollution of controlled water bodies	Pollution of controlled water bodies during operation is assessed in **Chapter 10: Road Drainage and Water Environment**, **Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**), in line with LA 113.			
Maintenance workers	Detriment to human health	Low	Moderate adverse[3]	Slight adverse (not significant)	Increase in significance from ES chapter to slight adverse but remains not significant.

[3] Moderate adverse based on the presence of benzo(a)pyrene concentrations in excess of GAC

4. SUMMARY

4.1.1. The one likely significant adverse effect relating to permanent loss of agricultural land identified in **Chapter 11: Geology and Soils, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**), would remain a significant adverse effect following the application of the LA 109 assessment criteria.

4.1.2. No further significant adverse effects have been identified following the application of the LA 109 assessment criteria.

4.1.3. Therefore, it is considered that the outcome **Chapter 11: Geology and Soils, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**) remains unchanged.

REFERENCES

Ref. 1.1. Highways England, Design Manual for Roads and Bridges, Sustainability & Environment Appraisal, LA 109 Geology and Soils, Revision 0 (2019), October 2019. Available at: http://origin.standardsforhighways.co.uk/ha/standards/DMRB/vol11/section3.htm

Ref. 1.2. Highways Agency (1993) Design Manual for Roads and Bridges Volume 11 Section 3 Part 11 Geology and Soils.

Ref. 1.3. Highways Agency (2001) Design Manual for Roads and Bridges Volume 11 Section 3 Part 6 Land Use. Amendment No. 1.

Ref. 1.4 Highways England, Design Manual for Roads and Bridges, Sustainability & Environment Appraisal, LA 113 Road drainage and the Water Environment, Revision 1 (2020), March 2020. Available at: http://origin.standardsforhighways.co.uk/ha/standards/DMRB/vol11/section3.htm

Ref. 1.5. Highways England, Design Manual for Roads and Bridges, Sustainability & Environment Appraisal, LA 104 Environmental assessment and monitoring, Revision 1 (2019), July 2019. Available at: http://origin.standardsforhighways.co.uk/ha/standards/DMRB/vol11/section2.htm

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