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Joe Hall,
Environment Agency,
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Date: 05/03/2025

Our Ref: MG1002/SRA/01

Dear Joe,

Re: Cross Leys Quarry – Stability Risk Assessment AEGB Liner Permeability Sensitivity Analysis

As requested in the permit application for Cross Leys Quarry a sensitivity analysis has been undertaken on the Plaxis modelling to assess how sensitive the modelling is to changes in permeability of the attenuation layer. As part of the sensitivity analysis a range of permeabilities were assessed for the attenuation layer. The selected permeabilities were K=1E-7m/s (minimum specification requirement), K=1E-8m/s (original modelled value) and K=1E-9m/s. The Plaxis models have been rerun and the factors of safety have been reported for the different permeabilities assessed (for each of the lining construction phases and the overall final stability). The sensitivity analysis results are presented in Appendix 1 of this letter.

Figure 1 below shows the attenuation layer construction lifts and final restoration profile with the factors of safety for each of the three permeability values assessed within this sensitivity analysis.

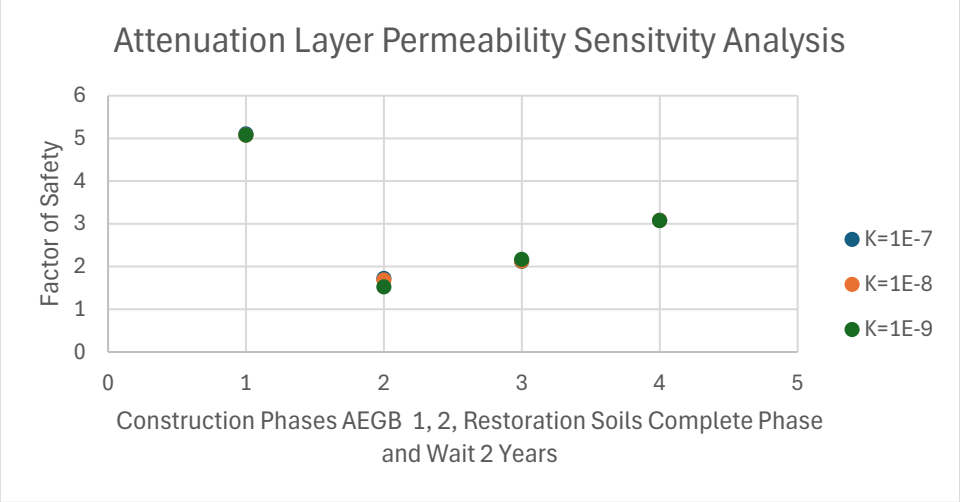

Figure 1 - Sensitivity Analysis for Selected Construction Lifts with the Reported Factors of Safety

Figure 1 above, for the attenuation layer construction phases (1 and 2), shows that as to be expected there is a slight decrease in the factors of safety reported when the permeability is lowered, with the highest factors of safety reported when the permeability of the attenuation layer is K=1E-7m/s. Figure 1 shows that the models are not particularly sensitive to changes in permeability with only marginal changes noted with a fairly close grouping.

It is likely that given the incoming material, the permeability for the attenuation layer will be lower than K=1E-7m/s (specification requirement) but it is likely to have fine drainage pathways in the material which will aid pore water dissipation and likely result in a macro-permeability of K=1E-8m/s which is the value used in the original SRA report.

Hopefully this sensitivity analysis provides sufficient comfort that the model is not overly sensitive to changes in permeability, however if there are any further queries please do not hesitate to contact us.

Yours sincerely

Suleiman Saad
Design Engineer
For and on behalf of Sirius Environmental Ltd

Enc : Appendix 1 – Sensitivity Results Tables

APPENDIX 1

SENSITIVITY RESULTS TABLE

Table SRAS1:Summary of Phi-C Reduction Runs for Stability and Resultant Factors of Safety

Construction Phases	Critical Slope Identified During Analysis	FoS 1E-7	FoS 1E-8	FoS 1E-9
AEGB 1 for Phase 1	Circular Failure through Existing Site-Won Fill in South-West of Site	5.103	5.072	5.072
AEGB 2 for Phase 3	Circular Failure through Temporary Soils Flank in South-West of Site	1.718	1.681	1.520
Imported Restoration Soils – Phase 3 Complete	Circular Failure through Completed Soils Flank in North-East of Site	2.117	2.124	2.164
Wait 2 years	Circular Failure through Completed Soils Flank in North-East of Site	3.079	3.075	3.072