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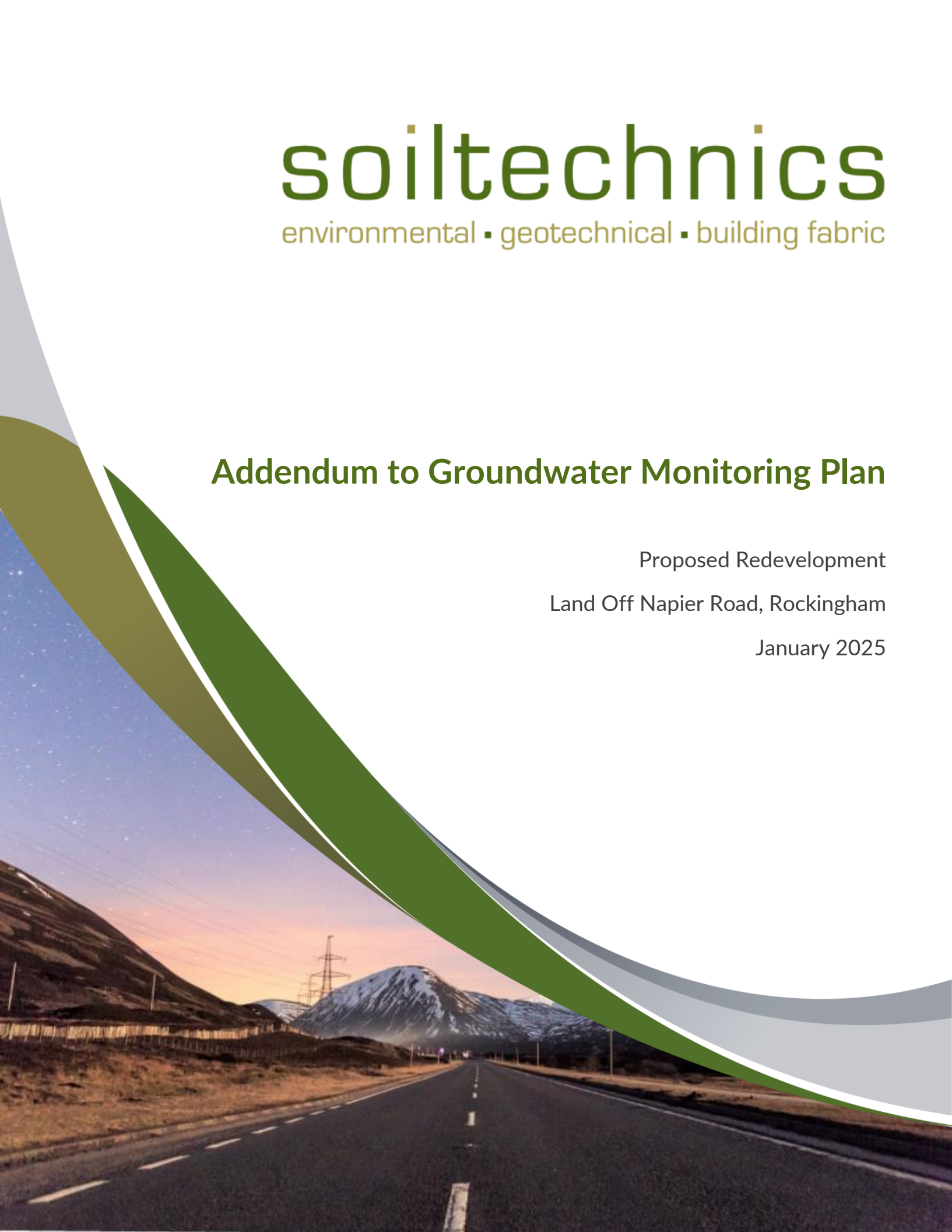
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Addendum to Groundwater Monitoring Plan

Proposed Redevelopment

Land Off Napier Road, Rockingham

January 2025



Project Details

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Document history and status

Revision	Date	Description	Author	Reviewer
A	January 2025	First Issue	JB	MOH

Appendix A Baseline Data Charts



1 Introduction

1.1 Brief

- 1.1.1 This report has been prepared following instructions received from Storefield Group Limited.
- 1.1.2 This report acts as an addendum to the previously issued Groundwater Monitoring and Maintenance Plan (report ref: STP3966D-LQ-R02-Rev_B, dated October 2024) and should be read in conjunction to the aforementioned report.
- 1.1.3 This report provides control and trigger levels and associated action plan for the groundwater monitoring outlined in the above report.

1.2 Aims and Objectives

- 1.2.1 The principal aim of this report is to satisfy the brief and provide control and trigger levels for specified contaminants within ground and surface water samples collected as part of the groundwater monitoring plan. An associated action plan will be detailed should either the control levels or trigger levels be exceeded.
- 1.2.2 The objectives of this report are outlined below:
 - i) Detail for which contaminants control and trigger levels will be established.
 - ii) Establish baseline conditions for selected contaminants based on previously collected dataset.
 - iii) Establish control and trigger levels for selected contaminants .
 - iv) Outline action plan should control and trigger levels be exceeded.

1.3 Limitations

- 1.3.1 Soiltechnics disclaims any responsibility to our Client and others in respect of any matters outside the scope of this report. This report has been prepared with reasonable skill, care and diligence in accordance with the terms of our contract, taking account of the resources, investigations and testing devoted to it by agreement with our Client. Soiltechnics accepts no responsibility of whatsoever nature to third parties to whom this report or any part thereof is made known. Any such party relies upon the report at their own risk.

2 Control and Trigger Levels

2.1 Control levels

2.1.1 Control levels take the form of Environmental Assessment Limits (EALs), which are used to determine the quality of the groundwater near a landfill. In some cases the EAL for groundwater will be equivalent to either the UK Drinking Water Standard (UKDWS) or the relevant Environmental Quality Standard (EQS), though consideration to the existing hydrochemistry is imperative, particularly where:

- No water-quality standard is readily available for the relevant chemical species,
- Baseline groundwater quality is already higher the water-quality standard available, whether this is from elevated natural levels or contamination from other anthropogenic activities,
- Baseline concentrations of the substance in groundwater are substantially lower than all applicable water quality standards and deterioration of groundwater quality to the water quality standard is considered environmentally unacceptable.

2.2 Trigger Levels

2.2.1 Trigger levels represent the level of contamination that constitutes pollution, and thus represent both a performance standard for monitoring and the success criteria for the risk assessment. As a general rule, trigger levels should be set for at least three, but no more than ten substances.

2.3 Proposed Chemical Testing

2.3.1 The Groundwater Monitoring Plan outlines the following suite of contaminants are to be tested

- Banded Total Petroleum Hydrocarbons
- Polycyclic Aromatic Hydrocarbons (PAH) (USEPA 16 suite)
- Inorganics, including pH, sulphate, chloride, ammoniacal nitrogen, nitrate and nitrite, complex cyanide, pH, electrical conductivity, chemical oxygen demand and alkalinity.
- Metals, including antimony, manganese, zinc and boron.

2.3.2 Contaminants selected for analysis compared to control and trigger values should firstly represent a broad spectrum of control data, including common non-hazardous pollutants, and should also take into account the elevated contaminants previously encountered on site.

2.3.3 Based on the above, the contaminants selected for analysis are as follows:

Compound	Indicator
Copper, nickel and ammonia	Existing contaminants of concern. Indicators of heavy metal and inorganic contamination
Antimony, chloride and sulphate	Contaminants of concern for the import of IBA. Sulphate also an existing contaminant of concern.
TPH <EC16	Indicative of mobile and soluble hydrocarbons, including SVOCs and VOCs.

2.3.4 Total Petroleum Hydrocarbons (TPH) and Polycyclic Aromatic Hydrocarbons (PAH) have largely been detected below the laboratory limit of detection (LOD) in previous groundwater and surface water sampling. A specific contaminant of concern has therefore not been included, and TPH is adopted as a marker for hydrocarbon contamination in general.

2.4 Proposed control and trigger levels

- 2.4.1 The Detailed Hydrogeological Risk Assessment established the following EAL.
- Antimony: 5 ug/l (UK DWS)
- 2.4.2 Limited baseline monitoring is present for antimony. The trigger level has been as the EU published “Ecological threshold concentrations for antimony in water and soil” for the European Center for Risk Assessment by Oorts and Smolders (2009).
- 2.4.3 For the other marker compounds and contaminants of concern, baseline concentrations have been established from monitoring data obtained since the issue of the Closure Report for the landfill in 2006.
- 2.4.4 For copper and ammonia the measured groundwater levels are already above the relevant EQS standards and are either significantly below drinking water thresholds and a deterioration of water quality to drinking water standards is likely considered to be unacceptable (copper), or no drinking water standard is available (ammonia). Therefore EALs have been established based on the 95th percentile of the baseline dataset.
- 2.4.5 The adoption of the 95th percentile from baseline monitoring data is likely to provide an early indication of a deterioration in groundwater quality. Occasional exceedances of the adopted EALs are to be expected when using a percentile approach; however, frequent and recurring exceedances should not be reported, unless a deterioration in quality is occurring.
- 2.4.6 The same 95th percentile approach has been applied to nickel, chloride and sulphate, where groundwater quality is already above both EQS and DWS standards.
- 2.4.7 Trigger levels have been set as x1.5 the maximum baseline concentration recorded, unless otherwise stated.
- 2.4.8 As Total Petroleum Hydrocarbons (TPHs) testing is frequently at the laboratory detection limits, the EAL and trigger levels have been set as x2 and x10 time the laboratory limits.
- 2.4.9 All approaches outlined above apply to surface waters, with the control limits and trigger levels being based on surface water monitoring data only.

Determinant (units)	Max Conc. (GW)	Mean Conc. (GW)	Max Conc. (SW)	Mean Conc. (SW)	Control level (GW)	Control level (SW)	Trigger level (GW)	Trigger level (SW)
Copper (µg/l)	51	11	27	7.5	28	16	77	40
Nickel (µg/l)	90	14	12	3.6	44	5	135	18
Ammoniacal Nitrogen (mg/l)	190	11.8	1.0	0.3	41	2.5	285	10.6
Antimony (µg/l)	5 (LoD)	3.2	5 (LoD)	3.2	5	5	110	110
Chloride (mg/l)	492	184	324	66	467	127	738	486
Sulphate (mg/l)	5,570	1,487	214	108	2,835	165	8,355	321
TPH <EC16 (µg/l)	10 (LoD)	10 (LoD)	10 (LoD)	10 (LoD)	20	20	100	100

Table 2-A: Control and trigger levels for selected contaminants

2.5 Action plan

- 2.5.1 Control levels will be deemed to have been breached when three successive measurements exceed the level at that monitoring location.
- 2.5.2 A single exceedance of the trigger level will be deemed a breach.
- 2.5.3 In the event that a breach(s) occurs, the following contingency actions will be taken:

Appropriate contingency action	Following a breach of a :	
	Environmental Assessment (control level)	Trigger level Limit
Advise site management	✓	✓
Advise environmental manager of landfill operating company	✓	✓
Advise Environment Agency	✓	✓
Confirm by repeat sampling and analysis	✓	✓
Review existing monitoring information	✓	✓
Review site management and operations and implement actions to prevent future failure of a trigger level	✓	
Review the assumptions incorporated into the conceptual site model	✓	✓
Review existing hydrogeological risk assessment, control and trigger levels	✓	✓
If risks are unacceptable, set in place procedures for implementing corrective measures in consultation with or required by the Agency		✓

Table 2-B: Contingency action plan

Appendix A Baseline Data Charts

