Bleak Hill III

784-B031732

Environmental Monitoring and Management Plan

Environmental Permit Application

CEMEX UK Materials Limited

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Document prepared on behalf of Tetra Tech Environment Planning Transport Limited.
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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

DRAWINGS

P6/206/7AA – Restoration Proposals
CEM/B031732/BH/01 – Borehole Plan

APPENDICES

Appendix A - CEMEX's Environmental Monitoring procedures

1.0 INTRODUCTION

1.1 REPORT CONTEXT

1.1.1 This document has been prepared by Tetra Tech on behalf of the Operator, CEMEX Materials UK Limited (CEMEX) to support an environmental permit application for the Bleak Hill III Deposit for Recovery operation (the site) at Nea Road, Ringwood, Hampshire, BH24 3PL.

1.1.2 CEMEX are seeking to gain a bespoke waste recovery permit for the permanent deposit of inert waste to land at the site to facilitate the restoration scheme (Drawing Number P6/206/7/A) as approved under planning permission 19/11326 granted by Hampshire County Council (HCC).

1.1.3 This document corresponds to Part B4 of the Environmental Permit application forms, specifically detailing the environmental management and monitoring plan for the site.

2.0 GROUNDWATER MANAGEMENT AND MONITORING

2.1 Adherence to the Waste Acceptance Criteria will ensure that the waste deposited at the site complies with the inert classification thereby mitigating any risk to groundwater.

2.2 A HRA has been prepared for the application (Appendix G of the Environmental Permit Application). The objective of the HRA is to assess the potential risk of significant impacts on groundwater quality as a result of the proposal, to derive control and compliance limits for groundwater and surface water and to provide recommendations for contingency actions on the event of exceedances of those levels.

2.2 GROUNDWATER MONITORING SCHEDULE

2.2.1 The HRA recommends that groundwater should be monitored at the boreholes that have been installed within the proposed permit area (WOB1, WOB2 and WOB3) as well as boreholes that are located along the border of the permit area and the adjacent landfill site known as Bleak Hill I. The location of the groundwater monitoring points is shown on Drawing Number CEM/B031732/BH/01.

2.2.2 The proposed monitoring requirements for groundwater are set out in Table 1 below.

Table 1: Proposed Groundwater Monitoring Determinands and Sampling Frequency

Monitoring Location	Parameter	Frequency
Upgradient boreholes: WOB1, WOB2 and WOB3 **Downgradient boreholes: W202, W203P1, W203P2,** and **W204P1 and W204P2**	Groundwater level (maOD) Ammoniacal Nitrogen, Chloride, Zinc. pH, electrical conductivity, alkalinity, calcium, ionic balance, iron, magnesium, manganese, TON, potassium, sodium, sulphate, TOC	Quarterly
Upgradient boreholes: WOB1, WOB2 and WOB3 **Downgradient boreholes: W202, W203P1, W203P2,** and **W204P1 and W204P2**	Ammoniacal nitrogen, chloride, zinc, alkalinity, antimony, arsenic, cadmium, calcium, chromium, COD, electrical conductivity, copper, dissolved oxygen, ionic balance, iron, lead, magnesium, manganese, nickel, TON, pH, potassium, selenium, sodium, sulphate, TOC	Annually

Compliance Limits (Groundwater Quality)

2.2.3 The HRA provides control and compliance levels for boreholes W202, W203 and W204 for ammoniacal nitrogen, chloride and zinc. Details of the control and compliance limits are provided in Table 2 below.

Table 2: Proposed Control and Compliance Levels

Compliance Location	Parameter	Control Level (mg/l)	Compliance Level (mg/l)
Downgradient Boreholes: W202, W203P1, W203P2, and W204P1, W204P2	Ammoniacal nitrogen	1	5
	Chloride	45	100
	Zinc	0.3	1

Contingency Plan (Groundwater Quality)

2.2.4 Once compliance levels have been agreed, should site monitoring identify an increase in the concentration of the selected determinands then a series of contingency actions will be required. Suggested contingency actions, which require agreement with the EA, are detailed below.

2.2.5 In the event that any Control Level is exceeded in one sampling point on one occasion, the following action will be taken:

1. The Company database will be queried to identify the past 12 months results from the affected location. If less than two of the last four results have breached the Control Level, no further action will be taken, other than to note that a breach has occurred. However, if two or more of the last four sampling results have breached the Control Level at this location, then the borehole will be re-sampled as soon as possible after receipt of the results.

2.2.6 If the repeat sample also exceeds the Control Level the following course of action will be taken:

2. Data from the monitoring point exceeding the Control Level and adjacent monitoring points will be reviewed by use of statistics and graphical presentation to establish the presence of any trends or patterns.
3. Groundwater levels will be reviewed to establish flow direction in order to determine whether the site is the most likely cause of any change in groundwater quality.
4. Waste acceptance records will be reviewed including waste acceptance criteria and validation testing to determine whether the waste is the cause of any changes in groundwater quality.
5. A preliminary inspection will be carried out to determine whether there has been:
   a) Any unusual activity or occurrence on or around the site that could account for the increase in the parameter.
   b) Any spillage of contaminants at the surface in the vicinity of the affected boreholes.
6. The Company will assess the results of all of the above information and specify its course of action on future monitoring.

2.2.7 In the event that any Compliance level is exceeded in one sampling point on one occasion, the following action will be taken:

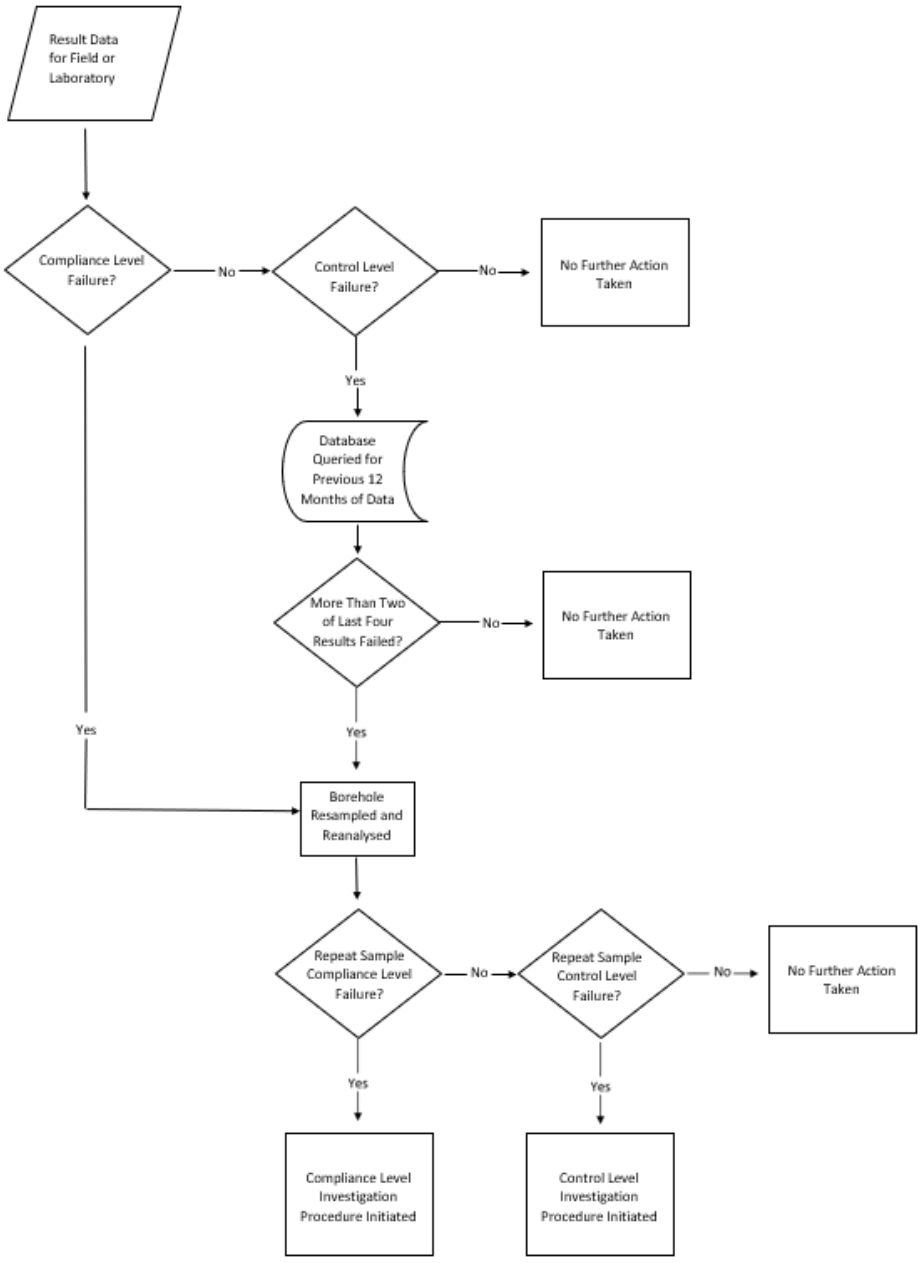
1. The monitoring point will be re-sampled as soon as possible after receipt of the results; whether the elevated determinand was derived from field or laboratory analysis the re-analysis will be carried out in the laboratory. This initial procedure will be used to eliminate errors that might be introduced during sampling, field analysis or laboratory analysis, before continuing. If this second sample does not exceed the Compliance level then no further action will be taken unless it exceeds the Control Level in which case the procedures set out above will be followed.

2.2.8 If the additional repeat sample also exceeds the Compliance level then:

1. The actions described in 2 to 5 above will be carried out; and
2. The monitoring frequency will be increased to monthly for an agreed set of monitoring determinands by laboratory analysis in the affected borehole and adjacent boreholes on a monthly frequency until the determinand concentration falls below the Compliance level.
3. If the laboratory results from the monthly monitoring show no indication of decline over a four month period (or other period assessed appropriate with respect to the rate of flow of groundwater at the site), and the evidence indicates that the site is the most likely cause of the increase in concentrations, then a hydrogeological risk assessment will be carried out (see below).
4. The Company will conclude the risk assessment with an explanation of the effect of the groundwater quality changes on the groundwater and surface water resource with recommendations for any remedial action if it is considered necessary. A course of action will be agreed with the Environment Agency.

2.2.9 The control and compliance level procedure are summarised on the flow chart below.

Figure 1: Control and Compliance Level Procedure Flow chart



2.3 QUALITY CONTROLS PROCEDURES

Monitoring Personnel

2.3.1 Monitoring will be undertaken by suitably trained person(s) appointed by the site management, who are familiar with the monitoring procedures and the EMMP.

Monitoring Procedures

2.3.2 The monitoring procedures for groundwater are provided as Appendix A to this report.

3.0 SURFACE WATER MANAGEMENT AND MONITORING

3.1 SURFACE WATER FEATURES

River Avon

3.1 The Site lies on the interfluve between the River Avon (c 1.5 km to the east) and its tributary Hamer Brook (to the west). The Avon valley includes a broad flood plain (about 500 m wide) with numerous drainage ditches flowing into the River Avon. A tributary of Hamer Brook called Whitefield Brook flows along the western side of the Site with the spring source located 60 m to the west of Bleak Hill III. It joins Hamer Brook c. 500 m to the south-west of the Site.

Hamer Brook and Whitefield Brook

3.2 Hamer Brook flows from north to south to the south-west of Bleak Hill II and III and then along the boundary of the Site to the south. Hamer Brook then joins Turmer Brook c. 1.5 km south of the Site which discharges into the River Avon about 2.2 km south-east. The main tributary of Hamer Brook is Sleep Brook, which becomes the Hamer Brook at the confluence with Whitefield Brook. Whitefield Brook has a catchment area of 2.06 km2 to its confluence with Hamer Brook. Hamer Brook has a catchment area of 7.24 km2 to its confluence with the Turmer Brook. Another smaller tributary of Turmer Brook, known locally as Lomer stream, is located on the eastern side of the Site. It rises from springs within Lomer Copse and flows eastwards towards Harbridge Green. It then flows southwards and discharges into Turmer Brook a few hundred metres downstream of its confluence with Hamer Brook. It passes c. 210 m from Bleak Hill III at its closest point in the south-eastern corner.

3.2 SURFACE WATER MANAGEMENT

3.2.1 To ensure that the site is worked dry, dewatering may be required where the water table is high or if there are operational issues with extracting the mineral wet. If required, dewatering would be carried out by pumping water from the excavation void. The abstracted water will be used for processing and any surplus water discharged to the surface water body to the south of Bleak Hill I which is the Site's consented discharge point. The water quality in the lake is monitored in accordance with the requirements of the environmental permit for the inert landfill operation (reference EPR/FP3498SZ).

3.2.2 Following completion and restoration of the landfills, dewatering will cease entirely and surface water discharge to the lake will no longer occur.

3.2.3 As detailed in the restoration plan (Drawing Number P6/206/7A) the site will be restored to agriculture with a small pond in the southeast corner. This pond will contribute towards the storm water attenuation capacity across the wider site.

3.3 SURFACE WATER MONITORING SCHEDULE

3.3.1 The HRA recommends that surface water should be monitored at three locations (WB1, BL2DIS and S1) which are identified on Drawing Number CEM/B031732/BH/01. The proposed monitoring requirements for surface water are set out in Table 3 below.

Table 3: Proposed Surface Water Monitoring Determinands and Sampling Frequency

Monitoring Location	Parameter	Frequency
BL2DIS	Ammoniacal nitrogen, chloride, pH, electrical conductivity, iron, suspended solids	Monthly
WB1 S1	Ammoniacal nitrogen, chloride, BOD, pH, electrical conductivity, iron, suspended solids	Monthly
BL2DIS	Ammoniacal nitrogen, chloride, pH, electrical conductivity, iron, suspended solids, alkalinity, arsenic, BOD, COD, dissolved oxygen, TON, sulphate, TOC	Quarterly
WB1 S1	Ammoniacal nitrogen, chloride, BOD, pH, electrical conductivity, iron, suspended solids, alkalinity, antimony, arsenic, cadmium, calcium, chromium, COD, copper, dissolved oxygen, ionic balance, lead, magnesium, manganese, nickel, TON, potassium, selenium, sodium, sulphate, TOC, zinc	Quarterly
BL2DIS	Ammoniacal nitrogen, chloride, pH, electrical conductivity, iron, suspended solids, alkalinity, antimony, arsenic, cadmium, calcium, chromium, COD, copper, dissolved oxygen, ionic balance, lead, magnesium, manganese, nickel, TON, potassium, selenium, sodium, sulphate, TOC, zinc	Annual

3.4 COMPLIANCE LIMITS

3.4.1 The HRA concludes that no control or compliance limits are required for surface water quality monitoring.

4.0 GAS MANAGEMENT AND MONITORING

4.1 A Gas Risk Assessment (GRA) has not been prepared for the site. However, a screening report has been prepared which has been submitted with the Environmental Permit application as Appendix H.

4.2 MANAGEMENT

4.2.1 The Gas Screening Report, in appendix H, indicates that due to the inert nature of the proposed waste types, the site will not give rise to significant quantities of gas. The negligible quantities of gas generated are unlikely to be under significant pressure which will minimise the likelihood of gas migration. The risk to nearby sensitive receptors associated with the generation and migration of gas is low.

4.2.2 Due to this low risk, it is considered that no active gas management will be required for the site.

4.3 MONITORING

4.3.1 For the proposed permit area three boreholes (WOB1 – WOB3) have been installed in the area and their locations are shown on the CEM/B031732/BH/01. The gas monitoring proposals including frequencies of monitoring for these particular boreholes are outlined in Table 4 below. Procedures for the monitoring of gas are provided as Appendix A to this report.

Table 4: Gas Monitoring Programme

Borehole Reference	Parameter	Monitoring Frequency
WOB1, WOB2 and WOB3	Methane, carbon dioxide, oxygen, , atmospheric pressure, differential pressure.	Monthly

4.3.2 In addition to the above, the EA's "Waste Recovery plans and deposit for recovery permits" guidance states that if an operator intends to deposit waste more than 2 metres below the surrounding ground surface, they must monitor the waste for methane, carbon dioxide and oxygen. As such, in-waste monitoring boreholes will be installed in areas where waste deposits exceed 2m below the surrounding ground surface. The location of in-waste boreholes will be confirmed through the completion of site surveys which will confirm areas that comprise waste deposits that exceed 2m. The requirement for in-waste monitoring boreholes will be discussed with the Environment Agency.

4.4 COMPLIANCE LIMITS AND ACTION LEVELS

4.4.1 Compliance limits and action levels have been set for each borehole, based on guidance set out in LFTGN03 and the Industry Code of Practice for Perimeter Soil Gas Emissions. These Compliance limits are detailed within Table 5.

Table 5:Compliance Limits

Monitoring Location	Parameter	Proposed Compliance Level (v/v%)	Monitoring Frequency	Proposed Action Level (v/v%)
WOB1, WOB2 and WOB3	Methane	1.0	Monthly	0.5
WOB1	Carbon Dioxide	None	Monthly	5.2
WOB2				3.6
WOB3				5.1

4.4.2 The Gas Screening Report (Appendix H of The Environmental Permit Application) demonstrates that the potential for high concentrations of gas is low. However, an appropriate Action Plan is required in the unlikely event that action levels set for each borehole are exceeded. Action Levels have been set at a level which enables the site management to take timely and appropriate action, so that Compliance limits are not exceeded. Further actions are however documented, in the event that both Action Levels and Compliance Limits are exceeded. The following sections set out the proposed Action Plan for the site.

4.5 ACTION PLAN

Investigation Procedure

4.5.1 The procedures for the assessment of gas monitoring results in relation to trigger limits are as follows:

1. For methane and carbon dioxide concentrations below the Action Level - allow as normal variability.
2. If methane or carbon dioxide concentrations exceed the Action Level then check previous two readings from the gas database and:

    i) If the previous readings do not exceed the Action Level then no further action is required other than to note that a breach has occurred.

    ii) If the previous two readings do exceed the Action Level, then increase monitoring frequency to fortnightly in affected and adjacent boreholes; and assess the possible cause of the increase in concentrations by problem solving described in Section 4.5.3.

3. If methane concentrations exceed the Compliance Level then check the previous reading from the gas database and:

    i) If the previous reading in the affected borehole was below the Action Level then take no further action except to note that the compliance level has been breached.

    ii) If the previous reading was above Action Level, then increase monitoring frequency to fortnightly in affected boreholes until concentrations reduce below Compliance Level %.

    iii) Assess the possible cause of the increase in concentrations by problem solving described in Section 4.5.3 and review previous monitoring results to see if there is any indication of a trend.

    iv) Monitor borehole pressure to determine likelihood of significant gas flow rates.

4.5.2 The procedures for the assessment of gas flow monitoring results in relation to compliance limits are as follows:

1. If significant flow rates are absent then continue monitoring fortnightly until gas concentrations reduce below Compliance Level.
2. If significant flow rates are absent but methane concentrations do not reduce below the Compliance Level within three months and the source of the gas has been identified as the permitted site, then consider the initiation of appropriate gas control measures in association with the Environment Agency.
3. If significant flow rates are present and readings persist above the Compliance Level % for more than 6 weeks with no signs of decreasing levels then carry out a gas survey of street services (for methane and carbon dioxide). Dependent on the results of the street survey, consider carrying out a gas survey of potentially affected properties after discussion with the Environment Agency.
4. The Company will make immediate arrangements to install gas control measures after consultation with the Environment Agency.

Problem Solving

4.5.3 In the preceding section, the first course of action proposed following any breach of compliance limits is to "assess the possible cause of the increase in gas concentrations". The routine to be followed to perform this instruction is set out below:

1. Check whether the barometric pressure was rising, falling or steady on the day and in the day(s) preceding the date of monitoring.
2. Check the results against those of other site monitoring boreholes to determine if the result is part of a general deterioration in the gas levels in the area, or a localised occurrence.
3. Check oxygen and carbon dioxide concentrations to determine if these correlate to a deterioration in methane concentrations.
4. Ensure that monitoring equipment is functioning effectively, check with an alternative gas machine, and consider taking a confirmatory sample for gas-chromatographic analysis if in any doubt.
5. Attempt to identify the most likely source of methane, in relationship to the history of the site, and previous monitoring results.
6. Investigate the surrounding area for signs of gas or leachate escape.

4.5.4 If a problem is identified, it will be rectified as soon as possible. The Site Manager or his nominee will be informed immediately, and he will co-ordinate any action required.

4.5.5 Record all actions in the Site Diary.

Gas Control procedure

4.5.6 Gas control measures may include one or more of the following: -

- Cut-off barrier; Passive vent trench;
- Pumped wells.

4.5.7 The selection of the appropriate control measures will be discussed with the Agency prior to installation and will take into account the nature and depth of the waste deposited. As this site contains only inert waste, it is highly unlikely that gas control procedures will be required, however if they were a passive vent trench or passive venting boreholes would probably be the most effective remedy.

4.5.8 Increased gas monitoring in the affected boreholes will continue throughout and after installation of the control measures and until values drop below the Action Level. Monthly monitoring will then resume unless the Action l Level is exceeded again.

5.0 METEOROLOGICAL MONITORING

5.0.1 Due to the acceptance of inert waste at the site and with reference to the HRA, it is considered unnecessary to manage and monitor leachate. This negates the need to monitor meteorological conditions for the purpose of using water balance calculations as a tool for evaluating leachate production.

5.0.2 Atmospheric pressure and ground conditions will be monitored and recorded during all gas monitoring visits.

5.0.3 Weather conditions that may be unfavourable to infilling particularly dry loads will be used to determine the acceptability of such wastes on a particular day, for example strong winds given as severe weather warnings from the Meteorological Office.

5.0.4 Details on weather conditions will be recorded in the company's environmental database.

6.0 AMENITY MANAGEMENT AND MONITORING

6.0.1 An Environmental Risk Assessment (ERA) has been prepared in accordance with the Environment Agency's Risk Assessment guidance. It specifically deals with the following: -

- Particulate Matter Management and Monitoring;
- Noise Management and Monitoring;
- Odour Management and Monitoring;
- Mud Management and Monitoring;
- Litter Management and Monitoring; and
- Birds, Vermin and Insect Management and Monitoring.

6.0.2 Due to the inert nature of the waste, the site will not produce odour or litter nor will it attract birds, vermin and insects.

6.0.3 The ERA concluded that the risk of particulate matter and noise annoyance was not significant and therefore it is not proposed to implement monitoring regimes for these potential hazards.

6.0.4 The ERA also considered the risk of mud being transferred to the local highways as not significant. A wheel washing facility will be employed on site which will be used by HGVs before they leave the site. Water sprays will also be employed to dampen the access road. However, in the unlikely event that mud is deposited on the road then a road sweeper will be utilised as necessary.

7.0 HEALTH IMPACT MONITORING

7.0.1 Due to the inert nature of the waste, it is considered unnecessary to undertake health impact monitoring on the surrounding population.

DRAWINGS

P6/206/7AA – Restoration Proposals

CEM/B031732/BH/01 – Borehole Plan

APPENDICIES

APPENDIX A - CEMEX'S ENVIRONMENTAL MONITORING PROCEDURES