

APP/M1900/W/21/3278097: Land at Former Hatfield Aerodrome, AL4 0HP

Statement of Common Ground

Affinity Water, Environment Agency, Hertfordshire County Council & Brett Aggregates

INTRODUCTION

On 6th January 2021 Hertfordshire County Council (HCC) refused planning permission application reference 5/0394-16 (CM0961) on 4 grounds. This Statement of Common Ground relates to reason 4 of that refusal decision, which states:

"The lower aquifer to the north of the application site is contaminated by Bromate. The application proposes the extraction of sand and gravels from within the lower aquifer in close proximity to groundwater contaminated by Bromate. There is a high level of local concern that extracting mineral from within the lower aquifer could; extend the bromate contamination within the mineral workings; reduce the effectiveness of the measures in place to remediate the Bromate contamination; and potentially lead to contamination of boreholes used for the public drinking water supply at ESSE. It has not been demonstrated to the satisfaction of the Mineral Planning Authority that the risks to the water environment from the mineral working are acceptable; and, that all routes to possible contamination have been appropriately investigated; and, that all necessary mitigation against all risks has been included in the proposal; and, that the proposed mitigation will be effective. The proposal would thereby be contrary to the provisions of the Hertfordshire Minerals Local Plan (Policy 17(iv)) which does not permit mineral development resulting in negative quantitative and/or qualitative impact on the water environment, and to the provisions of the NPPF (Paragraph 170) for conserving and enhancing the natural environment, and to Policy R7 (Protection of Ground and Surface Water) of the Welwyn Hatfield District Plan (adopted 2005)."

SUMMARY

Bromate (discussed in Section 3.0) was detected in potable water supplies in 2000, as part of testing in preparation for the current drinking water standard of 10µg/l. Bromate was found to have impacted a number of both public and private water supplies, with the source of the pollution traced back to St Leonards Court, a residential development located on a former chemical works.

St Albans District Council (SADC) determined the St Leonards Court site as contaminated land and a special site in 2002 under Part 2A of the Environmental Protection Act 1990 (Part 2A), with regulation the responsibility of the Environment Agency (EA), with works currently progressing against actions set out in the Voluntary Remediation Statement (VRS) as detailed in Section 2.0.

There is over 20 years of research into the bromate plume, including ongoing monitoring, development of conceptual site models (CSMs) and 2 University College London Engineering Doctorate Projects.

The proposed quarry is located in close proximity to the southern edge of the bromate plume.

In order to ensure that the risk associated with the proposed quarry activities in the vicinity of the plume can be managed, SLR Consulting (SLR) have undertaken additional investigation to allow refinement of the southern plume boundary (over 5 years of groundwater monitoring) along with pumping tests and signal tests to better understand the key influences on the groundwater regime under the site. This has informed the boundary of the proposed quarry (as of the 2016 application) and a scheme to manage groundwater as submitted, to ensure that any residual risk is mitigated.

The parties to this SOCG are of the opinion the proposed quarry has been subject to a detailed assessment which demonstrates that quarrying can be undertaken at this location in a manner which will not disturb the plume, jeopardise current or further management of the plume or impact upon potable water abstractions or groundwater resource potential now or in the future provided the requested planning conditions are included in any permission granted and adhered to.

1.0 BACKGROUND

- 1.1 On 20th June 2002, St Albans District Council (SADC) determined the St Leonard's Court site as "contaminated land" under Part 2A of the Environmental Protection Act 1990 (Part 2A). On 8th August 2002, SADC designated the site as a special site under s. 78C(1) EPA and regulation passed to the Environment Agency (EA).
- 1.2 The designation was due to St Leonard's Court being identified as the source of bromate (BrO₃) which had been detected in potable water abstractions in 2000, as part of preparatory sampling being undertaken for the introduction of drinking water standard (DWS) of 10ug/l. Bromate pollution of the Chalk aquifer poses a risk to the future groundwater resource potential and also causes failings of groundwater body objectives under the Water Framework Directive. As the competent authority for implementing the WFD, the EA has a duty to ensure that future groundwater resources are protected from deterioration and, where impacted by historic contamination, remediated to the required standard.

2.0 HISTORIC AND CURRENT REGULATION

- 2.1 On 8th November 2005, the EA served a Remediation Notice (1st RN) on Redland Minerals Limited (now Tarmac) and Crest Nicholson Residential PLC as Appropriate Persons (APs) under Part 2A. Both APs appealed the 1st RN.
- 2.2 In his report to the secretary of state on the 2007 Appeal, the Inspector:
 - Stated that, while there is some uncertainty over the precise extent of the plume, measurements suggest that concentration contours of 0.5 ug/l bromate and 125 ug/l bromide are broadly coincident.
 - Established a target concentration for bromide of 500 µg/l to be applied to public water supply groundwater abstractions within the plume to protect them from bromate formation during water treatment (paragraph 302 Inspector's report).
- 2.3 On 22nd July 2019, the Secretary of State for the Environment issued a decision which held the APs responsible for the pollution, varied the division of responsibilities between the APs and upheld the Remediation Notice the EA recommended to the Inspector at the inquiry (the Revised 1st RN"). The Revised 1st RN is attached at Appendix 1.

- 2.4 All actions in the First Notice have been completed and/or expired, with the last action expiring on 21st July 2019. The EA served a second remediation notice with accompanying Decision Document on the APs on 17th July 2019. The Decision Document submitted in support of the second remediation notice provides further detail with respect to the technical aspects of the bromate/bromide plume and remains the EAs current view.
- 2.5 Under Section 78H(5)(b) of Part 2A, the EA is precluded from serving a remediation notice where it is satisfied that “appropriate things, are being, or will be done by way of remediation without the service of a remediation notice on that person”.
- 2.6 A Voluntary Remediation Statement (VRS) was signed on 24th September 2020 and the second remediation notice withdrawn. The VRS is a live document and work is currently underway to address the actions as set out within the VRS, attached at Appendix 2

3.0 EXTENT OF PLUME AND CURRENT MANAGEMENT MECHANISMS

- 3.1 The bromate plume has been the subject of investigation over the last 20 years by various organisations including the EA, Water Companies, APs and academic institutions. Affinity Water and Thames Water (TWUL) co-funded two Engineering Doctorate Research Students at University College London (UCL) to investigate the bromate further Figure 1 shows the location of the bromate plume as published in Simon Cook’s PhD thesis based on c10 years of data.
- 3.2 Figure 2 is adopted from the EA’s decision document (referencing the F1 report produced by the APs) and shows the extent of the bromate plume based on c.20 years data. The spread of the bromate plume indicates the direction of the groundwater flow in the Chalk (mainly west to east). There is a recharge mound to the south of HATF (at the Water End swallow holes) that is maintained at all times and constrains the bromate plume at this location. The chalk piezometry in the area between NORM, HATF, ROES and TYTT is relatively flat indicating there is a groundwater plateau between the Colne and Lea catchments (Figure 3).
- 3.3 The SPZs (Source Protection Zones) at several nearby sources (such as TYTT, ROES and HATF itself) are orientated towards the Northwest towards the direction of the groundwater flow (Figure 4). The TYTT and ROES sources have not detected bromate above Limit of Detection (LoD) during either high or low groundwater level periods and also under higher abstraction from HATF). Locations for a number of boreholes, monitored as part of the ongoing works under Part 2A are shown in Appendix 3. These key monitoring locations are used to define the southern boundary of the plume from the source area to the north western edge of the proposed quarry (083,225,227,059) and show how the distribution of bromate mass changes along the north western boundary (162, 061). This dataset is further complemented by the higher resolution monitoring data and subsequent contouring from SLR presented in Figure 5.
- 3.4 As noted, ROES and TYTT have not detected bromate above the LoD. Monitoring locations (10b and 195) positioned between the proposed quarry and these abstractions (ROES and TYTT) show that bromate has not been consistently encountered above the LoD. This supports the premise that the bromate plume

does not migrate into this area under a range of groundwater level conditions and abstraction rates.

- 3.5 Figures 1, 2 and 5 all show the location of the bromate plume at different scales, but they all broadly demonstrate that the southern boundary of the plume has a similar position, with the limit of detection contour being at or close to the northern boundary of the proposed quarry. It needs to be noted that bromate is also found in the Chalk aquifer up-hydraulic gradient of the proposed quarry (Figure 6). The proposed quarry sits in a paleochannel, where the Chalk is overlain by Lower Gravels (forming the Lower Mineral Aquifer or LMA), Boulder Clay (the Interburden) and Upper Gravels (forming the Upper Mineral Aquifer or UMA).
- 3.6 As shown in Figure 7, bromate concentrations appear to be higher in the Chalk aquifer than the Lower Mineral Aquifer (LMA) based on bromate timeseries at BH104 (located near the northeast boundary of the proposed quarry). This trend (higher bromate in Chalk than LMA) suggests that the bromate is already in the chalk up-hydraulic gradient of the quarry and once the bromate-rich water travelling through the chalk fissures in the outcrop area meets the paleochannel, some enters the LMA but the main body of the plume continues to travel through the Chalk that underlies the LMA. However, this does not seem to be the case north of the boundary of the proposed quarry near the centreline of the plume, where the LMA has higher concentrations than the Chalk (as demonstrated by BH305 and BH105).
- 3.7 Since the proposed quarry is located further to the south and outside of the plume, this confirms that the LMA bromate concentration is insignificant relative to the Chalk at this location.

4.0 EFFECT OF HATFIELD ABSTRACTION ON THE PLUME LOCATION

- 4.1 The Chalk groundwater abstraction at HATF is critical in ensuring less bromate can travel eastwards towards ESSE and the TWUL sources in the Lea valley. This was noted by the Inspector following the public inquiry in 2007 and was recognised as an interim scavenger abstraction. When HATF abstraction is off or very low, more bromate is detected at the downstream sources and this response can be very fast (a matter of hours) indicating the karstic flow paths in the Chalk. The monitoring wells in the proposed quarry seem to be affected by the operation of HATF. As shown in Figure 8, the LMA monitoring wells located closer to HATF (eastern boundary of the proposed quarry) show greater relative drawdown characteristics than those further away from it. This has been demonstrated over a number of events throughout autumn 2018, suggesting that HATF is dominant in controlling the location of the southern boundary of the plume. Under low pumping at HATF the southern boundary of the plume moves north, while higher pumping rates cause this boundary to move south. However, even under scenarios where HATF has pumped at or near its maximum licensed volume (9Ml/d, in the past between 1995 and 2000 and more recently in 2013/14 and 2018), the southern plume boundary has been shown not to move onto the proposed quarry site.
- 4.2 The HATF abstraction location is at a higher elevation (102mAOD) than the proposed quarry site, and at some distance from the paleochannel (Figure 6). HATF boreholes are screened into and abstract from the Chalk at a total depth of c.100m (2mAOD), connected via adits spanning up to 174m at a depth of 82m (20mAOD). Adits were typically dug in the past to enhance the capture zone of a

borehole, enlarging yield in the most productive part of the aquifer. This suggests that the HATF abstraction receives most of its bromate rich water at depth within the Chalk aquifer (i.e where the adits are located). These depths contrast with the top of the Chalk beneath the proposed quarry (60-63mAOD), which is approximately 40m above the adit elevation.

- 4.3 Despite the fact that in the main part of the plume (to the north of the proposed quarry) the LMA can also have bromate-rich water, the primary mechanism for bromate scavenging at HATF is through the Chalk with minimal downward leakage through the LMA. In fact, since 2018 when the HATF abstraction became more stable at c4.5Ml/d, the bromate ratio between LMA and Chalk has stabilised, indicating that a steady state condition has been reached with fixed leakage between LMA and Chalk. The bromate concentration at both the LMA and the Chalk is primarily influenced by rainfall/recharge resulting in greater dilution during wet years and less during dry years. HATF abstraction is considered to be a secondary influence on the bromate plume at the proposed quarry, as demonstrated by the water quality data collected since 2018 (with stable abstraction).

5.0 IMPACT OF THE PLUME ON PUBLIC WATER SUPPLY

- 5.1 The abstracted water at HATF scavenger boreholes is dosed with ferrous chloride to reduce the bromate to bromide and is discharged via a dedicated main to a TWUL sewer for treatment at the Maple Lodge and Blackbirds STWs, before being discharged to the River Colne.
- 5.2 Bromate and bromide concentrations at HATF and ESSE are influenced by the background groundwater level fluctuation and the abstraction rates at the respective pumping stations. As the rate of abstraction increases, the bromate/bromide concentration increases due to the expansion of the cone of depression and the fact that more bromate-rich water is drawn into the boreholes. Lower background groundwater levels appear to result in higher bromate and bromide concentrations, potentially linked to lower dilution within the Chalk aquifer.
- 5.3 The water quality results from ESSE continue to confirm the influence of the HATF abstraction on the bromate/bromide concentrations at ESSE.
- 5.4 Affinity Water have continuous monitoring of groundwater levels at four Chalk observation boreholes, as well as monitoring the water quality at the abstraction sites at HATF and ESSE. Groundwater level monitoring continues to confirm that regional groundwater levels are dominated by seasonal impacts of natural recharge/discharge and not the abstraction from HATF.
- 5.5 Affinity Water also monitor the bromate and bromide concentrations on the River Colne at Green Bridge, near Denham. This is a point downstream of the STW outfalls and is used to monitor the effectiveness of the bromate reduction process, in accordance with the Voluntary Remediation Statement. Monitoring of the River Colne shows that bromate concentrations have remained below the limit of detection.
- 5.6 In total, 6,350kg of bromate have been removed and chemically treated since 2005, and 15,423kg of bromide removed as part of the scavenge pump and treat process. It is important to note that the quantities of bromate and bromide removed from the aquifer via scavenge pumping, do not account for additional bromate and bromide removed by other abstractions, or any natural discharges via springs and

stream baseflows.

- 5.7 The continuously high concentrations of bromate and bromide observed within the plume-wide monitoring network, the large volumes already permanently removed from the Chalk aquifer and the rapid increase in concentrations at ESSE when the HATF abstraction ceases, even for short periods, indicate a significant continuing source of both contaminants upstream of HATF. This “pump and treat” remediation scheme remains a valid interim remediation strategy to protect ESSE and the downstream TWUL sources to a degree but does not address the full pollution issue as HATF does not intercept the full extent of the bromate plume.

6.0 SIGNIFICANCE OF THE PROPOSED QUARRY OPERATION

Location of the Proposed Quarry in Relation to the Plume

- 6.1 A significant amount of monitoring data on and surrounding the site across a 7-year time span, including periods of high and low groundwater levels and different pumping regimes from HATF, support the conclusion that the bromate plume does not extend under the proposed quarry. Figure 5 illustrates the location of the bromate plume in the LMA relative to the site. While we note that there are some detections at various up and down gradient locations, the occurrence of these is not consistent and do not support assertion that the bromate plume is (or ever has) been present under the site.

Significance of Working Methods on Groundwater

- 6.2 The January 2020 GWMP describes four working plan scenarios in relation to LMH mineral extraction. While the objective is not to pump LMA groundwater at all on the site, one scenario is to implement temporary lowering of the groundwater level to facilitate Interburden removal in small discrete working areas (for up to two days in a week in sections of up to 100m x 30m). Following this, pumping ceases, the water level recovers, and the mineral is extracted in a wet state. The most likely phase where this working plan scenario could be applied is Phase G, as indicated by groundwater and Interburden elevation data presented in Table 1. The development phases are shown on Figure 9 (CD1.9).
- 6.3 The Phase-Specific GWMP will provide detail on the methodology and precautions should pumping be proposed.
- 6.4 The January 2020 GWMP details the extensive monitoring programme and the approach that will define control levels. A hierarchy of contingency actions to be implemented if a control level is exceeded will be as a minimum:
- Alert Affinity/EA/HCC & share data, cease LMA groundwater pumping (if pumping)
 - Repeat monitoring in the surrounding wells
 - Assess regional context of detection
 - Operational Review and Root Cause Analysis
 - Risk Assessment & Action plan
 - Stakeholder agreement to continue operations

- 6.5 Abstractions from both Upper Mineral Aquifer (UMA, with the Upper Mineral Horizon, UMH) and the LMA require licences. Measures are stipulated within the licences to ensure that no cross contamination of the UMA from any bromate impact can occur.
- 6.6 A licence to abstract groundwater from the UMA (Licence TH/039/0028/054, date of issue 02/11/2018; amended by Position Statement May 2019) relates to the use of UMA groundwater in mineral washing operations.
- 6.7 Water Resources “Transfer Licence to Abstract Water” (Licence Serial No: TH/039/0028/051, issued 2nd November 2018, amended by Position Statement May 2019) is a licence to abstract groundwater from both the UMA and the LMA for dewatering purposes which is discharged directly to the two lagoons and includes conditions to ensure that mixing of groundwater from the UMA and LMA does not take place. Specifically, it states that separate recharge lagoons are being used and that water abstracted from the UMA can be discharged into the UML and/or the LML, but LMA groundwater can only be discharged into the LML, and only when groundwater levels in the LML are below 74.5mAOD, and that the discharge should not result in water levels within the lagoon breaching this level while a discharge is taking place. these controls, combined with the requested planning conditions (detailed in Section 8.0) are sufficient to mitigate any residual risk. If the method of working the LMH does not involve pumping from the LMA, as indicated by data included in Table 1, then the level of risk would be considered even lower.

Concerns Raised by Local Residents

- 6.8 Objections have been raised due to concerns regarding the bromate plume and the potential interactions between the plume, the proposed quarry and associated activities and ongoing remedial actions required as part of regulation under Part 2A of the Contaminated Land regime.
- 6.9 The following documents have been submitted:
- Colney Heath Parish Council - Objection dated 06/09/2019;
 - Colney Heath Parish Council Response to Planning Application Ref No.5/2020/0357-Hatfield Aerodrome establishment of a new quarry- Objection, no date provided; and
 - Planning Application Ref No 5/0394-16 Land at Hatfield Aerodrome, Off Hatfield Road-Ellenbrook Area Residents Association objection to the planning application to quarry on Ellenbrook Fields - October 2019.
- 6.10 Rather than responding to each of the submitted objections point by point, the Parties’ responses to the concerns raised by the objectors have been grouped together as follows:
- **Point 1 - Plume Location:**
- Monitoring data shows that the bromate plume extends onto the proposed quarry and that bromate is present within both the upper and lower mineral aquifers (NB this point is made by CHPC in 2nd objection, not dated).

Response 1:

The parties to this SoCG do not consider that the plume is located within the proposed quarry site. Monitoring data (from SLR and APs) shows that concentrations of bromate above 2ug/l are located to the north of the dig area of the proposed quarry. While bromate has been detected within some of the perimeter wells, occurrences are intermittent and concentrations are low, generally below 3ug/l in the Chalk and below 2ug/l in the LMA.

We note that a specific reference was made by CHPC to bromate being encountered within the UMA although no borehole reference(s) or other pertinent information regarding the occurrence(s) have been provided. Based on available data provided by SLR, occurrences are intermittent and low.

- **Point 2 – Adequacy of investigation and assessment:**

There has not been sufficient investigation and assessment of the risk posed by quarrying in close proximity to the plume. Specifically, 3rd party data, biased in favour of the applicants has been used to support the proposal and that there has not been an independent review, undertaken by experts.

Response 2:

The preceding sections of this report, while a summary, illustrate that the bromate plume, its extent and major controls, are well known. Along with the ongoing works required under Part 2A, there have been two PhDs written on the matter and the conclusion regarding key aspects are agreed between the key parties.

It has to be acknowledged that investigation and assessment of issues such as the bromate plume have to be conducted at scales appropriate to the issue at hand. Further plume definition is not required at this stage, but more data will become available throughout the various phases of the development, if permission is granted.

In line with relevant guidance, such investigation and assessment should be undertaken by individuals with the required technical knowledge and experience. SLR are an established consultancy with experienced staff, and it is therefore considered that they are appropriate for the required works.

Notwithstanding the above, the parties to the SoCG employ staff who hold (as a minimum) degree level qualifications in a relevant subject, as well as membership to professional bodies, and will either be chartered or work with chartered individuals and have significant experience in the field of hydrogeology. Third party reports are subject to independent review by these staff to ensure that regulatory requirements are met and that both the water environment and the public water supplies are protected. If the submitted information is not sufficient, has not been collected in-line with the relevant statutory guidance and best practice or if the conclusions reached are not acceptable or do not fit conceptually with established geological or hydrogeological concepts and understanding, then further information is sought and, until such time that satisfactory responses are provided, objections are made, or the discharge of conditions is refused. This is the approach that has been undertaken in responding to the proposed quarry.

- **Point 3 – Expanding plume:**

The plume is spreading or continues to spread both towards the River Lea in the east and, in the vicinity of the proposed quarry to the south. Currently the spread is not understood by the “experts”.

Response 3:

It is not considered correct to state that the plume continues to spread towards the River Lea or in a southerly direction. It has been demonstrated that bromate had spread to the River Lea and the associated Northern New River Wells (NNRW) as noted by the 2007 inspector's report to the Secretary of State and in the decision to undertake scavenger pumping from HATF in 2005.

Regarding the southern migration, the water level and quality monitoring data collected in relation to the St Leonard's Court special site provides a long-term dataset, covering multiple background groundwater levels and HATF pumping scenarios, which is refined by the SLR monitoring data covering a period of over 8 years, with these datasets showing good agreement. In addition, the water quality data fits with the understanding of the hydrogeological regime in the area, which serves to constrain southwards migration. While there are aspects of the plume which are subject to further study and conceptualisation, the 2-dimensional extent of the plume is accepted by all parties.

- **Point 4 – Planning condition:**

The use of a water management planning condition is not appropriate as the level of risk is high and once the plume has migrated it will be too late and that bromate will take centuries to clean up.

Response 4:

Based on the amount of available information covering the bromate plume, Chalk hydrogeology, understanding of the geology and hydrogeology of the wider area etc., we consider that the plume does not extend onto the proposed quarry and that activities associated with the quarry will not result in the plume migrating. While the risk is considered to be low, a planning condition requiring a water management plan to be approved prior to commencement of each quarry phase has been requested to provide additional assurance and mitigation. In the unlikely event that migration of the plume would occur, this would be a gradual process with the first indication being a change in groundwater levels, showing that groundwater flow direction has changed. Low bromate concentrations which form the outer plume southern boundary would then migrate towards the northern boundary of the proposed quarry. Any changes in groundwater levels would be detected and mitigation measures as required by part E of condition 1 requested by the EA would be implemented. Should bromate start to migrate, elevated concentrations would be detected by the monitoring, with action taken to address them, causing the plume to return to its previous position. This is supported by the information presented above, particularly in Section 2.0. There is no plausible scenario under which bromate could migrate onto the proposed quarry at sufficient concentrations to cause a long term problem.

- **Point 5 - Risk to TYTT and ROES sources:**

Dewatering will alter the plume's location and backfilling the lower mineral void with a lower permeability material will permanently alter the plume and impact the ability of HATF to capture bromate, particularly if pumping rates are increased. This diversion of the plume could result in bromate impacted abstractions to the south (TYTT and ROES).

Response 5:

One of the major controls over the plume is pumping at HATF. The available evidence indicates that the plume has never been drawn onto the proposed quarry site, even during periods when HATF was pumping close to 9Ml/d. Both TYTT and ROES are baseload sources and routinely pump close to their licensed volumes, but this has not drawn the plume towards these abstractions under various

pumping regimes at HATF.

While the infilling with a lower permeability material will cause a localised change in groundwater flow in the LMA, the area to be infilled is of limited thickness and lateral extent in relation to the total thickness of the Chalk aquifer in which the bulk of bromate transport occurs. It is therefore not considered that the backfilling would have the potential to cause changes to the plume's behaviour, even when pumping at HATF is at or near 9MI/d.

7.0 GROUNDWATER MONITORING

- 7.1 Groundwater and Water Management Plan Final (Version 5) prepared for Brett Aggregates Limited by SLR Consulting sets out the overarching approach to groundwater monitoring and management, with further phase-by-phase refinement to be required by pre-commencement conditions.
- 7.2 While full details for each phase will be submitted, the plan is considered to be comprehensive and will allow for the adequate controls to ensure that controlled waters are protected.
- 7.3 Details relating to specific requirements have yet to be agreed, but the following are considered to be indicative of the likely requirements, based on previously accepted monitoring strategies and giving appropriate consideration to the site-specific conditions.

8.0 SUGGESTED EA CONDITIONS

- 8.1 The Conditions set out below as Conditions 1, 2 and 3 are as stated in the Environment Agency statement of case, September 2021.
- 8.2 The Groundwater and Water Management Plan Final (Version 5) prepared by SLR on behalf of Brett presents details required by draft Condition 26 and Condition 30 as set out in HCC's Report to Committee September 2020 although specific data requirements have evolved over time.

The draft condition 26 in the HCC Report to Committee September 2020 reflects the condition set out by the EA in its letter dated 3 July 2020.

Condition 1

- 8.3 Each phase of the development hereby permitted shall not commence until a Water Monitoring & Management Plan relating to that phase has been submitted to, and approved in writing by, the Mineral Planning Authority. Reports as specified in the approved Water Monitoring & Management Plan, including details of any necessary contingency action arising from the monitoring, shall be submitted at the times identified to, and approved in writing by, the Mineral Planning Authority.
- 8.4 Each Water Monitoring and Management Plan shall refine the Groundwater and Water Management Plan Final (Version 5) prepared for: Brett Aggregates Limited by SLR Consulting and shall include:
- details of construction and water management during construction of the two infiltration lagoons;
 - clarification of the restored site discharge point for the UML back-drain;
 - a long-term groundwater monitoring plan to continue during and post the

operational phase to include:

- A. monitoring and reporting programmes;
- B. location of monitoring points including additional monitoring boreholes particularly in the vicinity of the infiltration lagoons;
- C. analytical suites and limits of detection;
- D. groundwater level monitoring;
- E. details of contingency actions in the event of impact;
- a mechanism for periodic review; and
- a timetable of monitoring and submission of reports to the Mineral Planning Authority.

Reason

- to protect controlled waters and to not exacerbate the existing groundwater pollution;
- ensuring no deleterious impact to groundwater quality, in accordance with Policy 16 (Soil, Air and Water) of the Hertfordshire Waste Core Strategy 2012;
- to prevent development that would have an unacceptable risk or adversely affect water pollution; and
- to minimise the risks associated the flow and quantity of surface and groundwater and migration of contamination from the site, in accordance with paragraph 143 of the NPPF.

Condition 2

- 8.5 The two infiltration lagoons and back drain shall be constructed in accordance with the Groundwater and Water Management Plan Final (Version 5) prepared for Brett Aggregates Limited by SLR Consulting as refined by the Water and Monitoring Management plan approved under condition 1 above prior to the commencement of mineral extraction.

Reason

- 8.6 To protect controlled waters and to not exacerbate the existing groundwater pollution.

Condition 3

- 8.7 Groundwater monitoring and the management of water shall be conducted by the Mineral Operator in accordance with the Groundwater Management Plan as refined by the approved Water and Monitoring Management Plan, prepared for Brett Aggregates Limited by SLR Consulting for the lifetime of the development.

Reason

- 8.8 To protect controlled waters and to not exacerbate the existing groundwater pollution.

Discussion

- 8.9 The EA conditions are slightly different from the HCC conditions proposed in the September 2020 Committee Report, and as stated in paragraph 9.1 of that report, the conditions set out in this Report are based on the EA conditions in its statement of case September 2021, which Brett have similarly agreed.

9.0 SUMMARY AND RECOMMENDATIONS

- 9.1 We consider that the development of the proposed quarry can progress subject to the inclusion of appropriate conditions.

Coda from Jenny Lightfoot (Herts CC hydrogeology expert)

Sections 1 to 5 of the statement above presents the Environment Agency and Affinity Water understanding of the hydrogeology of the area, groundwater management and plume remediation developed over many years of data interpretation for the Hatfield area and bromate plume. I have scrutinised the interpretation in relation to the proposed quarry and have discussed this with the EA and AW. I have also received further clarification from Brett's hydrogeological consultant SLR relating to the proposed LMH pumping (See Table 1) and the proposed monitoring, triggers and contingency actions. In light of this I agree with all the above subject to an additional suitably worded planning condition that prevents LMH pumping in phases A to F and limits pumping in Phase G.

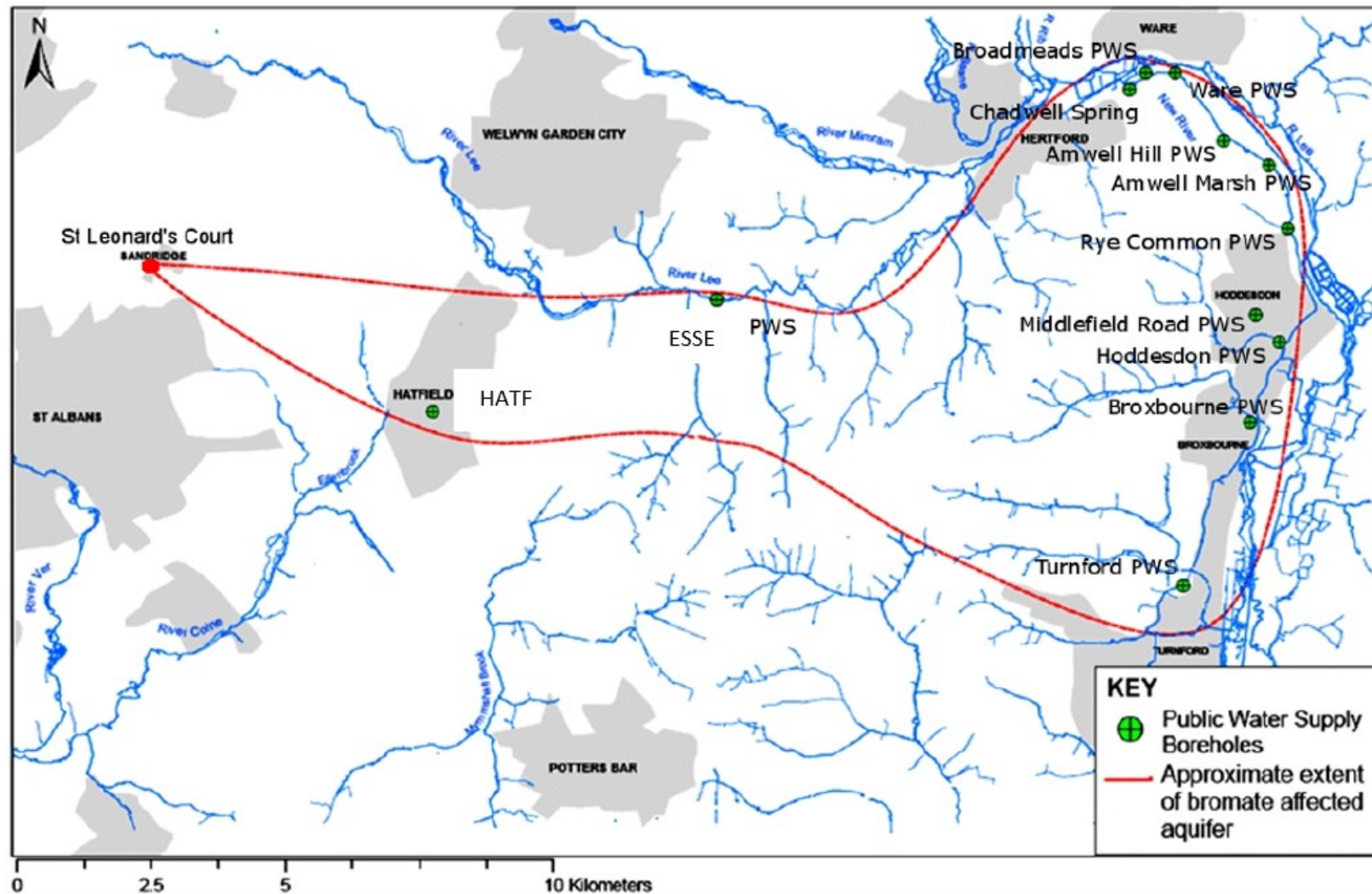


Figure 1
Location map showing the extent of the Herts Chalk aquifer affected by bromate contamination and the distribution of major public supply wells (adopted from Cook, 2010)

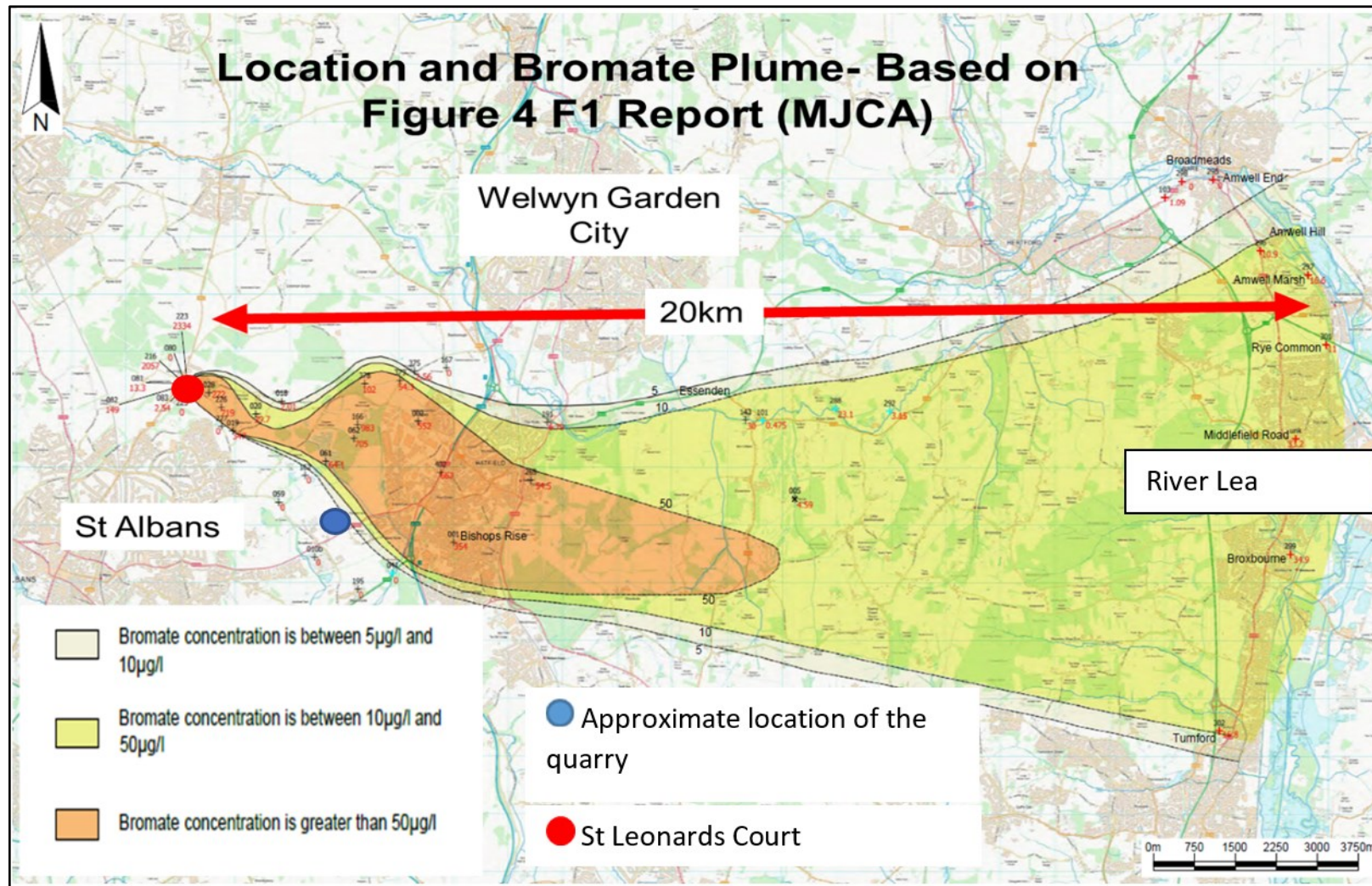


Figure 2
Location of bromate plume (map adopted from the EA decision document and F1 report)

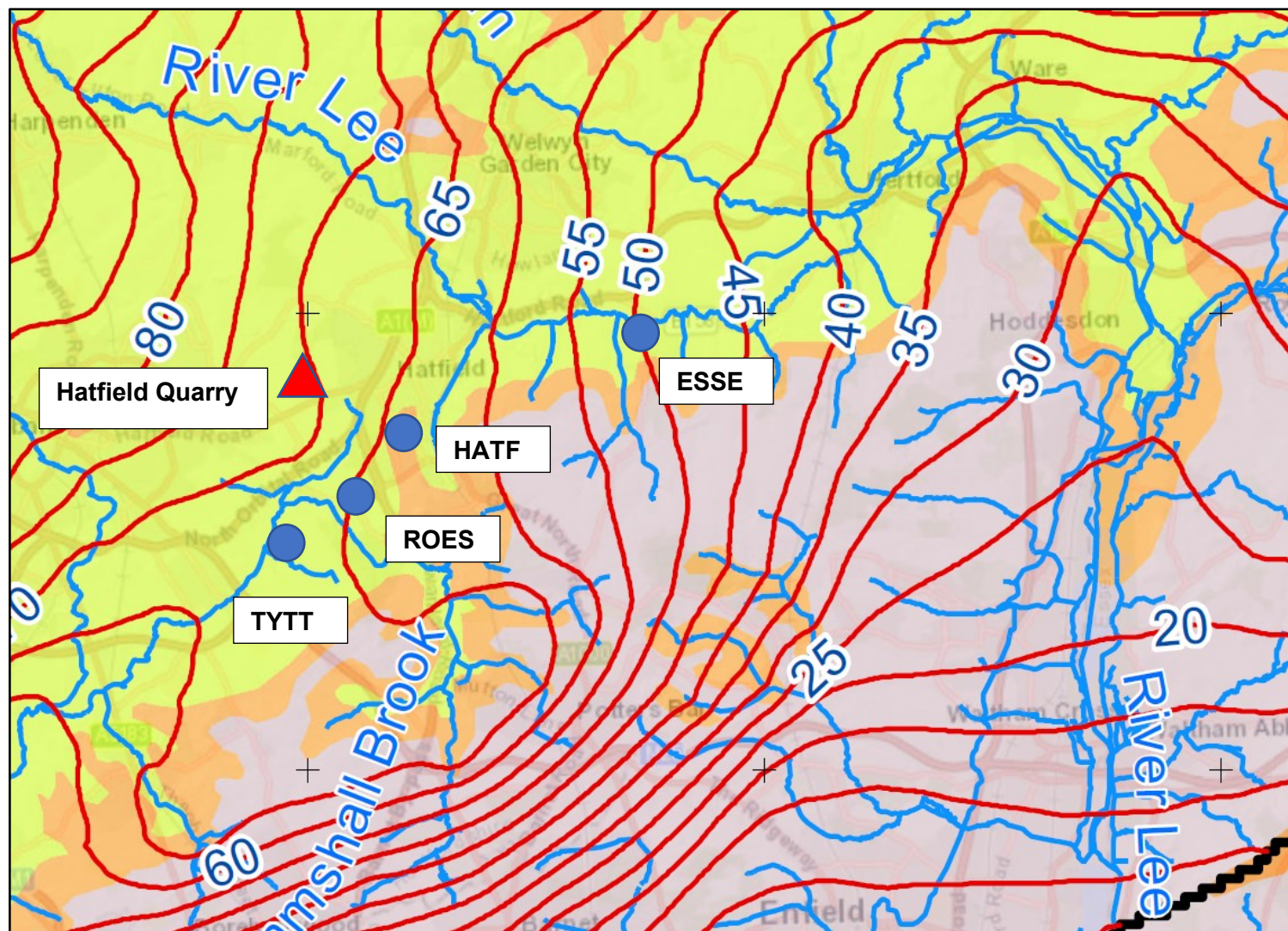


Figure 3
Regional groundwater flow pattern, taken from the Hertfordshire Chalk Model

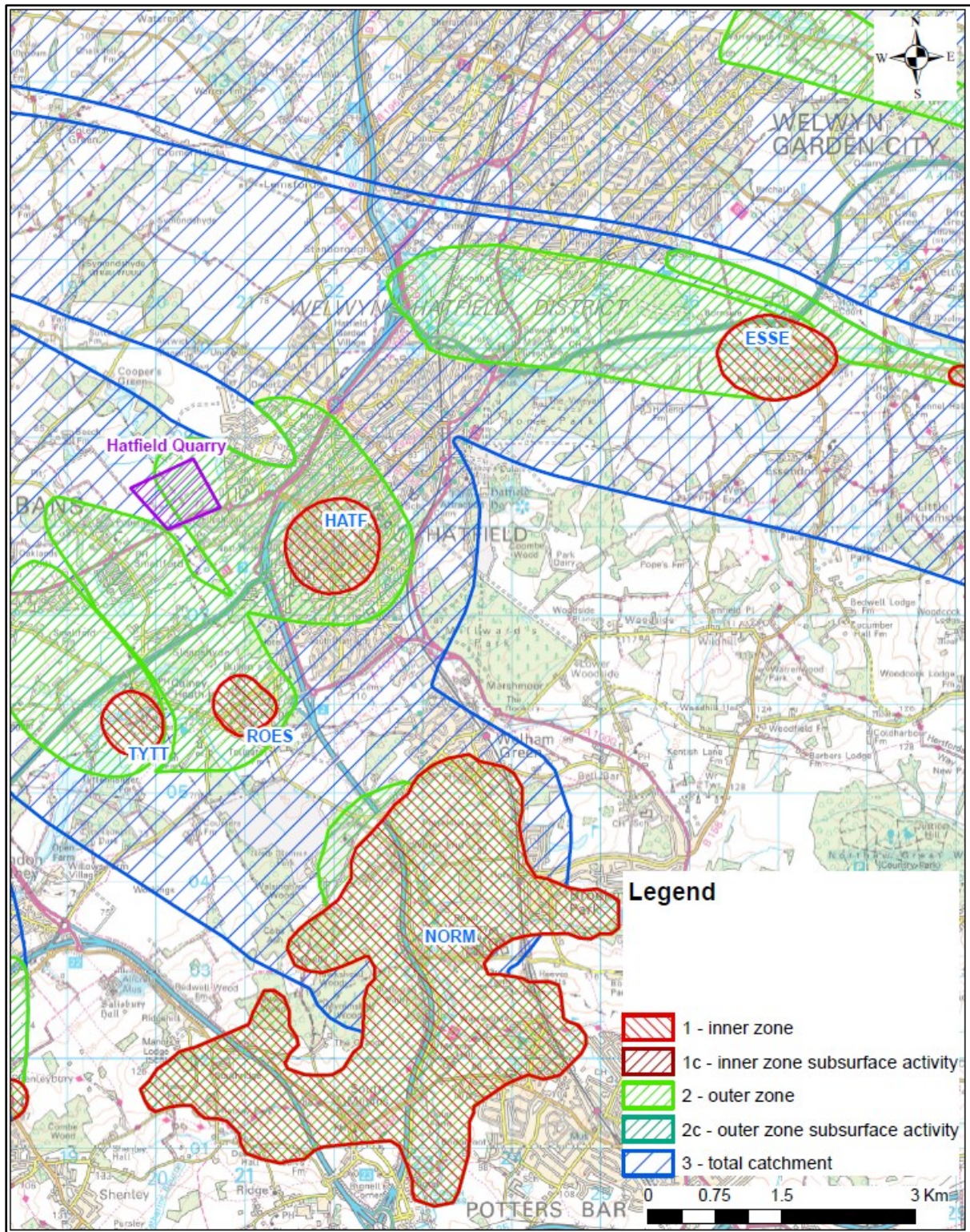


Figure 4
Source Protection Zones of groundwater sources around the proposed quarry

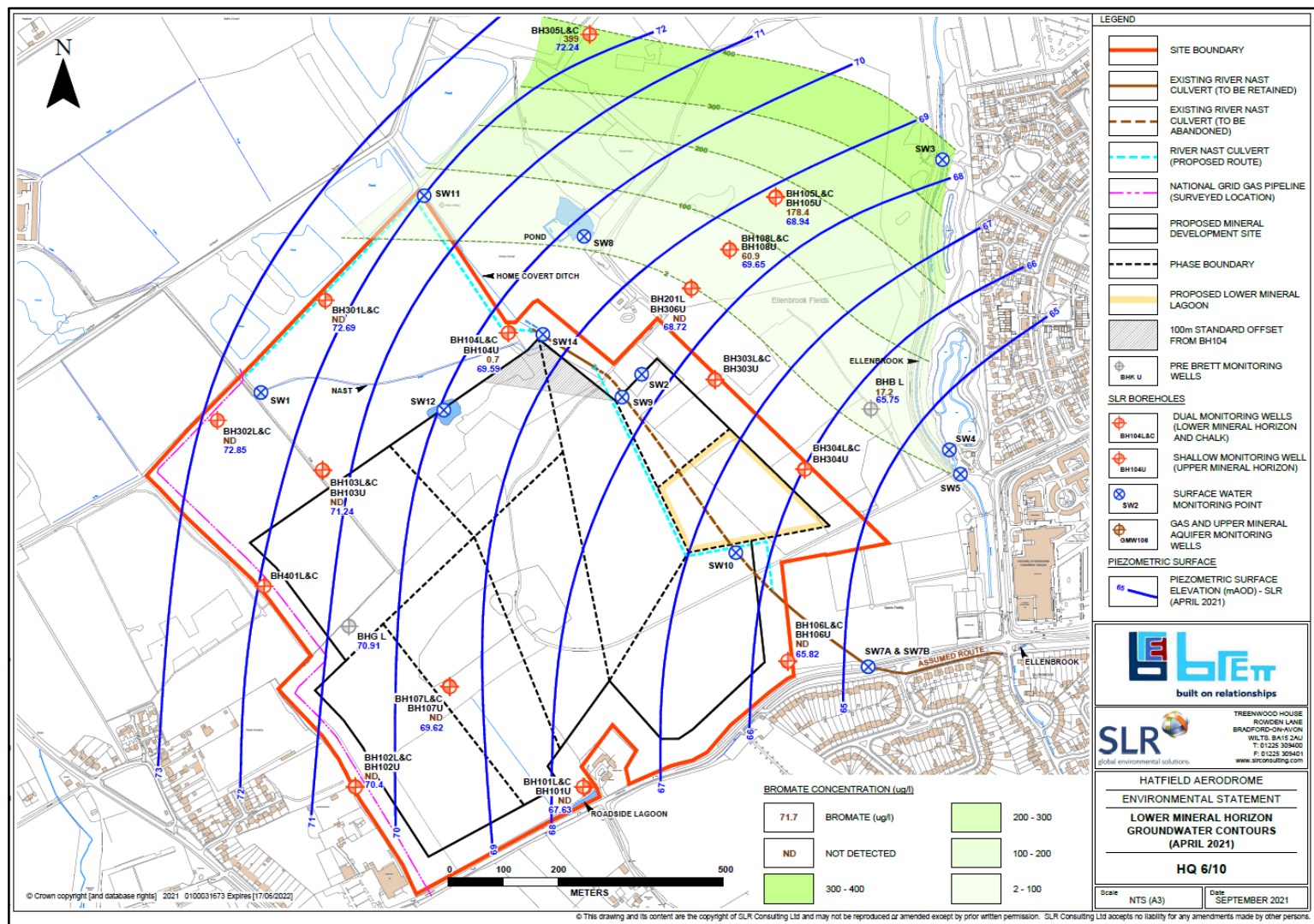


Figure 5
Location of the bromate plume in relation to the proposed quarry (adopted from SLR)

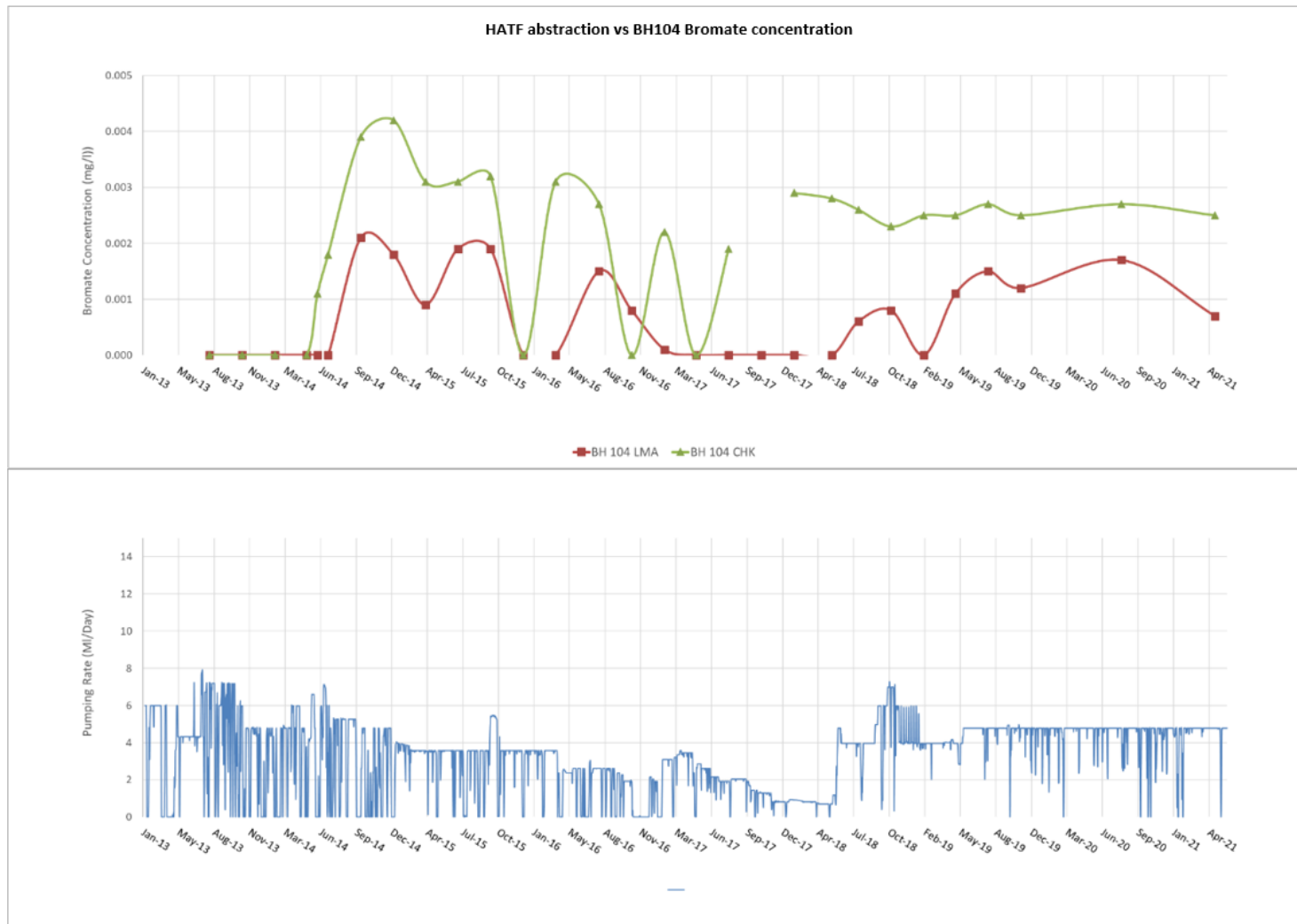


Figure 7
Bromate concentrations over time at BH104 screened in the LMA and in the Chalk
(located at the northern boundary of the proposed quarry) plotted against HATF abstraction (SLR data)

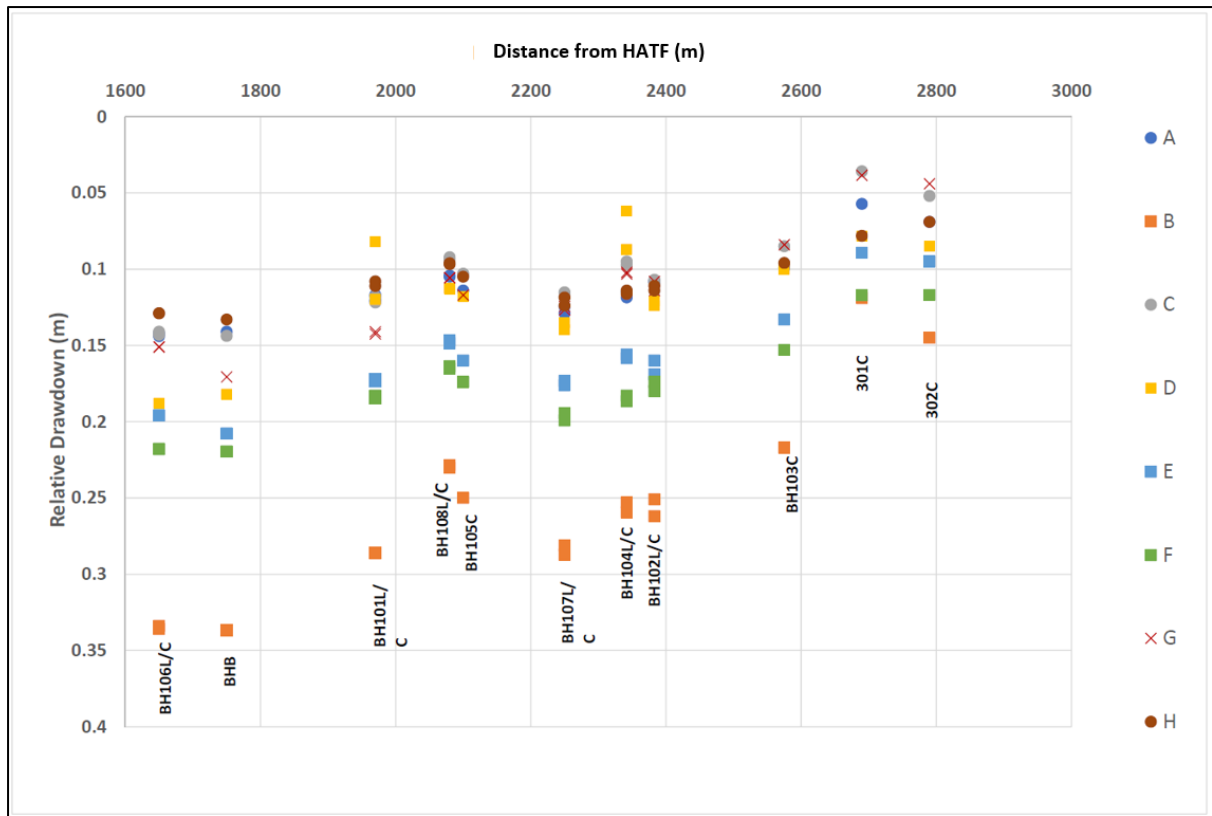
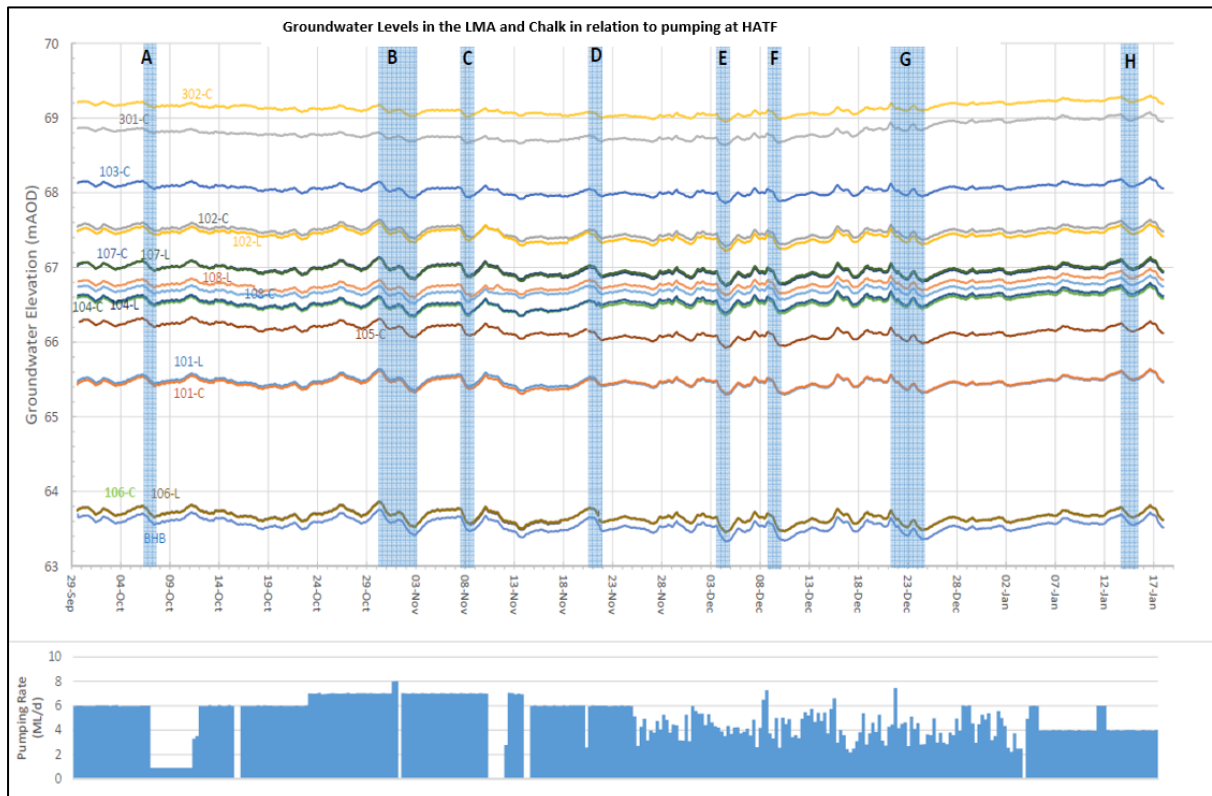


Figure 8
Groundwater level response in relation to changes in abstraction at HATF throughout Autumn 2018 (SLR data)

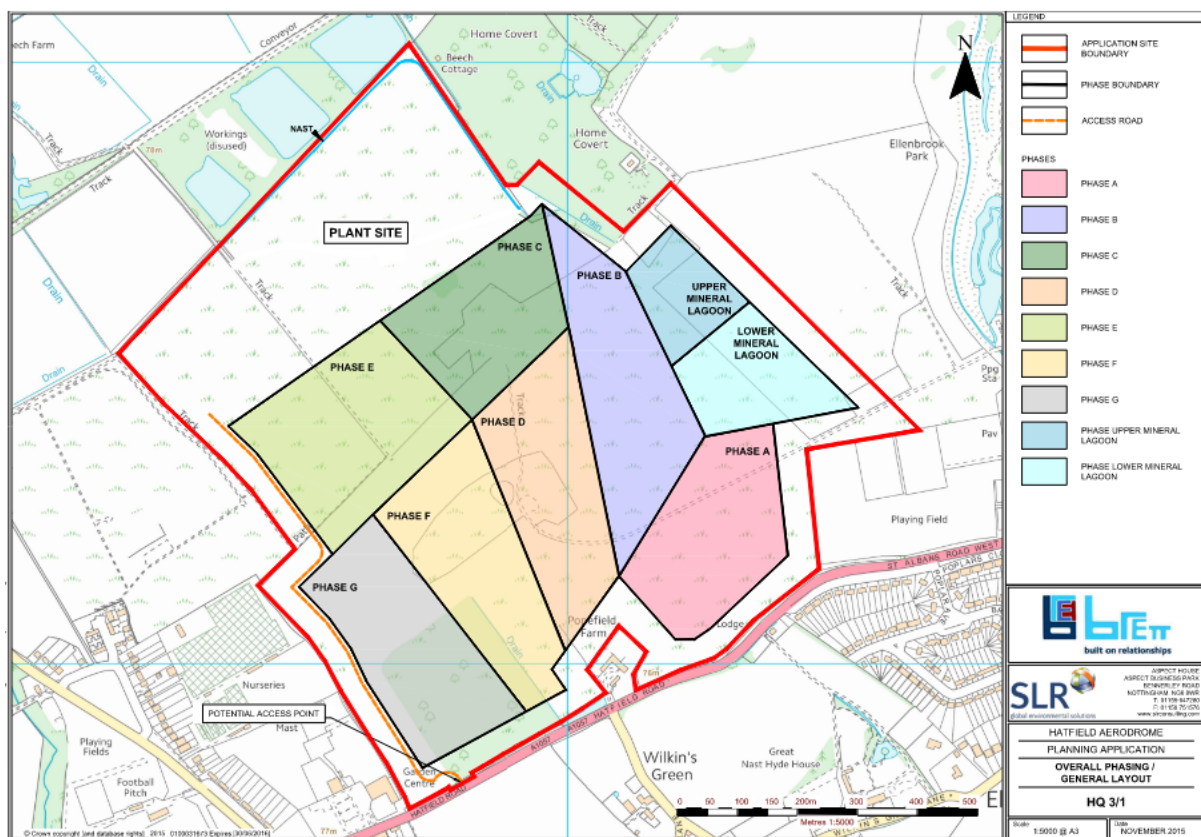


Figure 9
Phasing Layout

Phase	Groundwater Elevation (Lowest and Highest)				Base of Interburden		Groundwater Elevation Period							
							Low (June -Dec)				High (Jan-May)			
	Min (Nov 17)		Max (Mar 14)		High	Low	Minimum		Maximum		Minimum		Maximum	
	Base of Interburden Elevation													
	LL	HL	LH	HH	H	L	H	L	H	L	H	L	H	L
UM Lagoon	65.5	66.5	68	69	66.8	65.6								
LM Lagoon	64	65.5	66.5	68	66.3	65.6								
A	64.5	66	66.5	68	66.8	65.7	-2.3	-1.2	-0.8	0.3	-0.3	0.8	1.2	2.3
B	65.4	66.9	68	70	67.5	66.1	-2.1	-0.7	-0.6	0.8	0.5	1.9	2.5	3.9
C	66	67.5	69.5	71	68.3	66.9	-2.3	-0.9	-0.8	0.6	1.2	2.6	2.7	4.1
D	65.5	66.5	68	70	68.1	65.7	-2.6	-0.2	-1.6	0.8	-0.1	2.3	1.9	4.3
E	67	69	70	72	69.5	68.3	-2.5	-1.3	-0.5	0.7	0.5	1.7	2.5	3.7
F	66	67.5	68.5	71	68.2	66.5	-2.2	-0.5	-0.7	1	0.3	2	2.8	4.5
G	67	69	69	71.5	68.1	67	-1.1	0	0.9	2	0.9	2	3.4	4.5

PHASE X

PHASE BOUNDARY

UPPER MINERAL HORIZON (UMH)

LOW WATER

SEASONAL FLUCTUATION

LOW WATER

LOWER MINERAL HORIZON (LMH)

PHASE BOUNDARY

HIGH BAND OF INTERBURDEN

LOW BASE OF INTERBURDEN

Base of Interburden Elevation	
H	Highest Interburden Elevation in Phase
L	Lowest Interburden Elevation in Phase

	Unconfined and Unsaturated Conditions (-ve Head in LMA)
	Confined Conditions (+0 to 1m head in LMA)
	Confined Conditions (1> to 2 m head in LMA)
	Confined Conditions (> 2 m head in LMA)

Groundwater Elevation	
LL	Lowest Low in Phase
HL	Highest Low in Phase
LH	Lowest High in Phase
HH	Highest High in Phase

Table 1 – Lower Mineral Aquifer - Seasonal Groundwater Conditions

Note: where the cells are coloured green or yellow, the groundwater table is low enough, relative to the surface of the interburden to allow LMH excavation without any groundwater pumping

APPENDIX 1

1ST REMEDIATION NOTICE

TO APPEND PRIOR TO FORMAL SUBMISSION (included in the EA SoC)

**ENVIRONMENTAL PROTECTION ACT 1990, SECTION
78E(1)**

**THE CONTAMINATED LAND (ENGLAND)
REGULATIONS 2000 (SI 2000 NO: 227)**

**THE CONTAMINATED LAND (ENGLAND)
(AMENDMENT) REGULATIONS 2001 (SI 2001 NO: 663)**

REMEDIATION NOTICE – St. Leonards Court

TO:

1. Redland Minerals Limited of Bradgate House, Groby, Leicester LE6 0FA
2. Crest Nicholson Residential plc of Crest House, 39 Thames Street, Weybridge, Surrey KT13 8JL

This notice is served on you by the Environment Agency (“the Agency”) pursuant to s. 78E of the Environmental Protection Act 1990 (“the 1990 Act”) in relation to contaminated land identified by St Albans City and District Council under s. 78B EPA and designated as a special site under s. 78C of the 1990 Act.

A notice of identification of contaminated land dated 20th June 2002 was given to you by St Albans City and District Council of St Peter’s Street, St Albans, Hertfordshire AL1 3JE in accordance with s. 78B of the 1990 Act that St Leonard’s Court, Sandridge (“SLC”) is contaminated land.

The location and extent of the contaminated land to which this notice relates is shown edged red on the plan annexed to this notice.

The Environment Agency considers that you are an appropriate person within the meaning of the 1990 Act, by reason of having caused or knowingly permitted the substance, or any of the substances, by reason of which the contaminated land to which this notice relates is contaminated land, to be in, on or under that land.

The things that you are required to do by way of remediation and the period within which you are required to do each of these things are set out in Schedule 2.

The further matters required to be stated in this notice are set out in Schedules 3 to 7.

.....
John Collins
Acting North East Area Manager of the Thames Region of the Environment Agency

DATE: 8th November 2005

The Agency's address for the purposes of this notice is:

Environment Agency
Kings Meadow House
Kings Meadow Road
Reading
Tel: 0118 953 5175
Fax: 0118 950 9440
Ref: Legal/PC/KM/SLC

The contact name for the purposes of this part of the Notice is Pete Carty

[Note to recipient (this note does not form part of the Notice): Part IIA of the Environmental Protection Act 1990, which was inserted by section 57 of the Environment Act 1995, establishes a framework for the identification and remediation of contaminated land. Part IIA came into force in England on 1st April 2000. Part IIA contains the structure and main provisions of the regime. The Contaminated Land (England) Regulations 2000 (SI 2000/227) and the Contaminated Land (England)(Amendment) Regulations 2001 (SI 2001/663) set out detailed provisions on parts of the regime which Part IIA leaves to be specified in secondary legislation, including provisions relating to Remediation Notices and appeals. DETR Circular 02/2000 contains the statutory guidance which provides the detailed framework for the various key elements of the regime. The DETR Circular also sets out the way in which the regime is expected to work in England, by providing an explanation of government policy (Annex 1), a description of the regime (Annex 2) and a guide to the Regulations (Annex 4). Copies of the DETR Circular can be obtained from The Stationery Office, PO Box 29, Norwich NR3 1GN (www.itsofficial.net)]

SCHEDULE 1

(Location and extent of contaminated land to which this notice relates (Reg 4(1)(b))

The contaminated land is marked by the area edged red shown on the plan annexed hereto and centred on grid reference TL 17086 10460.

SCHEDULE 2

(Remediation requirements and periods (Section 78E(1) of the 1990 Act)

The Remedial Treatment Actions which will enable the pollutant linkages identified in Schedule 3 to be effectively remediated to the required standards cannot yet be identified. This is because specific Assessment Actions are needed to characterise in detail the significant pollutant linkages and to collect site data to evaluate the effectiveness of potential Remedial Treatment Actions. This Remediation Notice therefore, identifies the series of Assessment Actions that will enable Remedial Treatment Actions to be specified in one or more subsequent Remediation Notices.

NOTE: The following assessment actions are all desk studies apart from 1D and 2E.

1.The Assessment Actions listed below address the Bromate Pollutant Linkage (number 1) identified in Schedule 3.

A. The following Assessment Action is required to characterise in detail the Bromate Pollutant Linkage to establish what would need to be achieved by Remedial Treatment Actions. **Assessment Actions must be undertaken to:**

- (a) Make a best estimate of the load of bromate held in the unsaturated zone and saturated chalk beneath the area edged red on plan using the data reported in the site investigations carried out by consultants, Komex, in August 2000 and Atkins in November 2001;
- (b) Indicate the extent of the uncertainty in this estimate and the reasons for this uncertainty; and
- (c) Design and cost a site investigation to significantly reduce this uncertainty.

This action must be completed by 15th March 2006.

B. The following Assessment Action is required to characterise in detail the Bromate Pollutant Linkage identified to establish what would need to be achieved by Remedial Treatment Actions. **Assessment Actions must be undertaken to:**

- (a) Make a best estimate of the mass flux of bromate being transported in groundwater away from the area edged red in plan;
- (b) Indicate the extent of the uncertainty in this estimate and the reasons for this uncertainty; and
- (c) Design and cost a site investigation to significantly reduce this uncertainty.

This action must be completed by 15th March 2006.

C. The following Assessment Action is required to characterise in detail the Bromate Pollutant Linkage identified to establish what would need to be achieved by Remedial Treatment Actions. **An Assessment Action must be undertaken to review the scope for modelling the contaminant plume.**

The review must include:

- (a) Possible types of models;

- (b) The data requirements of each type;
- (c) The extent to which the necessary data already exists;
- (d) The work that would be required to obtain data which does not exist at present;
- (e) The capacity of each type of model to predict how the plume will behave under present conditions; and
- (f) The capacity of each type of model to predict the likely effect on the plume of scavenge-pumping from different locations and at different rates, and the effect of any other action which appears to be a potential Remedial Treatment Action..

This action must be completed by 15th May 2006.

D. The following Assessment Action is required to characterise in detail the Bromate Pollutant Linkage identified to establish what would need to be achieved by Remedial Treatment Actions. **An Assessment Action must be undertaken to monitor as specified below.** This action must be started on 15th February 2006 and continued until 14th February 2011.

The Assessment Action is to provide quality-assured monitoring data and report it to the Agency every two months at the locations identified in Table 1 below for the parameters in Table 2 below and to the detection limits, precision and bias in Table 3 below.

Table 1. Locations to be monitored under Assessment Action D

Loc ref	Site name	Type	NGR	Ownership
020	Cap's Cottages	P	TL 18377 09920	Mr A Sheriff, Nashes Farm
018	Fairfolds Farm	P	TL 18852 10141	Mr A Sheriff, Nashes Farm
059	Hatfield Quarry, WM1	M	TL 18800 08395	Cemex UK
065	Hatfield Quarry, WM9 - Lower level (P2)	M	TL 19718 10115	Cemex UK
068	Hatfield Quarry, WM13	M	TL 18891 09163	Cemex UK
	Symonshyde Quarry, W29	M	TL 2129010670	Cemex UK
	Symonshyde Quarry, W35	M	TL 20370 10445	Cemex UK
	Symonshyde Quarry, W36	M	TL 21100 10500	Cemex UK
167	The Old Cottage, newbh	P	TL 21868 10722	Mr & Mrs N Redfern
191	M7, Mill Green Borehole	M	TL 23716 09780	Installed by Three Valleys on public access land.
005	Hatfield and London Country Club Workshop	P	TL 28234 08457	Hatfield & London Country Club
265	Park Street, Old Hatfield	M	TL 23410 08778	Installed by Three Valleys on verge of public highway.
266	Hill End Farm, Hatfield House Estate	M	TL 25496 09364	Hatfield House Estate
262	Lee Borehole BHA (32 m. deep)	M	TL 25348 09774	Installed by Agency. Hatfield House Estate
195	M10, Sleapshyde OBH	M	TL 20251 06887	Installed by Three Valleys on public access land.
010b	BH by Block 3 (northernmost) Glinwell's Nursery	P	TL 19458 07443	Glinwell plc
041	Ellenbrook @ North Orbital Road (A414)	M	TL 20882 07164	Access from public highway

292	R Lee, Water Hall gauging station	S	TL 29967 09978	Access from public bridle path
101	River Lee downstream from Essendon Pumping Station (Holwell Bridge)	S	TL 27641 09814	Access from public highway
288	Stream from Arkley Hole spring, upstream of confluence with Lee	S	TL 28976 10021	Woolmers Park
001	Hatfield PWS BH	PWS	TL 22000 07700	Three Valleys Water plc
142	Roestock P.S. (raw water sampling point)	PWS	TL 21000 05900	Three Valleys Water plc
141	Tyttenhanger P.S. (raw water sampling point)	PWS	TL 19820 05720	Three Valleys Water plc
143	Essendon P.S. (raw water sampling point)	PWS	TL 27330 09820	Three Valleys Water plc
144	Waterhall P.S. (raw water sampling point)	PWS	TL 29400 09500	Three Valleys Water plc
298	Broadmeads PWS	PWS	TL 35310 13960	Thames Water Utilities Ltd
295	Amwell End PWS	PWS	TL 35880 13990	Thames Water Utilities Ltd
296	Amwell Hill PWS	PWS	TL 36750 12760	Thames Water Utilities Ltd
297	Amwell Marsh PWS	PWS	TL 37620 12340	Thames Water Utilities Ltd
301	Rye Common PWS	PWS	TL 37950 11130	Thames Water Utilities Ltd
300	Hoddesdon PWS	PWS	TL 37840 08980	Thames Water Utilities Ltd
299	Broxbourne PWS	PWS	TL 37300 07500	Thames Water Utilities Ltd
135	Turnford PWS	PWS	TL 36000 04440	Thames Water Utilities Ltd
M = monitoring borehole, P = private water supply, S = surface water, PWS = public water supply				

Methods of borehole purging, sampling and sample handling are to be detailed in a method statement submitted to the Agency for approval prior to sampling commencing, and are to be in accordance with relevant Agency guidance and practice unless otherwise agreed by the Agency. Analysis of samples is to be carried out by a laboratory accredited to ISO 17025 and using United Kingdom Accreditation Service accredited methods, performance-tested in accordance with Water Research Centre plc (WRc) publication NS30, 'Analytical Quality Control in the Water Industry' (WRc Report NS30, June 1989, ISBN 0902156853). The laboratory will operate a system of routine analytical quality control, preferably based on the use of control charts (see WRc Report Ref: Co4239 'Quality Control Charts in Routine Analysis'). Samples must be analysed within 48 hours of collection. Results are to be reported to the Agency no more than 4 weeks after sampling, in a summarised format to be agreed with the Agency, accompanied by laboratory certificates of analysis, which must state the associated measurement uncertainty.

Table 2. Parameters to be measured and frequency of measurement

Controlled waters	Frequency	Monitoring interval	Parameters to be measured (see Table 3 for abbreviations & symbols)
Groundwater in, or in continuity with, the Chalk aquifer	12 times per calendar year	25-35 days	Water level AOD. Depth to base of borehole where feasible
Groundwater in, or in continuity with, the Chalk aquifer	6 times per calendar year	50-70 days	pH, EC, Cl, Na, TON, BrO ₃ , Br temperature, DO
Surface waters	12 times per calendar year	25-35 days	pH, EC, Cl, Na, TON, BrO ₃ , Br

Table 3. Precision, bias and limit of detection for each quantity measured

Determinand or measurement	Symbol or abbreviation	Limit of detection (See note A)	Precision (See note A)	Bias (See note A)	Comments
Water level above Ordnance Datum	Water level AOD	Not applicable	To nearest 10mm	See note B	Datumpoints and levels will be supplied
Depth to base of borehole	None	Not applicable	To nearest 200mm	See note B	Datumpoints and levels will be supplied. Measurement not feasible in all boreholes.
Temperature	None	Not applicable	To nearest 0.5°C	See note B	Measured in-situ
Dissolved oxygen	DO	Not applicable	See note B	See note B	Measured in-situ
Log hydrogen ion concentration	pH	Not applicable	See note B	See note B	Measured in-situ
Electrical conductivity	EC	Not applicable	See note B	See note B	Measured in-situ
Chloride	Cl	1mg/l	5%	10%	
Sodium	Na	2mg/l	5%	10%	
Total oxidised nitrogen	TON	0.2mg/l	5%	10%	
Bromate as BrO ₃	BrO ₃	0.001mg/l	5%	10%	
Bromide	Br	0.005mg/l	5%	10%	

Notes to Table 3:

A. As defined in WRC report NS30.

B. Field instrument to be calibrated in accordance with manufacturer's instructions.

Once the results of the Assessment Actions have been obtained, further work will be required to review possible Remedial Treatment Actions, and these will be specified in subsequent Remediation Notices.

2. The Assessment Action listed below addresses the both the Bromate Pollutant Linkage (number 1) and the Bromide Pollutant Linkage (number 2) identified in Schedule 3.

- E The following Assessment Action is required to characterise in detail the Bromide and Bromate Pollutant Linkages identified to establish what would need to be achieved by Remedial Treatment Actions. **An Assessment Action must be undertaken to monitor as specified below.** This action must be started on 15th February 2006 and continued until 14th February 2011.

The Assessment Action is to provide quality-assured monitoring data and report it to the Agency every two months at the locations identified in Table 4 below for the parameters listed in Table 2 above for groundwater, to the detection limits, precision and bias in Table 3 above.

Table 4. Locations to be monitored under Assessment Action E

Loc ref	Site name	Type	NGR	Ownership
244	Pound Farm, Sandridge	M	TL 16872 10716	Borehole site and access route leased to Agency by the Salvation Army Trustee Company
223	SLC10, St Leonard's Court	M	TL 17134 10440	Beechgrove (Sandridge) Management Ltd
082	MW4, St Leonard's Court	M	TL 17121 10427	Beechgrove (Sandridge) Management Ltd
221	SLC8, St Leonard's Court	M	TL 17074 10487	Beechgrove (Sandridge) Management Ltd
028	Orchard Garage	P	TL 17523 10286	Orchard Garage
225	GW 12, top of House Lane	M	TL 17152 10365	Hertfordshire County Council
226	GW 13, Harefield House	M	TL 17748 10035	Borehole site and access route leased to Agency by Beaufort Trust Corporation Ltd and Lady Mary June Meaney
227	GW 14, beside Jersey Farmpond	M	TL 17754 09706	Public access land owned by St Albans District Council
019	Nashes Farm	P	TL 17958 09626	Mr Adrian Sheriff
166	Hatfield Quarry, WPG16	M	TL 20241 09741	Cemex UK
067	Hatfield Quarry, WM12 – Lower level (P2)	M	TL 19389 09580	Cemex UK
M = monitoring borehole, P = private water supply, S = surface water, PWS = public water supply				

Procedures for sampling, sample handling and sample analysis are to be as specified for Action D above.

Once the results of the Assessment Action E have been obtained, further work will be required to review possible Remedial Treatment Actions, and these will be specified in subsequent Remediation Notices.

SCHEDULE 3

(Particulars of the significant harm/pollution of controlled waters and particulars of substances (Regulation 4(1)(e) and (f))

The particulars of the pollutant linkages that form the basis of the determination of land as Contaminated Land and to which this Notice relate are set out below:

Pollutant linkage number	Pollutant	Source location	Pathway	Receptor	Pollution of controlled waters
1	Bromate	Soil at land identified in Schedule 1	Unsaturated zone and groundwater contained in, or in hydraulic continuity with the Chalk aquifer	Controlled waters: Groundwater contained in, or in hydraulic continuity with the Chalk aquifer.	Pollution of controlled waters is being caused.
2	Bromide	Soil at land identified in Schedule 1.	Unsaturated zone and groundwater contained in, or in hydraulic continuity with the Chalk aquifer	Controlled waters: Groundwater contained in, or in hydraulic continuity with the Chalk aquifer.	Pollution of controlled waters is being caused.

SCHEDULE 4

(Reasons for enforcing authority's decision on remediation requirements (Regulation 4(1)(g))

The Remedial Treatment Actions which will enable the land and controlled waters to be effectively remediated, to the required standards, cannot yet be identified. This is because specific Assessment Actions are needed to characterise in detail the SPLs and to collect data to evaluate the likely effectiveness of Remedial Treatment Actions. Schedule 2 identifies a series of Assessment Actions that will enable Remedial Treatment Actions to be specified in one or more subsequent Remediation Notices.

SCHEDULE 5

(other appropriate persons (Section 78E(3) of the 1990 Act and Regulation 4(1)(h), (i) and (j))

The Agency therefore considers that the following are the appropriate persons responsible for all of the assessment actions described in Schedule 2 of this Notice for the following reasons

1. Redland Minerals Limited of The Old Rectory, Misterton, Lutterworth, Leicester LE17 4JP.

Excluded from the bromide SPL by exclusion test 3, “sold with information” because Crest Nicholson Residential plc bought the land with the broad measure of the presence of the pollutant.

Solely responsible for the bromate SPL by virtue of causing the pollutant to be in the land.

Proportion of overall cost to be borne: All costs associated with the bromate SPL because Redland Minerals Limited is the only Class A person for the bromate SPL. Therefore, all costs related to actions 1A to 1D are to be borne by Redland Minerals Limited as they are single linkage actions and 50% of the costs for the bromide SPL because assessment action 2E is a shared action.

2. Crest Nicholson Residential plc of Crest House, 39 Thames Street, Weybridge, Surrey, KT13 8JL.

Solely responsible for bromide SPL by virtue of knowingly permitting the pollutant to be in the land.

Proportion of overall cost to be borne: 50% of the costs of the bromide SPL because assessment action 2E is a shared action.

SCHEDULE 6

(Names and addresses of owners and occupiers of the contaminated land to which this notice relates and persons whose consent is required for remediation purposes (Regulation 4(1)(k) and (l)))

The owners and occupiers of the contaminated land are:

Freehold owner of land: Beechgrove (Sandridge) Management Limited

The names and addresses of persons whose consent is required under section 78G(2) of the 1990 Act:

Mr P Hyde (Director), Beechgrove (Sandridge) Management Ltd, 18 St Leonards Court, House Lane, Sandridge, St Albans, Herts AL4 9UY
Beaufort Trust Corporation Ltd and Lady Mary June Meaney, 11 Church End, Sandridge, St Albans, Herts AL4 9DL
Territorial Property Director, Salvation Army Trustee Company. 101 Newington Causeway, London SE1 6BN
Mr R Irving, Orchard Garage, Woodcock Hill, Sandridge, St Albans, Herts AL4 9EE
Mr C H Franklin, Principal Land Agent, Hertfordshire County Council, County Hall, Pegs Lane, Hertford SG13 8DN
Mr A Sheriff, Nashes Farm House, Sandridge, St Albans, Herts AL4 9HF
Mr & Mrs N Redfern, Old Cottage, Green Lanes, Hatfield, Herts AL10 9BH
Mr J Takeda (fao Mr Peter Creary), Hatfield and London Country Club, Bedwell Park, Essendon, Hatfield, Herts AL9 6HN
Mr P Clegg, Chief Executive, Estate Office, Hatfield Park, , Hatfield, Herts AL9 5NQ
Mr S Redwood, Estates and Development Manager, RMC Materials Ltd, Cemex UK Operations, Cemex House, Evreux Way, Rugby, Warwickshire CV21 2DT
Mr M Simon, Glinwell plc, Hatfield Road, Smallford, nr St Albans, Herts AL4 0HD
Mr J Godbold (fao Mr Neil Agnew), Woolmers Park, Letty Green, Herts SG14 2NX
Mr A Hodson, Solicitor, Three Valleys Water plc, PO Box 48, Bishops Rise, Hatfield, Herts AL10 9HL
Mr B Connorton, Raw & Waste Water Manager, Thames Water Utilities Ltd, Clearwater Court, Vastern Road, Reading, Berks RG1 8DB

SCHEDULE 7

(Offences, penalties and Appeals)

Offences, Penalties and Appeals (Regulation 4(1),(n) and (o), Regulation 4(2)(a), (b) and (c))

Offences and Penalties (section 78M of the 1990 Act)

- Under section 78M of the 1990 Act, it is an offence to fail, without reasonable excuse, to comply with any of the requirements of this Notice.
- A person who commits such an offence is liable to the following penalties:
 - Where the contaminated land to which the notice relates is “industrial, trade or business premises” as defined in section 78M(6) of the 1990 Act, on summary conviction, to a fine not exceeding £20,000 or such greater sum as the Secretary of State or National Assembly of Wales, may from time to time by order substitute and to a further fine of an amount equal to one-tenth of that sum for each day on which the failure continues after conviction of the offence and before the enforcing authority has begun to exercise its powers by virtue of section 78N(3)(c) of the 1990 Act.
 - Where the contaminated land to which the notice relates is not “industrial, trade or business premises”, on summary conviction, to a fine not exceeding level 5 on the standard scale and to a further fine of an amount equal to one-tenth of level 5 on the standard scale for each day on which the failure continues after conviction of the offence and before the enforcing authority has begun to exercise its powers by virtue of section 78N(3)(c).

Right of Appeal (section 78L of the 1990 Act)

You have a right of appeal against this Notice, under section 78L of the 1990 Act. If you wish to appeal you must do so, within the period of twenty-one days beginning with the day on which the notice is served:

- (a) if it was served by a local authority, to a magistrates’ court; or
- (b) if it was served by the Environment Agency, to the Secretary of State or National Assembly for Wales.

Appeals to a Magistrates’ Court (Regulation 8)

- Regulation 8 states the following:
 - (1) An appeal under section 78L(1) to a magistrates’ court against a remediation notice shall be by way of compliant for an order and, subject to section 78L(2) and (3) and regulations 7(3), 12 and 13, the Magistrates’ Courts Act 1980 shall apply to the proceedings.
 - (2) An appellant shall, at the same time as he makes a compliant,-
 - (a) file a notice (“notice of appeal”) and serve a copy of it on –

- (i) the enforcing authority;
- (ii) any person named in the remediation notice as an appropriate person;
- (iii) any person named in the notice of appeal as an appropriate person;
- (iv) any person named in the remediation notice as the owner or occupier of the whole or any part of the land to which the notice relates;
- (b) file a copy of the remediation notice to which the appeal relates and serve a copy of it on any person named in the notice of appeal as an appropriate person who was not so named in the remediation notice; and
- (c) file a statement of the names and addresses of any persons falling within paragraph (ii), (iii) or (iv) of sub-paragraph (a) above.
- (3) The notice of appeal shall state the appellant's name and address and the grounds on which the appeal is made.

[Note: "file" means deposit with the justices' chief executive in England or Justices clerk in Wales]

- Further information relating to appeals to a magistrates' court is given in Circular 02/2000, Annex 4 "Guide to the Contaminated Land (England) Regulations 2000" or relevant National Assembly for Wales Guidance.

Appeals to the Secretary of State (Regulation 9)

- Regulation 9 states the following:
 - (1) An appeal to the Secretary of State (or National Assembly for Wales) against a remediation notice shall be made to him by a notice ("notice of appeal") which shall state –
 - (a) the name and address of the appellant;
 - (b) the grounds on which the appeal is made; and
 - (c) whether the appellant wishes the appeal to be in the form of a hearing or to be disposed of on the basis of written representations.
 - (2) The appellant shall, at the same time as he serves a notice of appeal on the Secretary of State (or National Assembly for Wales),-
 - (a) serve a copy of it on –
 - (i) the Environment Agency;
 - (ii) any person named in the remediation notice as an appropriate person;
 - (iii) any person named in the notice of appeal as an appropriate person; and
 - (iv) any person named in the remediation notice as the owner or occupier of the whole or any part of the land to which the notice relates;
 and serve on the Secretary of State (or National Assembly for Wales) a statement of the names and addresses of any persons falling within paragraph (ii), (iii) or (iv) above; and
 - (b) serve a copy of the remediation notice to which the appeal relates on the Secretary of State (or National Assembly for Wales) and on any person named in the notice of appeal as an appropriate person who is not so named in the remediation notice.
- Appeals to the Secretary of State (England) should be submitted to the Planning Inspectorate. Their current address and telephone number are as follows: The Planning Inspectorate, Room 4/19, Eagle Wing, Temple Quay House, 2 The Square, Temple Quay, Bristol, BS1 SPN. Tel: 0117 372 6372. Appeals to the Secretary of State (Wales) should be submitted to the National Assembly for

Grounds of Appeal (Section 78L of the 1990 Act and Regulation 7)

- (1) The grounds of appeal against a remediation notice pursuant to section 78L of the 1990 Act are any of the following:-
- (a) that, in determining whether any land to which the notice relates appears to be contaminated land, the local authority-
 - (i) failed to act in accordance with guidance issued by the Secretary of State (or National Assembly for Wales) under section 78A(2), (5) or (6); or
 - (ii) whether by reason of such a failure or otherwise, unreasonably identified all or any of the land to which the notice relates as contaminated land;
 - (b) that, in determining a requirement of the notice, the enforcing authority-
 - (i) failed to have regard to guidance issued by the Secretary of State (or National Assembly for Wales) under section 78E(5); or
 - (ii) whether by reason of such a failure or otherwise, unreasonably required the appellant to do any thing by way of remediation;
 - (c) that the enforcing authority unreasonably determined the appellant to be the appropriate person who is to bear responsibility for any thing required by the notice to be done by way of remediation;
 - (d) subject to paragraph (2) below, that the enforcing authority unreasonably failed to determine that some person in addition to the appellant is an appropriate person in relation to any thing required by the notice to be done by way of remediation;
 - (e) that, in respect of any thing required by the notice to be done by way of remediation, the enforcing authority failed to act in accordance with guidance issued by the Secretary of State (or National Assembly for Wales) under section 78F(6);
 - (f) that, where two or more persons are appropriate persons in relation to any thing required by the notice to be done by way of remediation, the enforcing authority-
 - (i) failed to determine the proportion of the cost stated in the notice to be the liability of the appellant in accordance with guidance issued by the Secretary of State (or National Assembly for Wales) under section 78F(7); or
 - (ii) whether, by reason of such a failure or otherwise, unreasonably determined the proportion of the cost that the appellant is to bear;
 - (g) that service of the notice contravened a provision of subsection (1) or (3) of section 78H (restrictions and prohibitions on serving remediation notices) other than in circumstances where section 78H(4) applies;
 - (h) that, where the notice was served in reliance on section 78H(4) without compliance with section 78H(1) or (3), the enforcing authority could not reasonably have taken the view that the contaminated land in question was in such

a condition by reason of substances in, on or under the land, that there was imminent danger of serious harm, or serious pollution of controlled waters, being caused;

- (i) that the enforcing authority has unreasonably failed to be satisfied, in accordance with section 78H(5)(b), that appropriate things are being, or will be, done by way of remediation without service of a notice;
- (j) that any thing required by the notice to be done by way of remediation was required in contravention of a provision of section 78J (restrictions on liability relating to the pollution of controlled waters);
- (k) that any thing required by the notice to be done by way of remediation was required in contravention of a provision of section 78K (liability in respect of contaminating substances which escape to other land);
- (l) that the enforcing authority itself has power, in a case falling within section 78N(3)(b), to do what is appropriate by way of remediation;
- (m) that the enforcing authority itself has power, in a case falling within section 78N(3)(e), to do what is appropriate by way of remediation;
- (n) that the enforcing authority, in considering for the purposes of section 78N(3)(e), whether it would seek to recover all or a portion of the cost incurred by it in doing some particular thing by way of remediation-
 - (i) failed to have regard to any hardship which the recovery may cause to the person from whom the cost is recoverable or to any guidance issued by the Secretary of State (or National Assembly for Wales) for the purposes of section 78P(2); or
 - (ii) whether by reason of such a failure or otherwise, unreasonably determined that it would decide to seek to recover all of the cost;
- (o) that, in determining a requirement of the notice, the enforcing authority failed to have regard to guidance issued by the Environment Agency under Section 78V(1);
- (p) that a period specified in the notice within which the appellant is required to do anything is not reasonably sufficient for the purpose;
- (q) that the notice provides for a person acting in a relevant capacity to be personally liable to bear the whole or part of the cost of doing any thing by way of remediation, contrary to the provisions of section 78X(3)(a);
- (r) that service of the notice contravened a provision of section 78YB (interaction of Part IIA of the 1990 Act with other enactments), and-
 - (i) in a case where subsection (1) of that section is relied on, that it ought reasonably to have appeared to the enforcing authority that the powers of the Environment Agency under section 27 might be exercised;

- (ii) in a case where subsection (3) of section 78YB is relied on, that it ought reasonably to have appeared to the enforcing authority that the powers of a waste regulation authority or waste collection authority under section 59 might be exercised; or
 - (s) that there has been some informality, defect or error in, or in connection with, the notice, in respect of which there is no right of appeal under the grounds set out in sub-paragraphs (a) to (r) above.
- (2) A person may only appeal on the ground specified in paragraph (1)(d) above in a case where-
- (a) the enforcing authority has determined that he is an appropriate person by virtue of subsection (2) of section 78F and he claims to have found some other person who is an appropriate person by virtue of that subsection;
 - (b) the notice is served on him as the owner or occupier for the time being of the contaminated land in question and he claims to have found some other person who is an appropriate person by virtue of that subsection; or
 - (c) the notice is served on him as the owner or occupier for the time being of the contaminated land in question, and he claims that some other person is also an owner or occupier for the time being of the whole or part of that land.
- (3) If and in so far as an appeal against a remediation notice is based on the ground of some informality, defect or error in, or in connection with, the notice, the appellate authority shall dismiss the appeal if it is satisfied that the informality, defect or error was not a material one.

Suspension of Remediation Notice Upon Appeal (Regulation 14)

Once an appeal has been duly made, the relevant remediation notice is suspended until the appeal is finally determined or is withdrawn (abandoned) by you. “Duly made” for this purpose means that an appeal must be made within the time limit, and in accordance with the Regulations.

Appendix 2

Voluntary Remediation Statement (VRS)

TO APPEND PRIOR TO SUBMISSION

St Leonards' Court, Sandridge, Hertfordshire (the Site)

Remediation statement under section 78H(7) of the Environmental Protection Act 1990 (EPA)

The Site was designated by St Albans City and District Council (SADC) as contaminated under section 78B(1) EPA on 20th June 2002.

The Environment Agency (EA) is the regulatory authority for the Site in accordance with a notice of SADC dated 8th July 2002 under section 78C(1)(b) EPA.

The EA has a duty under section 78E(1) EPA to serve a remediation notice specifying what a person is to do by way of remediation and the periods within which he is required to do each of the things so specified.

Under section 78H(5)(b) EPA the EA is precluded from serving a remediation notice if it is satisfied that appropriate things are being, or will be, done by way of remediation without the service of a remediation notice on that person. To the extent that the APs and the EA are in agreement as set out herein the EA is satisfied that this voluntary remediation statement satisfies that requirement.

The appropriate persons for the Site are Redland Minerals Limited and Crest Nicholson Residential Limited (the Appropriate Persons) under a remediation notice of 22nd July 2009.

This remediation statement sets out the actions which the Appropriate Persons have agreed to take and which satisfy the EA that things will be done by way of remediation.

This remediation statement will be regulated in accordance with Part 2A EPA and the Department for Food Environment and Rural Affairs' Contaminated Land Statutory Guidance of April 2012.

At the end of the time limits set out in actions 8, 9 and 10(d)(iii) the EA will decide if it needs to serve another remediation notice or to negotiate another remediation statement with the Appropriate Persons.

The interrelationship between the actions in the Voluntary Scheme is depicted in the Illustrative Flow Chart in Appendix 1. The actions are iterative and not sequential.

The apportionment of the costs has been agreed between the Appropriate Persons is set out in Appendix 2.

The Actions which the Appropriate Persons will do by way of remediation under this remediation statement are:

Assess the feasibility of abstracting and treating the contaminated groundwater to allow connection to: a) Water Company water pipes and/or connection to an injection borehole(s) and/or surface water, b) Water Company sewerage assets.

1. An assessment action will be undertaken as below for each of (a) and (b) above, unless otherwise agreed by the Agency in writing:

a. Assess the feasibility of abstracting and treating groundwater from segments within the bromate plume between SLCourt and Bishops Rise to be agreed with the Environment Agency. Treatment techniques to consider are:

- (A) Granular Activated Carbon (GAC)
- (B) Ion Exchange
- (C) Chemical reduction of bromate
- (D) Combinations of treatment options, not necessarily limited to A, B and C.

In each case:

- (i) Assess the before and after treatment concentrations for a range of groundwater concentrations found within segments of the plume, by bench tests, results of a literature search and/or communications with the water industry, to provide reliable estimates;
- (ii) Estimate via appropriate technical assessment the potential effect on bromate concentrations within (a) the part of the plume between SLCourt and Bishops Rise and (b) at the monitoring points listed in Table 4 and Table 5.
- (iii) Assess where appropriate: residence times; the availability of appropriate businesses where the media, (A) GAC and (B) Ion Exchange resin, can be sent for regular regeneration;
- (iv) Assess plant installation costs for (A), (B), (C) and (D) above;
- (v) Assess annual running costs for (A), (B), (C) and (D) above.
- (vi) Assess the feasibility and cost of running pilot plant scale tests for treatments selected from the results of assessments (i)–(iv) above.

b. Determine a list of potentially technically suitable locations to consider in Assessment Action 2, based on likely potential effect on bromate concentrations within (a) the part of the plume between SLCourt and Bishops Rise and (b) at the monitoring locations listed in Table 4 and Table 5.

c. Report on the outcome of 1a and 1b above to the Agency in writing and identify the options to be taken forward for further consideration in Assessment Action 4.

This Action will be completed within 5 months of the date of this remediation statement unless otherwise agreed in writing with the Environment Agency, acting reasonably and having regard to the availability of information from the Water Companies, namely Affinity Water Limited, or any successor(s) to its water undertaking, ("**Affinity Water Ltd**") and Thames Water Utilities Limited, or any successor(s) to its water and/or sewerage undertakings ("**Thames Water Utilities Ltd**").

Assess locations in the vicinity of Bishops Rise and up gradient for a treatment plant and connection to Water Company water pipes

2. An Assessment Action will be undertaken as below, unless otherwise agreed by the Agency in writing:

- a. Assess locations derived from Assessment Action 1 for the installation of a treatment plant which could be installed and operated to allow connection to Affinity's raw water supply pipes and/or connection to an injection borehole(s), surface water and/or the sewer network or to identify and facilitate an alternative use for the treated water.
- b. For each treatment plant location, and each treatment method in Assessment Action

- 1, estimate costs including:
 - (i) Acquiring legal rights to carry out the operation at that location;
 - (ii) Installing treatment equipment;
 - (iii) Providing a pipeline connection from the abstraction borehole(s) to the location;
 - (iv) Providing a pipeline connection to a suitable water pipe on the Water Company system which has adequate capacity for the anticipated flow;
 - (v) Recurring annual operations;
 - (vi) Providing and maintaining injection boreholes;
 - (vii) Providing a connection to a suitable sewer.
- c. For each treatment plant location estimate the maximum rate of abstraction that could reasonably be achieved and assess the likely rate of removal of bromate and bromide from the aquifer.
- d. For each treatment method and location identify the benefits and limitations. Including review of the estimated concentrations in Assessment Action 1a(ii) above.
- e. Identify any alternatives to the arrangements outlined in 2a to 2d above that might achieve the same objective of removing bromate and bromide from the aquifer and dealing with the abstracted water.
- f. Report the outcome of 2a to 2e above to the Agency in writing and identify the options to be taken forward for further consideration in Assessment Action 4.

This Action will be completed within 7 months of the date of this remediation statement unless otherwise agreed in writing with the Environment Agency, acting reasonably and having regard to the availability of information from the Water Companies.

Obtain and review further relevant information on water supply infrastructure, raw water treatment, operational management of the water supply and wastewater management from Thames Water Utilities Limited and Affinity Water Ltd.

3. An Assessment Action will be undertaken as below, unless otherwise agreed by the Agency in writing:

- a. Request comprehensive and detailed information from the Water Companies on the Water Companies' existing blending procedures, treatment infrastructure and treatment plant performance for the management of groundwater abstracted from the Public Water Supply locations set out in Table 4, seek to establish the concentrations of bromate and bromide which can be managed by the Water Companies when abstracting water to enable the Water Companies to continue to provide a safe water supply in accordance with applicable statutory drinking water standards, taking into account the need to allow for variability and uncertainty in future concentrations of the contaminants in the plume.
- b. Request comprehensive and detailed information from the Water Companies on the Water Companies' existing water pipes and sewers within and in the vicinity of the footprint of the plume.
- c. Request any other information from the Water Companies that would be beneficial to achieving the objectives of this RS.
- d. Report the outcome of 3a, 3b and 3c above to the Agency in writing.

This Action will be completed within 5 months of the date of this remediation statement unless otherwise agreed in writing with the Environment Agency, acting reasonably and having regard to the availability of information from the Water Companies.

Identify the candidate Best Practicable Technique(s)

4. An Assessment Action will be undertaken as below, unless otherwise agreed by the Agency in writing:

- a. Using the information gained from Assessment Actions 1, 2 and 3 above:
 - (i) Assess the practicality, effectiveness and durability of each of the options identified for further consideration in the reports in respect of Assessment Actions 1, 2 and 3 in relation to abstraction, treatment and management of abstracted water (a) within the plume between SLCourt and Bishops Rise, and (b) at Essendon PWS and the Northern New River Wellfield.
 - (ii) Identify the material uncertainties associated with each of 4a(i)(a) and 4a(i)(b).
 - (iii) Identify any alternative arrangements that would achieve the same objective of removing bromate and bromide from the aquifer.
 - (iv) Evaluate including by comparison of the cost benefit analysis for each option, which option(s) amount(s) to the candidate Best Practicable Technique(s) for achieving the Remedial End Point referred to in Remedial Treatment Action 10c(ii) below and provide the reasons for that assessment.
- b. Based on the assessment in relation to Assessment Action 4a above consider the benefit of undertaking (a) pumping trial(s) within the contamination plume between SLCourt and Bishops Rise and/or the benefit of other practical measures, trials or assessments that would materially reduce the uncertainty associated with decision critical areas regarding the identification of the Best Practicable Technique for achieving the Remedial End Point referred to in Remedial Treatment Action 10c(ii) below.
- c. Without prejudice to the need for revision of Assessment Actions 4a and 4b above, which are likely to need to be iterative, report the outcome of Assessment Actions 4a and 4b above to the Agency in writing.
- d. Where the need is identified in Assessment Action 4b above for other practical measures, trials or assessments make proposals including locations, timescales and reports of the findings, to the Agency in writing. The actions shall then be implemented following the approach agreed in writing between the Agency and the APs.

Actions 4a to 4c will be completed within 8 months of completion of the report required under Assessment Actions 1, 2 and 3 above unless otherwise agreed in writing with the Environment Agency, acting reasonably and having regard to the availability of information from the Water Companies.

Following completion of Actions 4a to 4c, the APs will consider based on the available technical information, whether it is beneficial or necessary to carry out further studies to determine the Best Practicable Technique or whether the Best Practicable Technique can be determined without carrying out further studies. The APs will seek agreement with the Agency on the basis of all available information and advice. If further studies are agreed in writing as not required, the APs will not be required to carry out Actions 4d, 5 or 6, unless otherwise agreed in writing with the Agency, acting reasonably and having regard to the availability of information from the Water Companies.

If it is necessary Action 4d will be completed within 4 months of completion of the report required under Action 4c above unless otherwise agreed in writing with the Environment Agency, acting reasonably and having regard to the availability of information from the Water Companies.

The actions identified in the report prepared under Action 4d will be implemented in accordance with the timetable presented in that report.

If identified as beneficial and necessary in the report in respect of Assessment Action 4 assess scavenge pumping from location(s) within the bromate plume between SLCourt and Bishops Rise

5. An Assessment action will be undertaken as below

Assess unless otherwise agreed by the Agency in writing, acting reasonably and having regard to the outcomes of Assessment Action 4 above, for any location(s) within the bromate plume between SLCourt and Bishops Rise identified in Action 4 above:

- a. Estimate the costs of:
 - (i) Acquiring legal rights to carry out the operation;
 - (ii) Installing suitable boreholes and pumps, or adapting the existing boreholes and pumps;
 - (iii) Provide a pipeline connection to enable disposal of the abstracted water or identifying the means and associated costs of alternative management of the abstracted water;
 - (iv) Recurring annual operating and other costs, including any costs related to treatment of the water to remove bromate and bromide, or reduce bromate to bromide, and the chemical loading element of any trade effluent or other changes.
- b. Estimate the maximum rate of groundwater abstraction and rate of mass removal of bromate and bromide which could be achieved within the constraints above and with reference to the local hydrogeology and distribution of contaminant mass within the plume.
- c. Without prejudice to the need for revision of Assessment Actions 5a and 5b above which are likely to need to be iterative, report the outcome of 5a and 5b above to the Agency in writing.

This action will be completed within 4 months of the date of completion of Action 4c above, unless otherwise agreed in writing with the Agency, acting reasonably and having regard to the availability of information from the Water Companies.

Carry out and report on any scavenge pumping trial

6. An Assessment Action will be undertaken as below:

If identified as necessary under Action 4b and having regard to the outcome of Action 5:

- a. Carry out a review of the findings of Action 5 above.
- b. Based on the review, proposals, including timescales, for a scavenge pumping trial shall be submitted to the Agency for approval in writing, such approval not to be unreasonably withheld, within 4 months of the date of completion of Action 5 above.

- c. Carry out the agreed scavenge pumping, to find the most effective means of removing bromate and bromide, in line with an abstraction licence (if required), and dispose of the pumped water arising from the trial without significant adverse environmental effects, unless otherwise agreed with the Agency in writing.
- d. The outcome of the trial shall be reported to the Agency in writing.

This action will be completed within 3 months of completion of the pumping trial under Assessment Action 6c unless otherwise agreed in writing by the Agency.

Update of consideration of the options and the Best Practicable Technique for the remediation of bromate and bromide contamination in groundwater

7. An Assessment Action will be undertaken as below, unless otherwise agreed by the Agency in writing:

- a. Taking account of the information gained from Assessment Actions 1 to 6 above as applicable and the information gained from actions taken under the First Notice:
 - (i) Undertake an assessment to include consideration of the contribution made by scavenge pumping at Bishops Rise and alternative and/or additional measures which might be implemented including the future options available for management of the abstracted water by the Water Companies,
 - (ii) Assess or update the practicality, effectiveness and durability of each option, individually and/or in combination, as appropriate for the purpose of determining the Best Practicable Technique for achieving the Remedial End Point set out in Remedial Treatment Action 10c(ii) below ("**BPT**");
 - (iii) Consider whether the BPT is capable of achieving the current Remedial End Point (REP). If it is not, consider whether the Best Practicable Technique assessment justifies an alternative REP to that set out in Assessment Action 10c(ii), or if further investigation or testing is necessary. If an alternative REP is considered to be justified as part of the consideration of the BPT, identify and justify this alternative REP.
 - (iv) Evaluate, including by comparison of the cost benefit analysis for each, which option individually and/or in combinations amounts to the BPT and provide the reasons for that assessment;
 - (v) Update and refine the conceptual model as appropriate when new information is obtained;
 - (vi) Assess the effectiveness of the scavenge pumping at Bishop's Rise and propose improvements to maximise hydraulic containment and contaminant removal as appropriate when new information is obtained.
- b. Without prejudice to the need for the revision of Assessment Action 7a above which is likely to need to be iterative, report the outcome of 7a above to the Agency in writing by means of an update of Report F1 which identifies the Remedial End Point and the Best Practicable Technique together with the proposals and timescale for its implementation.
- c. Implement the BPT in accordance with the implementation timetable following approval by the Agency.

This action will be completed within 8 months of completion of the report required under Assessment Action 4c or the completion of the reports following completion of Assessment Action 4d (other investigations) or Action 6 (pumping trial), whichever is the later date and unless otherwise agreed in writing by the Agency.

Groundwater monitoring of the bromate and bromide plumes

8. A Monitoring Action will be undertaken as below:

- a. Provide quality-assured monitoring data and report it to the Agency quarterly within six weeks of sampling wherever possible taking into account the availability of information from the Water Companies at the locations identified in Table 1 below for the parameters, and at the frequencies, listed in Table 2 below, and to the detection limits, precision and bias specified in the approved Method Statement referred to in Action 8b below, unless otherwise agreed in writing with the Agency.

Table 1. Locations to be monitored under Monitoring Action 8

Location Reference	Site name	Type ¹	NGR*
080	MW2, St Leonards Court	M	TL 17070 10455
223	SLC 10, St Leonards Court	M	TL 17134 10440
082	MW4, St Leonards Court	M	TL 17121 10427
081	MW3, St Leonards Court	M	TL 17096 10435
083	MW5, St Leonards Court	M	TL 17074 10411
216	SLC03, St Leonards Court	M	TL 17080 10475
028	Orchard Garage	P	TL 17500 10300
028b	Orchard Garage MJCA BH1	M	TL 17507 10293
028c	Orchard Garage MJCA BH2	M	TL 17510 10305
028d	Orchard Garage MJCA BH3	M	TL 17561 10316
225	GW12, top of House Lane	M	TL 17152 10365
226	GW13, Harefield House	M	TL 17748 10035
227	GW14, beside Jersey Farm pond	M	TL 17754 09706
019	Nashes Farm	P	TL 18000 09600
166	Hatfield Quarry WPG16	M	TL 20241 09741
162	Hatfield Quarry WM3B	M	TL 19283 08858
061	Hatfield Quarry WM4	M	TL19661 09103
062	Hatfield Quarry WM5	M	TL 20175 09499
064	Hatfield Quarry WM7	M	TL 19900 09275
066	Hatfield Quarry WM10, lower level (P2)	M	TL 20051 09393
402	Comet Way BH5	M	TL 21760 08911
002	Hatfield Business Park	P	TL 21350 09795
001	Bishops Rise	PS	TL 22000 07700

Notes to Table 1:

*Precise locations of abstractions are masked

¹M – monitoring borehole, P – private water supply, PS – pumping station

Table 2. Parameters to be measured and frequency of measurement

Controlled waters	Frequency	Parameters to be measured
Groundwater in, or in continuity with, the Chalk aquifer	4 times per calendar year* in January, April, July, & October	pH, EC, BrO ₃ , Br, Cl, Temperature, DO, Redox Potential, Water level AOD, Depth to base of borehole where feasible
Surface waters	4 times per calendar year* in January, April, July, & October	pH, EC, BrO ₃ , Br, Cl

Note to Table 2: * pro rata per part of calendar year

- b. Update the Method Statement completed for Action G of the First Notice dated 22nd July 2009 so that it is in accordance with relevant British Standards, and paragraph c below, unless otherwise agreed in writing by the Agency. Specify in the Method Statement the precision, bias and limit of detection to be achieved for each parameter monitored. Submit the Method Statement to the Agency for approval prior to sampling commencing.
- c. Analysis of samples is to be carried out by a laboratory accredited to ISO/IEC 17025:2017 and using United Kingdom Accreditation Service accredited methods, performance-tested in accordance with Water Research Centre plc (WRc) publication NS30, '*Analytical Quality Control in the Water Industry*' (WRc Report NS30, June 1989, ISBN 0902156853). The laboratory will operate a system of routine analytical quality control, preferably based on the use of control charts (see WRc Report Ref: Co4239 '*Quality Control Charts in Routine Analysis*'). Samples must be analysed within 72 hours of collection.
- d. Results are to be reported to the Agency no more than six weeks after sampling and measurement, in a summarised format to be agreed in writing by the Agency, accompanied, where relevant, by laboratory certificates of analysis, which will state the associated measurement uncertainty.

This action will be continued for up to a maximum of 10 years from the date of this remediation statement or the expiry of the period referred to in Remedial Treatment Action 10d below whichever is the sooner with reviews of the need to continue monitoring and of the extent of the monitoring every 3 years or such shorter period as may be agreed in writing by the Agency.

Groundwater and surface water monitoring of the bromate plume

9. A Monitoring Action will be undertaken as below:

- a. Provide quality-assured monitoring data and report it to the Agency quarterly within six weeks of sampling wherever possible taking into account the availability of information from the Water Companies in January, April, July and October at the locations identified in Table 3 below for the parameters, and at the frequencies, in Table 2 above and to the detection limits, precision and bias specified in the approved Method Statement referred to in Action 8b above, unless otherwise agreed in writing with the Agency.
- b. Procedures for sampling, sample handling and sample analysis are to be as specified for Action 8 above.

Table 3. Locations to be monitored under Monitoring Action 9

Location reference	Site name	Type ¹	NGR*
020	Cap's Cottages	P	TL 18400 09900
018	Fairfolds Farm	P	TL 18800 10100
059	Hatfield Quarry, WM1	M	TL 18800 08395
375	Symonshyde Quarry, W29	M	TL 2129010670
378	Symonshyde Quarry, W35	M	TL 20370 10445
379	Symonshyde Quarry, W36	M	TL 21100 10500
167	The Old Cottage, new bh	P	TL 21900 10700
191	M7, Mill Green Borehole	M	TL 23716 09780
005	Hatfield and London Country Club Workshop	P	TL 28200 08500
265	Park Street, Old Hatfield	M	TL 23410 08778
195	M10, Sleapshyde OBH	M	TL 20251 06887
010b	BH by Block 3 Glinwell's Nursery	P	TL 19500 07400
041	Ellenbrook@ North Orbital Road (A414	S	TL 20882 07164
292	R Lee, Water Hall gauging station	S	TL 29967 09978
101	River Lee downstream from Essendon Pumping Station (Holwell Bridge)	S	TL 27641 09814
142	Roestock P.S. (raw water sampling point)	PWS	TL 21000 05900
141	Tythenhanger P.S. (raw water sampling point)	PWS	TL 19800 05700
143	Essendon P.S. (raw water sampling point)	PWS	TL 27300 09800
144	Waterhall P.S. (raw water sampling point)	PWS	TL 29400 09500
298	Broadmeads PWS	PWS	TL 35300 13900
295	Amwell End PWS	PWS	TL 35800 13900
296	Amwell Hill PWS	PWS	TL 36700 12700
297	Amwell Marsh PWS	PWS	TL 37600 12300
301	Rye Common PWS	PWS	TL 37900 11100
MR	Middlefield Road PWS	PWS	TL 37400 09500
300	Hoddesdon PWS	PWS	TL 37800 08900
299	Broxbourne PWS	PWS	TL 37300 07500
302	Turnford PWS	PWS	TL 36000 04400

Notes to Table 3:

*Precise locations of abstractions are masked

¹ M - monitoring borehole, P - private water supply, PWS - public water supply, S - surface water

This action will be continued for up to a maximum of 10 years from the date of this remediation statement or the expiry of the period referred to in Remedial Treatment Action 10d below whichever is the sooner with reviews of the need to continue monitoring and of the extent of the monitoring every 3 years or such shorter period as may be agreed in writing by the Agency.

Continuation of scavenge pumping at Bishop's Rise

10. A Remedial Treatment Action will be undertaken in accordance with the requirements set out below unless varied in writing by the Agency:

- a. **Continue to procure the existing scavenge pumping and treatment programme being carried out from the Affinity Water existing abstraction boreholes at Bishops Rise, Hatfield (Bishops Rise). For the purposes of this action the material features of the scavenge pumping and treatment programme are as follows:**
 - (i) Maintaining abstraction from Bishops Rise source. Seek to manage abstraction rates from Bishops Rise source on a day by day basis so as to optimise control of bromate and bromide, taking into account constraints imposed by the treatment process, operational considerations and the capacity of the receiving sewer system. Rainfall events have an impact on the attainable flows. Maximum rates of abstraction are 9 MI/d (the licensed amount), with an average annual daily target of 3-6 MI/d.
 - (ii) Dosing the abstracted water with ferrous chloride or an alternative suitable reducing agent of reasonable cost to reduce bromate in the water to bromide, if required.
 - (iii) Using a dedicated pipeline to remove the abstracted water to a trunk sewer system managed by Thames Water Utilities Ltd.
 - (iv) Monitoring water levels in the receiving sewer manhole and ensure that the discharge has no detrimental impacts on the sewer network.
 - (v) Implement agreed improvements proposed in Action 7a(vi).
- b. **Continue to procure monitoring, or carry out monitoring in agreement with the Water Companies, as follows:**
 - (i) Monitoring at the locations and frequencies in Table 4 and Table 5 below for the parameters in Table 2 above and to the detection limits, precision and bias set out in the Method Statement specified in Action 8 above, unless otherwise agreed in writing by the Agency.
 - (ii) Monitoring of bromate and bromide weekly, or at such other frequency as may be agreed in writing by the Agency, in the final effluent at the receiving sewage treatment works, Blackbirds and Maple Lodge.
 - (iii) Reporting of the results of monitoring, under 10a(iv) to 10b(ii) above, to the Agency and in accordance with a scheme of reporting that has been agreed in writing by the Agency.
- c. **In connection with this action the following definitions shall apply:**
 - (i) "procure" shall mean payment quarterly in arrears as follows:

To Affinity Water Ltd, all the costs solely attributable to pumping and treatment of bromate-contaminated groundwater, and associated costs of monitoring (at the locations and frequencies designated for Affinity Water in Table 4 and Table 5 below) and management.

To Thames Water Utilities Ltd, all costs solely attributable to disposal of the treated groundwater by foul sewer and associated costs of monitoring (at the locations and frequencies designated for Thames Water Utilities Ltd in Table 4 and Table 5 below) and management

- (ii) "Remedial End Point" shall, unless otherwise agreed by the Agency incorporating the outcome from Assessment Action 7 above, mean in relation to Relevant Abstraction Points:
1. A concentration of bromate less than or equal to 5 µg/l.
 2. A concentration of bromide less than or equal to 500 µg/l.
- Note:** These concentrations are the Required Concentration Standards in the First Notice dated 22 July 2009.
- (iii) "Relevant Abstraction Points" shall (unless otherwise agreed by the Agency) mean the public water supply sources and associated monitoring points listed in Table 4 below.
- d. **This action will be continued for the period defined by whichever is the shortest of 10d(i) or 10d(ii) or 10d(iii) below:**
- (i) Until an alternative Remedial Treatment scheme has been approved by the Agency, implemented and shown to be effective in controlling concentrations of bromate at the Relevant Abstraction Points without any associated adverse environmental consequences;
 - (ii) Until the Appropriate Person(s) demonstrate that the Remedial End Point has been achieved and can be maintained in the raw water abstracted from all the Relevant Abstraction Points without the continuation of such pumping at Bishops Rise;
 - (iii) Up to a maximum of 10 years from the date of this remediation statement, or such shorter period as may be agreed in writing by the Agency with a substantial review of the need to continue scavenge pumping and/or other Remedial Treatment 5 years after the date of this remediation statement.

Table 4. The Relevant Abstraction Points to be monitored in connection with Remedial Treatment Action 10

Loc ref	Site name	Type	NGR	Designation ¹ in relation to payments for monitoring	Frequency
143	Essendon	PWS	TL 27300 09800	Affinity	Weekly
298	Broadmeads	PWS	TL 35300 13900	TWUL	Fortnightly
295	Amwell End	PWS	TL 35800 13900	TWUL	Fortnightly
296	Amwell Hill	PWS	TL 36700 12700	TWUL	Fortnightly
297	Amwell Marsh	PWS	TL 37600 12300	TWUL	Fortnightly
301	Rye Common	PWS	TL 37900 11100	TWUL	Fortnightly
MR	Middlefield Road	PWS	TL 37400 09500	TWUL	Fortnightly
300	Hoddesdon	PWS	TL 37800 08900	TWUL	Fortnightly
299	Broxbourne	PWS	TL 37300 07500	TWUL	Fortnightly
302	Turnford	PWS	TL 36000 04400	TWUL	Fortnightly
103	Chadwell	S	TL 34997 13683	TWUL	Fortnightly

S = surface water, PWS = public water supply,

Note to Table 4: ¹ Affinity - Affinity Water, TWUL - Thames Water Utilities Ltd

Table 5. The additional locations to be monitored in connection with Remedial Treatment Action 10

Loc ref	Site name	Type	NGR	Designation ² in relation to payments for monitoring	Frequency
001	Bishops Rise	PS	TL 22000 07700	Affinity	Weekly
382	Lynch Mill Spring	S	TL 37711 08519	Monitoring is carried out by the APs	Quarterly
288	Stream from Arkley Hole spring, upstream of confluence with Lee	S	TL 28976 10021	Monitoring is carried out by the APs	Quarterly
GB	River Colne at Green Bridge	S		Affinity	Monthly
ML	Maple Lodge sewage treatment works final effluent	E		TWUL	Weekly
BB	Blackbirds sewage treatment works final effluent	E		TWUL	Weekly
S = surface water, PS = pumping station, E = Sewage effluent					

Note to Table 5: ² Affinity - Affinity Water, TWUL - Thames Water Utilities Ltd

Annual Reports

11. An Assessment Action will be undertaken as below:

Provide annual progress reports to the Agency in writing to include reviews of:

- (i) the effectiveness of remediation;
- (ii) the evolution of the plumes; and
- (iii) the need for continuing or further active measures.

This action will be completed within 15 months of this remediation statement and every 12 months thereafter until the expiry of the period referred to in Remedial Treatment Action 10d above and unless otherwise agreed in writing with the Agency.

Appendix 1 – Illustrative Flow Chart

Appendix 2 – The agreed apportionment of the costs between the Appropriate Persons

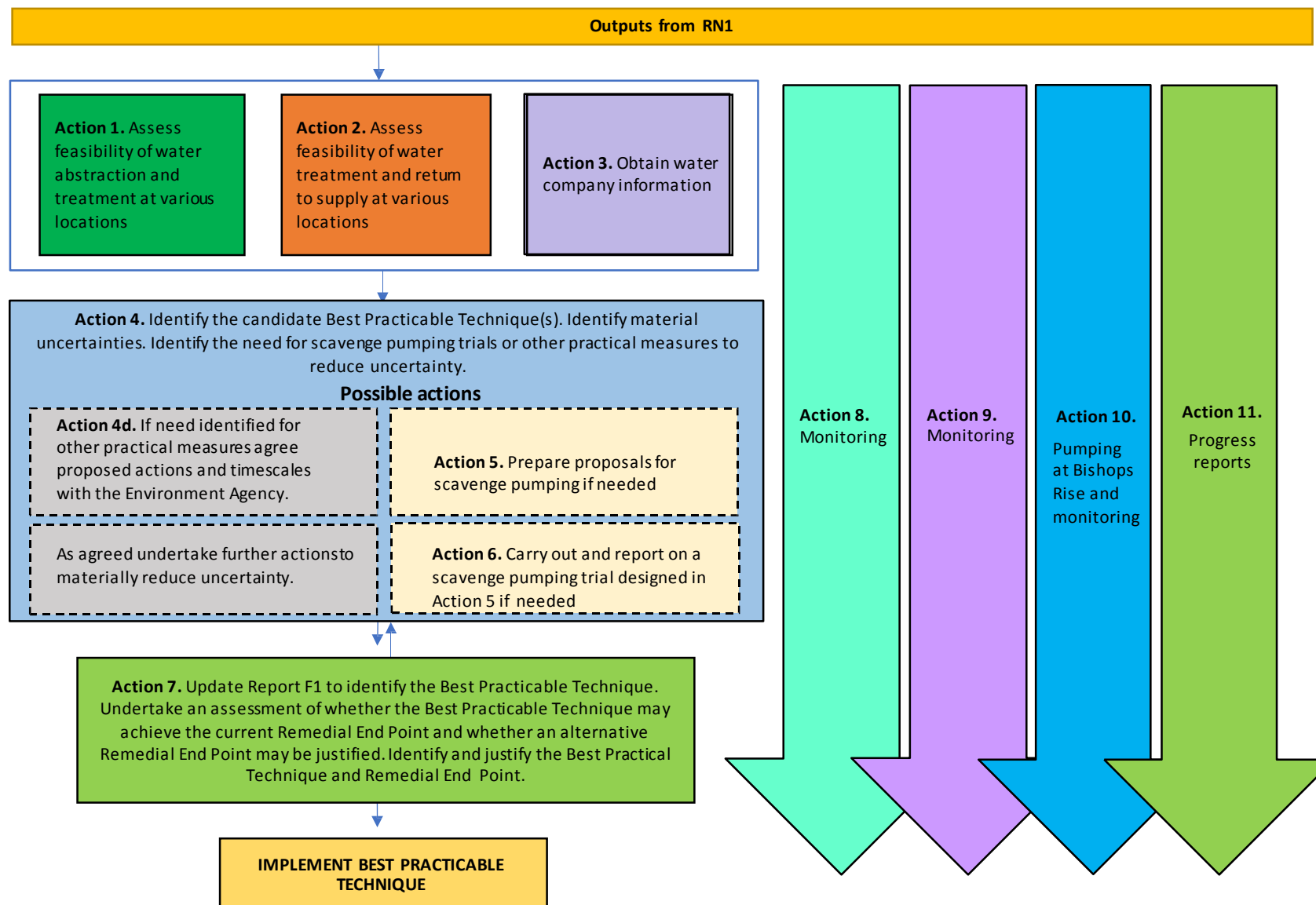
Date: 2020

.....
Keith Spence,
Environment Agency

.....
Ross Halley
Redland Minerals Limited

.....
Kevin Maguire
Crest Nicholson Residential Limited

Illustrative flow chart



Appendix 2

Proportion of Overall Costs to be borne under the Remediation Statement

Redland Minerals Limited

Redland Minerals Limited bear 85% of costs associated with the bromate significant contaminant linkage (SCL) and 45% of costs associated with the bromide SCL that is

Actions 1, 9, and 10: 85% of these Single Linkage Actions as they are associated with the bromate SCL only.

Actions 2, 3, 4a to 4c, 5, 6, 7, 8 and 11: 65% of these Shared Common Actions.

Action 4d: 85% if the actions under 4d relate to further investigations or assessments relating to the bromate SCL. 65% if the actions under 4d relate to further investigations or assessments relating to both the bromate and bromide SCLs.

Crest Nicholson Residential Limited

Crest Nicholson Residential Limited bear 15% of costs associated with the bromate significant contaminant linkage (SCL) and 55% of costs associated with the bromide SCL that is

Actions 1, 9, and 10: 15% of these Single Linkage Actions as they are associated with the bromate SCL only.

Actions 2, 3, 4a to 4c, 5, 6, 7, 8 and 11: 35% of these Shared Common Actions.

Action 4d: 15% if the actions under 4d relate to further investigations or assessments relating to the bromate SCL. 35% if the actions under 4d relate to further investigations or assessments relating to both the bromate and bromide SCLs.

Consequential implementation works

It should be noted that where any implementation works are required consequent upon this voluntary remediation statement then such costs shall be borne as follows:

Redland Minerals Limited	85% in relation to the bromate SCL
	45% in relation to the bromide SCL

Crest Nicholson Residential Limited	15% in relation to the bromate SCL
	55% in relation to the bromide SCL

In the event of implementation works being required to address both SCLs and where they meet the criteria for Shared Common Actions then such costs shall be borne as follows:

Redland Minerals Limited	65%
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Crest Nicholson Residential Limited	35%
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NOTE

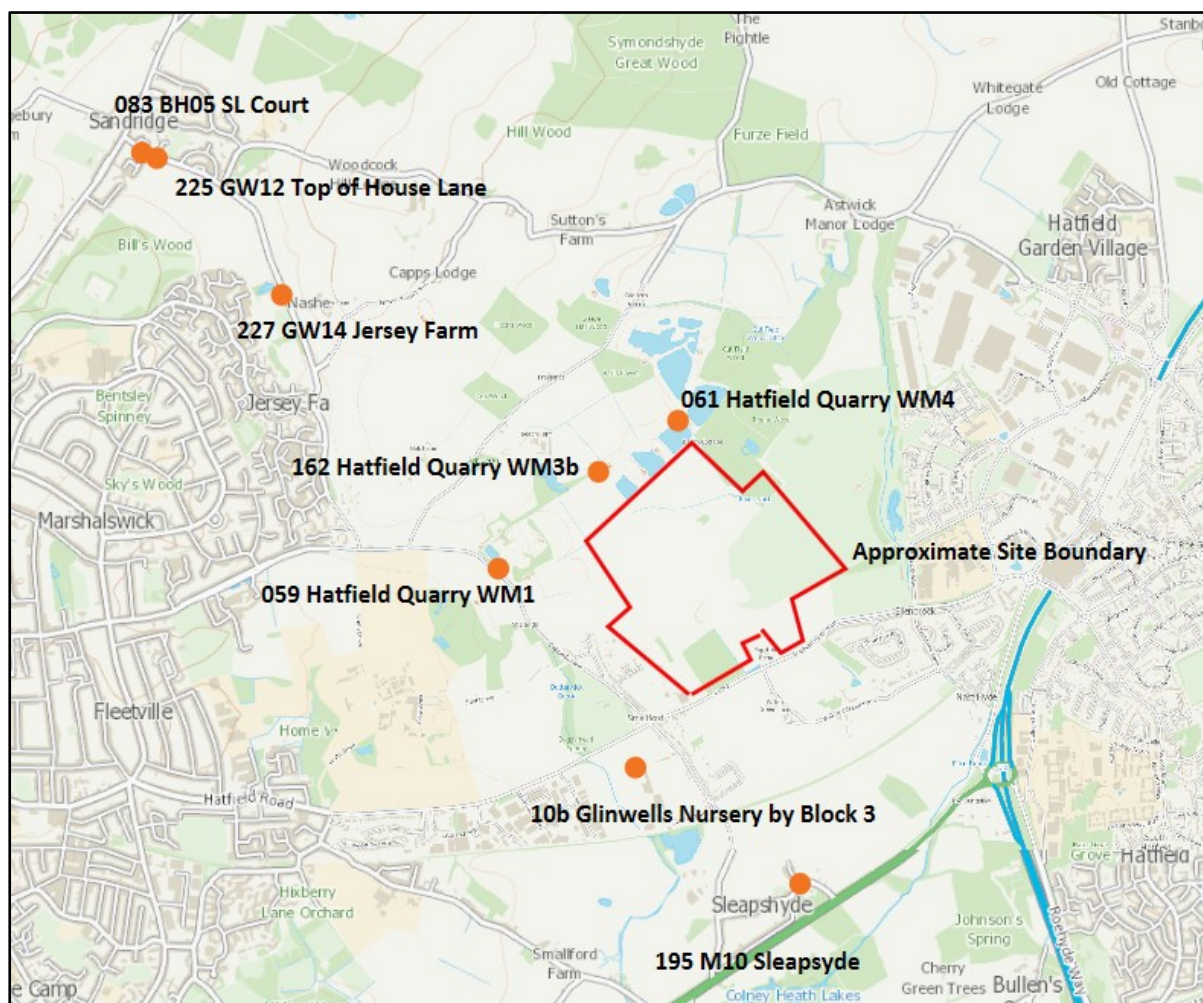
Shared Common Actions in the above are those referable to both bromide and bromate, and are Actions which would have been part of the remediation statement for each of the bromide and the bromate SCLs had they been addressed separately.

APPENDIX 3

LOCATION PLAN AND TIMES SERIES GRAPHS FOR MONITORING POINTS ON SOUTHERN PLUME BOUNDARY

NB- GRAPHS AND PLAN TO BE UPDATED TO INCLUDE MOST RECENT DATA.

Figure A
Southern boundary monitoring locations for times series graphs from the
ongoing works required under the Remediation Statement.



NB- Where concentrations are less than the limited of detection (LoD), results have plotted as the LoD, which is considered conservative. It should be noted that limits of detection (LoD) have varied across different monitoring time periods and locations., ranging between 0.3-2.00ug/l. Apparent changes in concentrations are, in some cases an artefact of this differing LoD, particularly for the following locations 83, 225, 227, 059, 162, 10b and 195.

