

Land at Hatfield Aerodrome



Groundwater Statement of Common Ground: Hertfordshire County Council & Brett Aggregates

INTRODUCTION

1. This Groundwater Statement of Common Ground has been prepared by Dr Luke Wilkinson, Technical Director, SLR Consulting in respect of a Section 78 appeal for the establishment of a quarry on land at the former Hatfield Aerodrome.
2. On 12th January 2024 Hertfordshire County Council (HCC) refused planning permission application reference PL\0232\21 (CM0961) (**Application**) on 8 grounds. This Statement of Common Ground relates to reason 8 Groundwater of that refusal decision, which states:
The proposals do not demonstrate that the existing hydrogeological flow regime would not be adversely affected during mineral workings, and that the risks to groundwater from disturbance of the bromate plume can be adequately managed and mitigated. The proposal is thereby contrary to Minerals Policy 17 (iv) (Criteria For The Control of Mineral Development to Protect Critical Capital and Other Environmental Assets) and the site specific considerations for Preferred Area 1 of the Hertfordshire Minerals Local Plan 2007 and the NPPF (paragraph 174 (e)). (RfR)
3. Relevant Development Plan Policy. The RfR refers to the following policy:
 - a. Minerals Policy 17 (iv) (Criteria For The Control of Mineral Development to Protect Critical Capital and Other Environmental Assets) and the site specific considerations for Preferred Area 1 of the Hertfordshire Minerals Local Plan 2007
 - b. The NPPF (paragraph 174 (e))
4. The following section summarises those matters that are agreed in respect of the bromate plume (also referred to as the plume in this SOCG).
5. The Main SOCG (CDXX) explains the Appeal Scheme and that sand and gravel would be worked in two discrete horizons the Upper Mineral Horizon (UMH) and the Lower Mineral Horizon (LMH). The groundwater within each horizon is referred to as the Upper Mineral Aquifer (UMA) and Lower Mineral Aquifer (LMA) respectively.

AGREED MATTERS

Assessments Undertaken And Relevant Guidance

6. With regards to water environment the submitted documents were:
 - a. Chapter 6 of the Environmental Statement. Dated 2021.
 - b. Submission Pursuant to Regulation 25 of Town and Country (Environmental Impact Assessment Regulations 2017 Appendix 02: Updated. Dated 2022.
7. The proposed quarry is located outside but near to the southern edge of the bromate plume, based upon the results of several phases of investigation and groundwater monitoring by SLR Consulting Ltd (SLR) on behalf of Brett Aggregates Ltd (Brett). Groundwater monitoring to establish the extent of the bromate plume close to the application site, and its absence within the application site has been undertaken since 2013; thus the data set spans 10 years and comprises multiple quarterly and annual sampling events (around 30 in total).

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The Previous Appeal

8. Appendix 1 includes a Statement of Common Ground (SoCG) developed between the EA, Affinity, Brett and Hertfordshire County Council (HCC) including HCC's hydrogeology advisors Arup, for the Hatfield Quarry Planning Inquiry in 2021 relating to the 2016 planning application.
9. The parties to the 2021 SoCG were of the opinion that the proposed quarry had been subject to a detailed assessment that demonstrated that quarrying could be undertaken at this location in a manner that will not disturb the plume, jeopardise current or future management of the plume or impact upon potable water abstractions or potable water resource potential now or in the future provided that the requested planning conditions included in any planning permission were included and adhered to. The planning conditions include the requirement for Groundwater Management and Monitoring Plans.
10. In the Appeal Decision of 25th January 2022, the Inspector stated in paragraph 62 that "subject to the imposition of [such] conditions, I am satisfied that the risk from bromate pollution could be reduced to an acceptable level. On this basis, I find no conflict with local or national policies concerning groundwater pollution. With appropriate planning conditions any residual risk of the appeal scheme exacerbating bromate pollution would not weigh significantly in the planning balance."

The Application

11. The current application specifically excludes groundwater abstraction from the LMH and includes clarification in respect of the Groundwater Monitoring and Management Plan as set out in the Regulation 25 response, which will include all necessary amendments set out in a Technical Note by ARUP dated 8 March 2023. The Conditions proposed in the 2023 Planning Officers Report are almost identical to those agreed in respect of the 2016 planning application.
12. No objection to the Application was made by Affinity Water or the Environment Agency, subject to the imposition of agreed conditions from the previous Inquiry.
13. The October 2023 Report to HCC Planning Committee concludes in relation to groundwater and bromate:

Having taken into account the environmental information submitted with the application and the comments of statutory consultees responsible for protecting the water environment, it is considered the proposed development, with conditions, will meet the requirements of the NPPF in preventing the new and existing development from contributing to, being put at unacceptable risk to, or being adversely affected by unacceptable levels of pollution in relation to the water environment. (para 9.74)

In terms of the water environment, the site sits at the edge of the bromate plume to the north of the site. The existing contamination of groundwater by bromate and the potential effect of quarrying activity in close proximity to the plume has been considered carefully by the Environment Agency and Affinity Water. Detailed assessments have demonstrated that the potential risks are capable of being managed throughout mineral extraction and restoration via the condition recommended by the Environment Agency and operation of the Environmental Permit. (Para 10.8).

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Summary

14. The parties to this SOCG agree that the proposed quarry has been subject to a detailed assessment and that the potential for quarrying to have an influence on the bromate pollution can be addressed by the imposition of (and adherence to) the Conditions recommended in the Report to the Planning Committee dated 31 October 2023 and revised by HCC in consultation with the Environment Agency in November 2024. .

Proposed Planning Conditions

15. A series of Conditions (Draft Conditions 25 to 30 of the Planning Officers Report) are as stated in the consultation response issued by the Environment Agency to HCC on 31 March 2023 that proposed six Conditions related to Groundwater Management and Protection of the Chalk Aquifer. Condition 31 was also included that required "No pumping of groundwater from the lower mineral horizon is permitted within any part of the mineral working". These Conditions were consistent with those considered by the previous Appeal Inspector in 2021. An updated list of draft Groundwater Conditions were submitted by HCC to the 2024 Inquiry; and were refined by Arup, on behalf of HCC in Consultation with the Environment Agency and SLR on 21st and 25 November 2024. These proposed Conditions are included as Table 1 below:

Table 1: Proposed Groundwater Conditions (from Arup, advisors to HCC Planning Officers 25 November 2024).

30	<p><u>Groundwater Lagoons</u></p> <p>Prior to the construction of the infiltration lagoons as on drawing number HQ 3/7R, the following shall be submitted to and approved in writing by the MPA:</p> <ul style="list-style-type: none"> (i) Details of the construction of the upper and lower infiltration lagoons; (ii) Details of the water management during construction and upon restoration of infiltration lagoons; (iii) Details of the upper infiltration back-drain upon restoration <p>The development shall be undertaken in accordance with the approved details.</p> <p>Reason: To ensure groundwater is protected and not adversely affected by contamination as a result of mineral working.</p>
31	<p><u>Groundwater and Water Monitoring and Management Plan</u></p> <p>Prior to the commencement of development, a Groundwater and Water Monitoring and Management Plan (GWMMP) shall be submitted to and approved in writing by the MPA. The GWMMP shall have regard to the available data relating to groundwater conditions both within and without the site so far as relevant to the GWMMP. The GWMMP shall be based upon the GWMMP (SLR Ref: 403.09885.00024 Version No FINAL & Technical Note by ARUP 18 March 2023. The GWMMP shall include:</p> <ul style="list-style-type: none"> (i) The locations of surface and groundwater monitoring, the type and nature of monitoring and sampling to be undertaken and the scope of laboratory analysis to be undertaken on the samples obtained, which will include contaminants suspected to be present based on the site history (e.g. PFAS); (ii) The surface and groundwater monitoring referred to above shall include, but not be limited to, ongoing monitoring for well-head parameters, groundwater level, bromate and bromide concentrations in monitoring wells: BHB, BH104, BH106, BH301, BH303 & BH304 to continue the long-term dataset; unless otherwise agreed in writing by the MPA.

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	<p>(iii) The timetable for the submission of monitoring reports Provisions which are specific to Phase A including details of phase specific boreholes</p> <p>(iv) Details of the water management in the lower and upper mineral infiltration lagoons and a mechanism for review.</p> <p>(v) A method to validate any borehole monitoring results which are relied upon as trigger levels. This would include but would not be limited to:</p> <ul style="list-style-type: none"> (a) (vi) Arrangements for validation sampling; (b) (vii) Evaluation of results below detection limits; (c) (viii) Arrangements for stakeholder notification, data review and escalation process. <p>(vi) An outline action plan</p> <p>(vii) an outline response plan</p> <p>The water and groundwater sampling, analysis and reporting of the results shall be in accordance with the approved GWMMP. The development shall be undertaken in accordance with the approved GWMMP.</p> <p>Reason: To ensure protected groundwater is protected and not adversely affected by contamination as a result of mineral working.</p>
32	<p><u>Groundwater Management Plan – Phasing</u></p> <p>Prior to the extraction of minerals from the Lower Mineral Horizon in each of Phase's B, C, D, E, F and G, a revised GWMMP adding details specific to each phase shall be submitted to and approved in writing by the MPA. This shall include details of ongoing monitoring and all phase specific boreholes to be installed including those needed to characterise and identify the depth of the chalk. The revised GWMMP shall also have regard to any data arising for the site and its surrounds. The development shall be undertaken in accordance with the revised GWMMP as approved.</p> <p>Reason: To ensure groundwater is and protected and not adversely affected by contamination as a result of mineral working.</p>
33	<p><u>Groundwater Management – Action Plan</u></p> <p>In the event that monitoring results indicate that bromate concentrations in the Lower Mineral Horizon extraction phase exceed the trigger level of $2\mu\text{g l}^{-1}$, then an action plan based on that outlined in the approved GWMMP shall be submitted for approval of the MPA (detailing further assessment of groundwater levels and chemistry and programme for implementation of actions). The action plan shall be implemented as approved.</p> <p>Reason: to ensure groundwater is not adversely affected by bromate contamination as a result of mineral working</p>
34	<p><u>Groundwater monitoring – response plan</u></p> <p>29. In the event that monitoring results indicate that bromate concentrations in the current Lower Mineral Horizon extraction phase exceed the trigger level of $5\mu\text{g l}^{-1}$, then a response plan based on that outlined in the approved GWMMP shall be submitted for the approval of the MPA. Lower Mineral Horizon excavation shall cease until the MPA has approved a response plan. The response plan shall be implemented as approved.</p> <p>Reason: To ensure groundwater is not adversely affected by bromate contamination as a result of mineral working.</p>
35	<p><u>Protection of chalk aquifer</u></p>

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	<p>No excavations of the Lower Mineral Horizon shall take place at the base of the quarry within 1m of the chalk aquifer. The upper surface of the chalk aquifer shall be defined in the GWMMP in advance of excavation commencing in each phase.</p> <p>Reason: To ensure groundwater is not adversely affected by bromate contamination as a result of mineral working.</p>
36	<p>No pumping of groundwater from the Lower Mineral Horizon is permitted within any part of the mineral working.</p> <p>Reason: to ensure groundwater sources is not adversely affected by bromate contamination as a result of mineral working.</p>

Development of the Groundwater Monitoring and Management Plan

16. A previous iteration of the groundwater monitoring and management plan (GWMMP) was examined by the parties to the 2021 SOCG during the 2021 planning inquiry. As a result of this examination, Paragraph 76 of the closing statement to the 2021 Inquiry on behalf of HCC stated that “a scheme of conditions is now agreed which it is accepted resolve HCC’s RfR 4”.
17. The current GWMMP¹, prepared by SLR, has adopted the findings and modifications resulting from the 2021 Inquiry and has benefitted from the sharing of monitoring data and technical consultation with Affinity, the EA and HCC, including HCC’s hydrogeology advisors Arup. In particular, it incorporates the matters that the Inspector considered could be conditioned and specifically excludes groundwater pumping from the Lower Mineral Aquifer and includes a 100m stand-off from the southern edge of the bromate plume.
18. The September 2022 Groundwater Monitoring and Management Plan (GWMMP) described three hydrogeological/operational scenarios relating to LMH mineral extraction for each phase/sub-phase. A methodology for mineral extraction has been devised for two scenarios, the third scenario results in no LMH mineral extraction taking place.
19. The GWMMP shall be based on the GWMMP (SLR Ref: 403.09885.00024 Version No: FINAL DRAFT September 2022) submitted to the mineral planning authority in October 2022 including all necessary amendments set out in a Technical Note prepared by ARUP for HCC, dated 8 March 2023, including:
 - a. The locations of surface and groundwater monitoring, the type and nature of monitoring and sampling to be undertaken and the scope of laboratory analysis to be undertaken on the samples obtained, which will include contaminants suspected to be present based on the site history.
 - b. The surface and groundwater monitoring referred to above shall include, but not be limited to, ongoing monitoring for well-head parameters, groundwater level, bromate and bromide concentrations in monitoring wells: BHB, BH104, BH106, BH301, BH303 & BH304 to continue the long-term dataset; unless otherwise agreed in writing by the MPA.
 - c. The timetable for the submission of monitoring reports; provisions which are specific to Phase A including details of phase specific boreholes.

¹ GWMMP SLR Ref: 403.09885.00024 Version No: FINAL DRAFT September 2022 submitted to the mineral planning authority in October 2022 The GWMMP to be submitted under conditions will include all necessary amendments set out in a Technical Note by ARUP dated 8 March 2023

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- d. Details of the water management in the lower and upper mineral infiltration lagoons and a mechanism for review.
- e. A method to establish the statistical confidence required for any borehole monitoring results which are relied upon as trigger levels. This would include but would not be limited to:
- f. Arrangements for validation sampling;
- g. Evaluation of results below detection limits;
- h. Arrangements for stakeholder notification, data review and escalation process. The water and groundwater sampling, analysis and reporting of the results shall be in accordance with the approved GWMMP.
- i. The development shall be undertaken in accordance with the approved GWMMP.

20. Thus, the GWMMP (Final Draft) dated September 2022 prepared for Brett Aggregates Limited by SLR Consulting, with all necessary amendments set out in a Technical Note by ARUP dated 8 March 2023, sets out the overarching approach to groundwater monitoring and management, with further phase-by-phase refinement as required by pre-commencement conditions.

21. While full details for each phase will be submitted, it is agreed that the plan is comprehensive and will allow for the adequate controls to ensure that controlled waters are protected.

MATTERS IN DISPUTE

AGREED BY

Andrea Bruce

~~Dr. Luke Wilkinson~~

Andrea Bruce

On behalf of Brett Aggregates Limited, (date 28-11-24)

XXXX

On behalf of Hertfordshire County Council, (date 28-11-24)

Brian Owen

Appendix 1

**Statement of Common Ground Affinity
Water, Environment Agency, Hertfordshire
County Council and Brett Aggregates 2021.**

Appendix 1

**Statement of Common Ground Affinity
Water, Environment Agency, Hertfordshire
County Council and Brett Aggregates 2021.**

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 (9MI/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 9Ml/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.

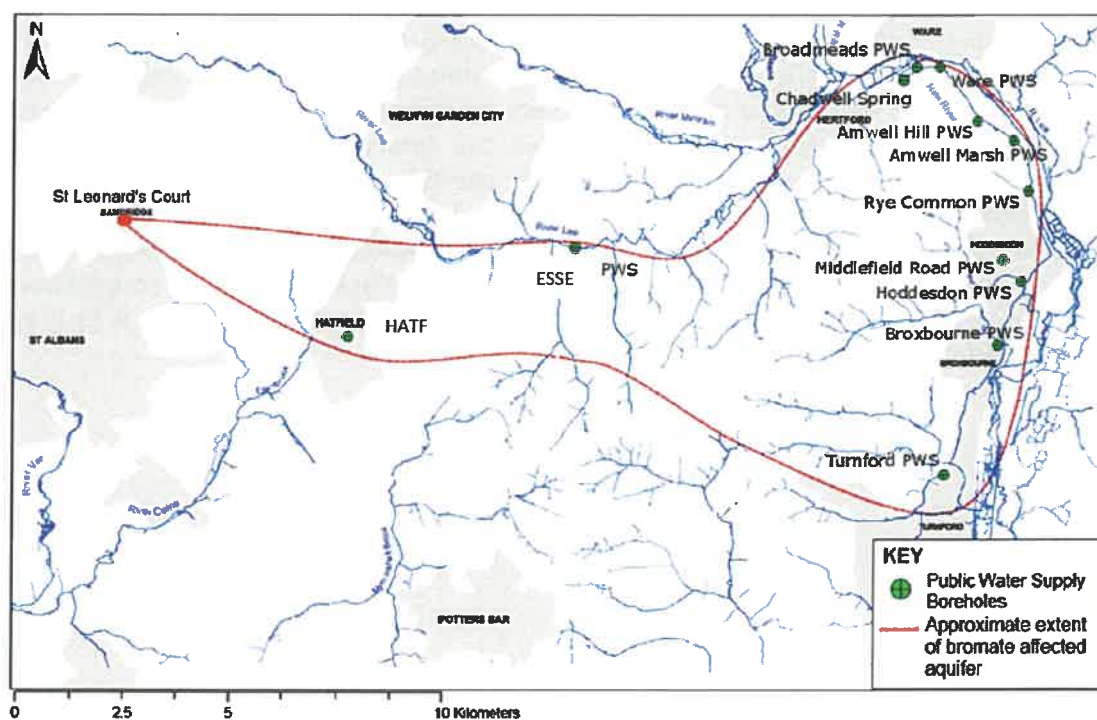


Figure 1
Location map showing the extent of the Herts Chalk aquifer affected by bromate contamination and the distribution of major public supply wells (adopted from Cook, 2010)

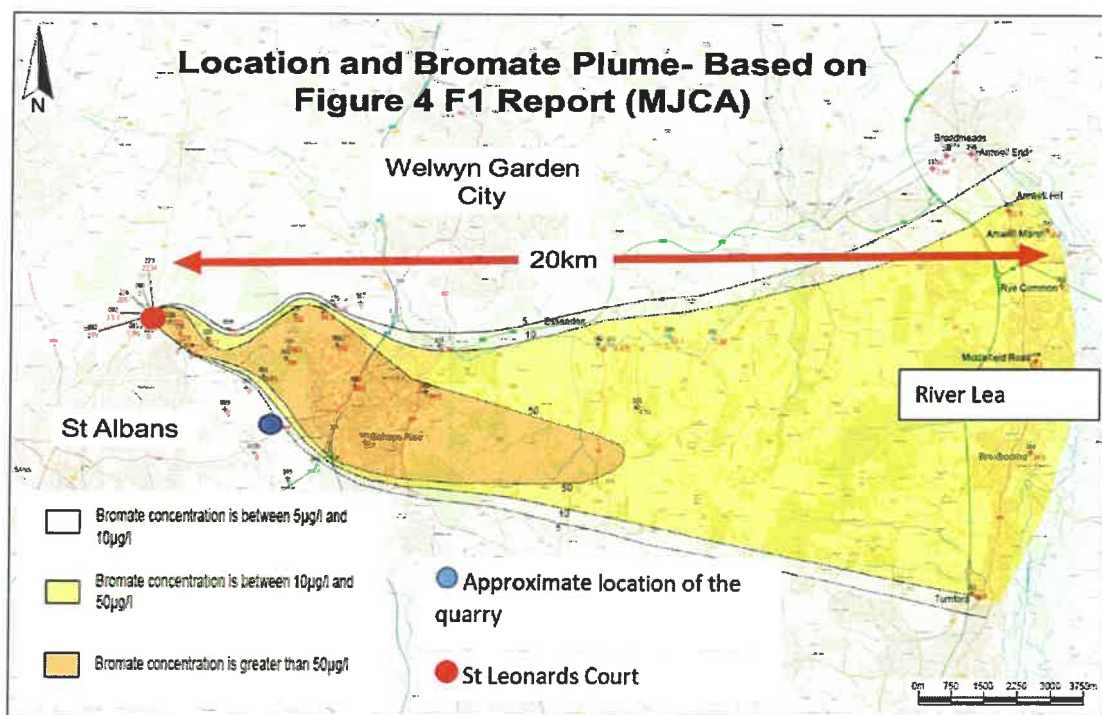


Figure 2
Location of bromate plume (map adopted from the EA decision document and F1 report)

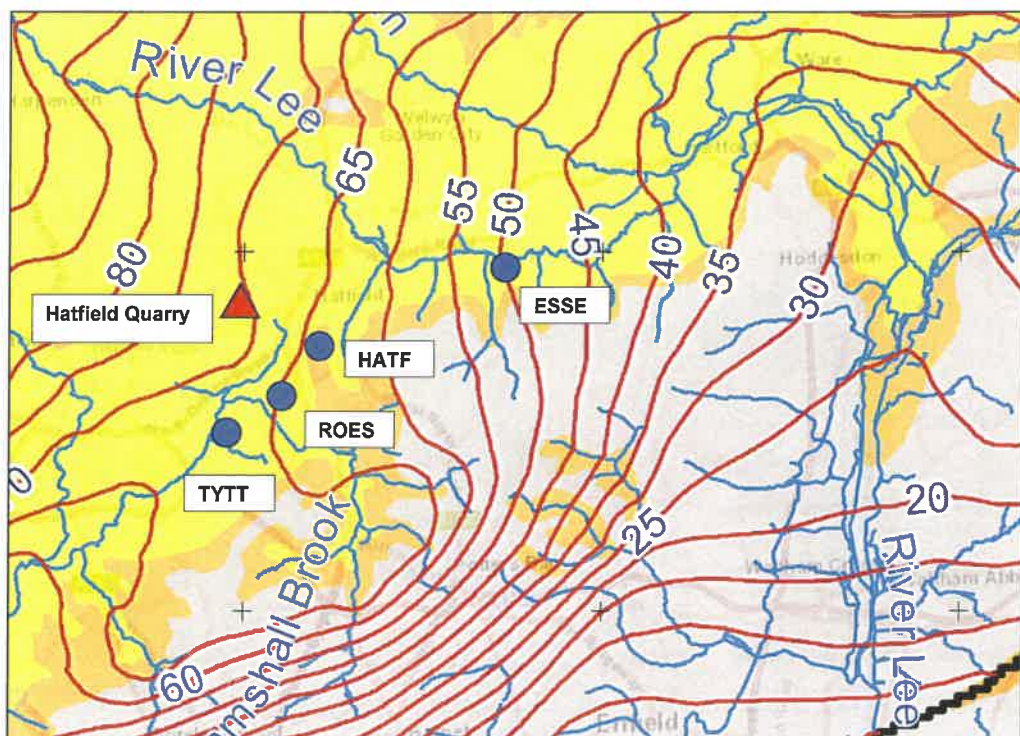


Figure 3
Regional groundwater flow pattern, taken from the Hertfordshire Chalk Model

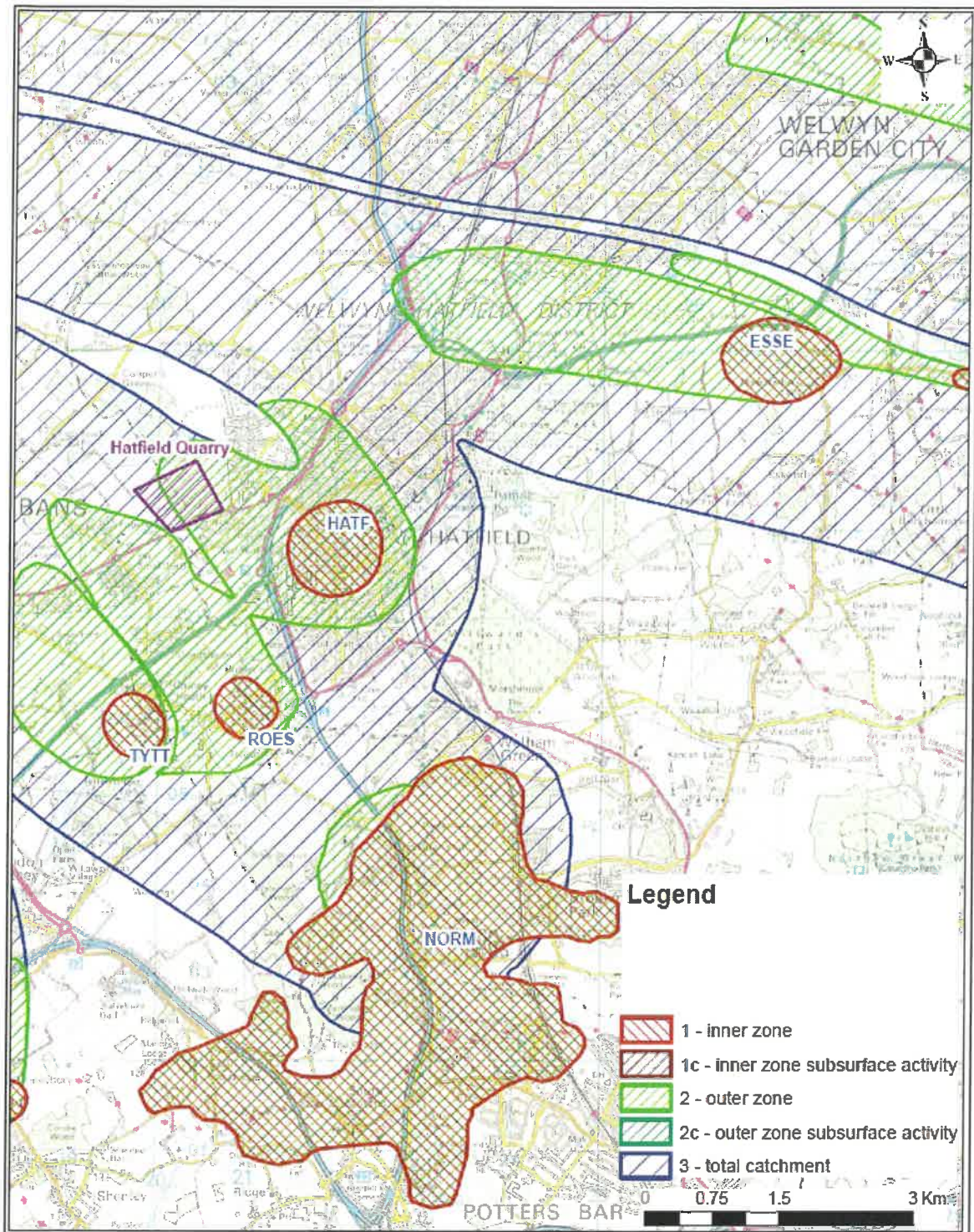


Figure 4
Source Protection Zones of groundwater sources around the proposed quarry

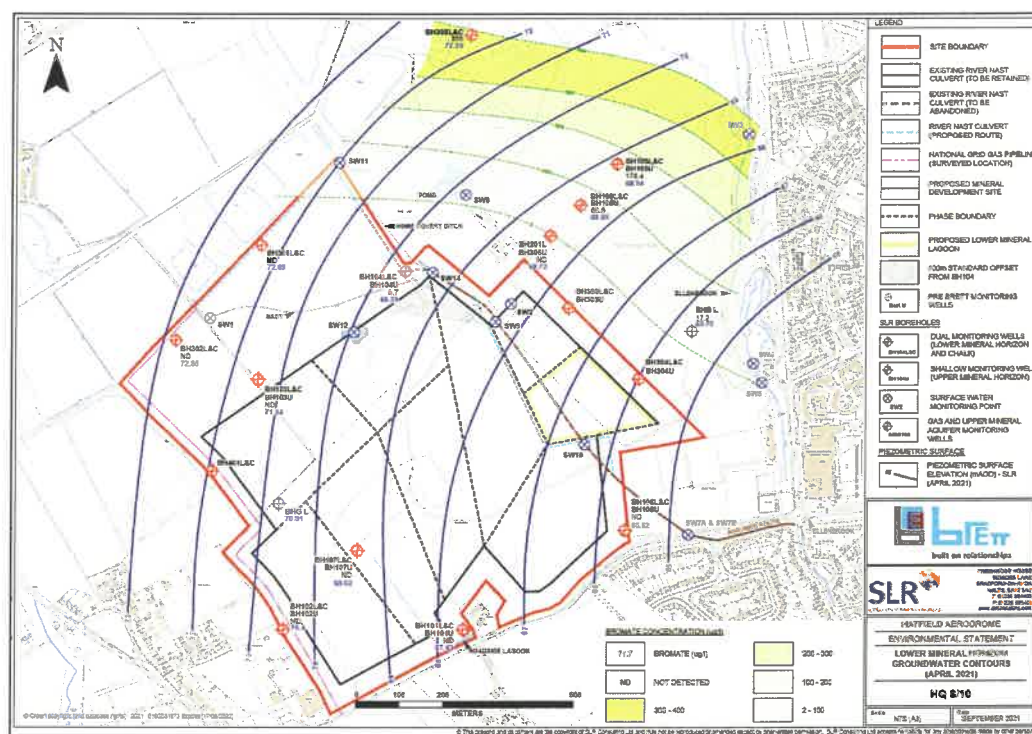


Figure 1
Location of the bromate plume in relation to the proposed quarry (adopted from SLR)

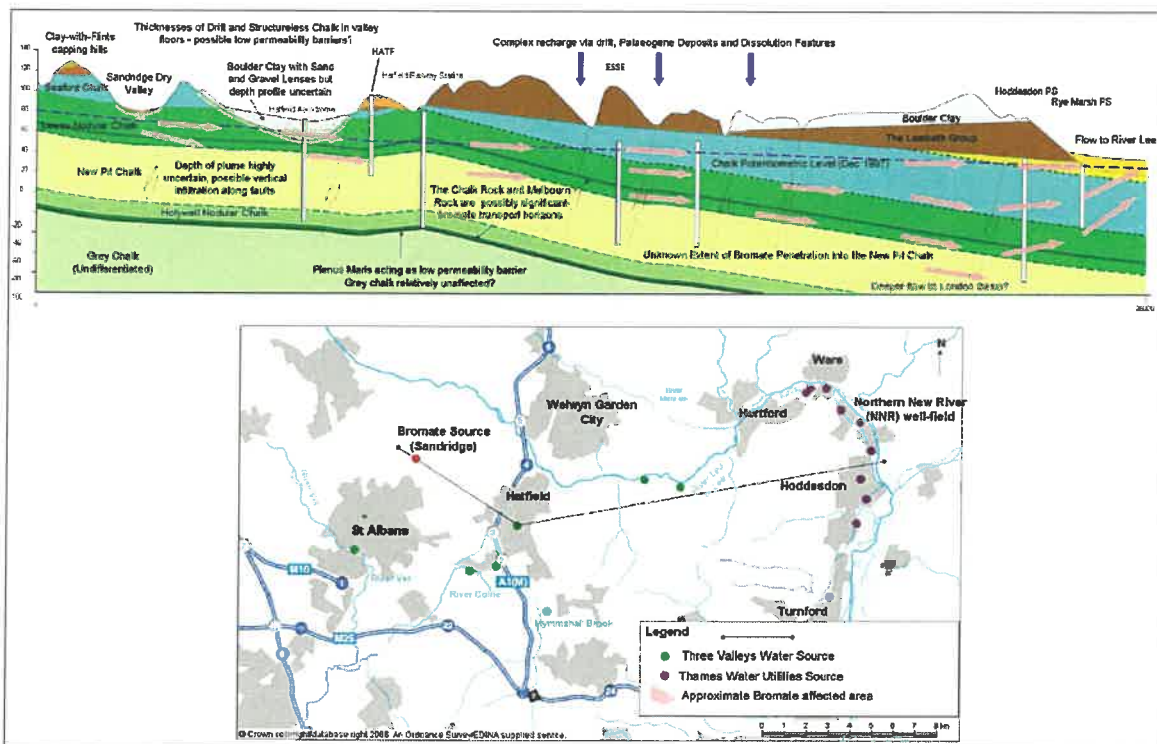


Figure 2
Conceptual understanding of the bromate plume (adopted from Cook, 2010)

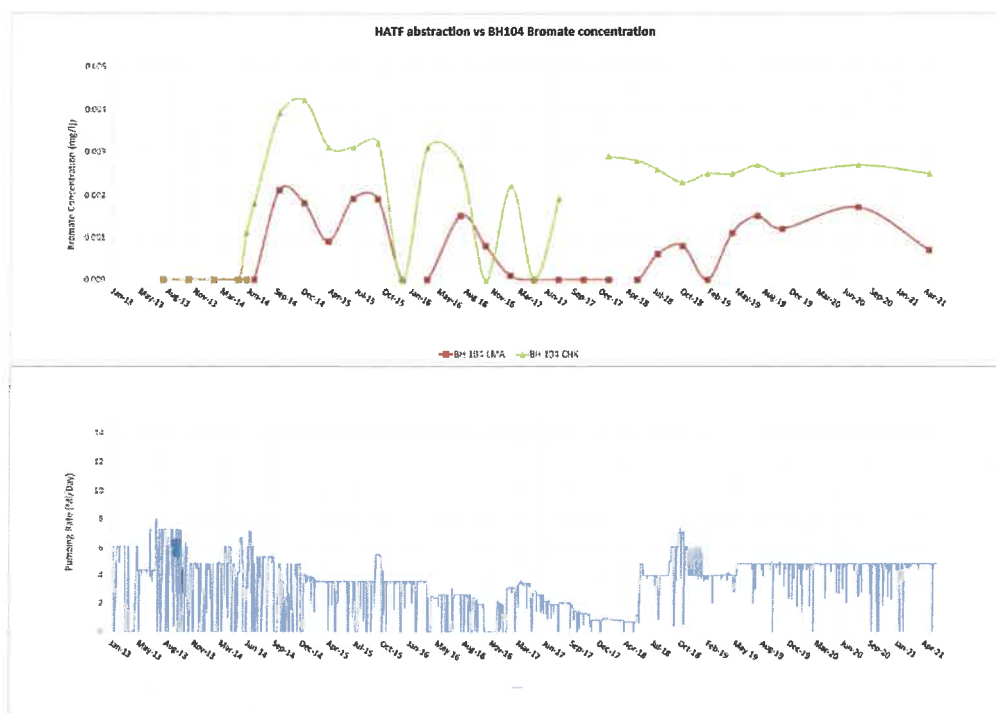


Figure 3
 Bromate concentrations over time at BH104 screened in the LMA and in the Chalk
 (located at the northern boundary of the proposed quarry) plotted against HATF abstraction (SLR data)

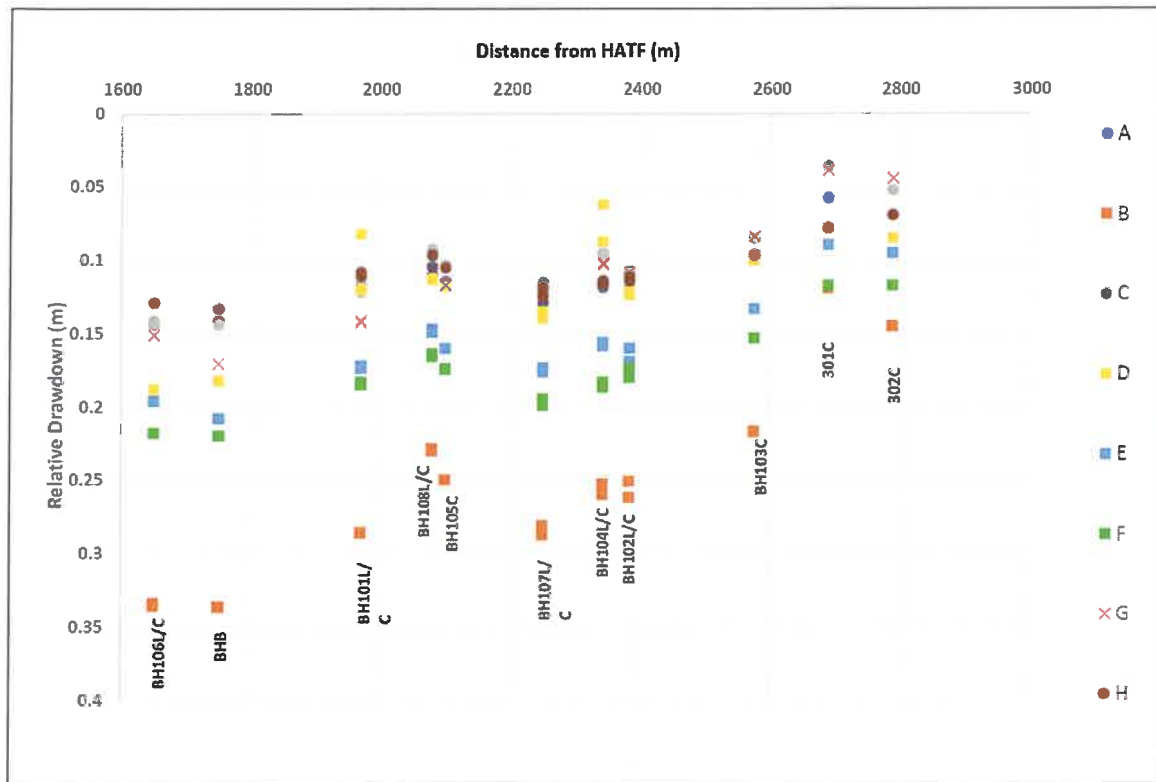
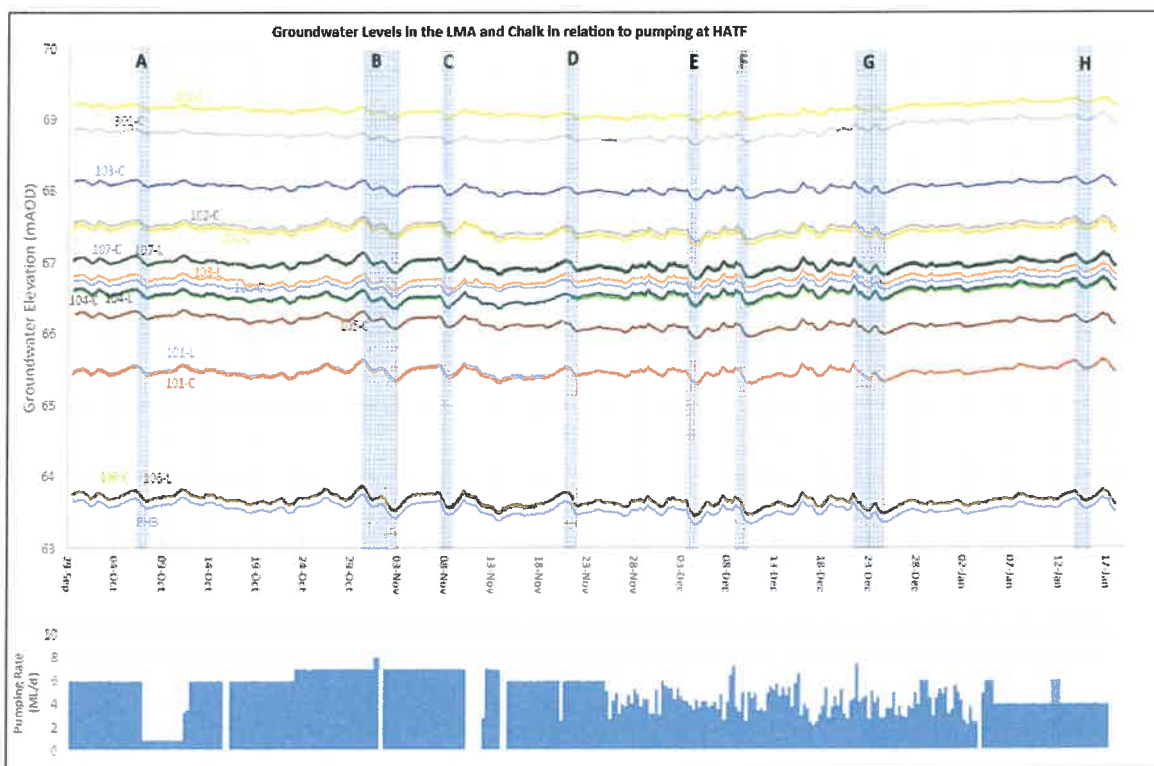


Figure 4
Groundwater level response in relation to changes in abstraction at HATF throughout Autumn 2018 (SLR data)

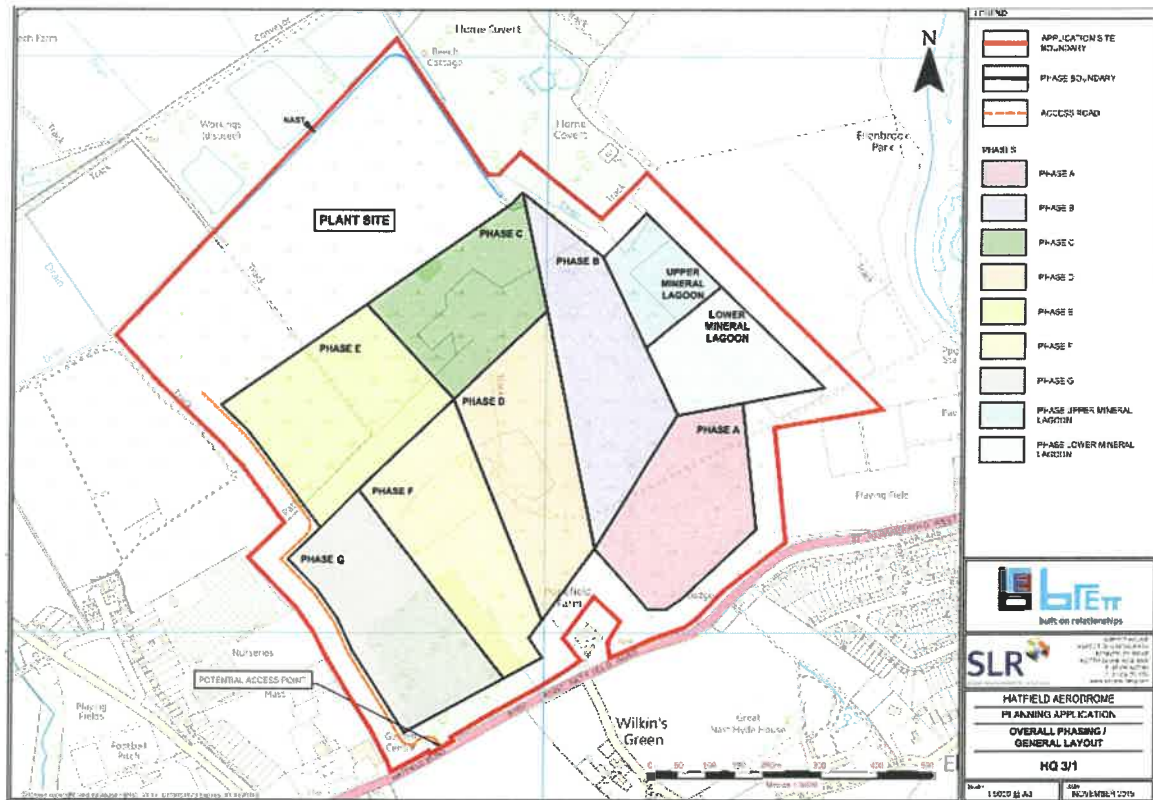


Figure 9
Phasing Layout

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	
	LL	HL	LH	HH	H	L	Base of Interburden Elevation							
	H	L	H	L	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

UPPER MINERAL HORIZON (LMA)

SEASONAL FLUCTUATION

LOWER MINERAL HORIZON (LMA)

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

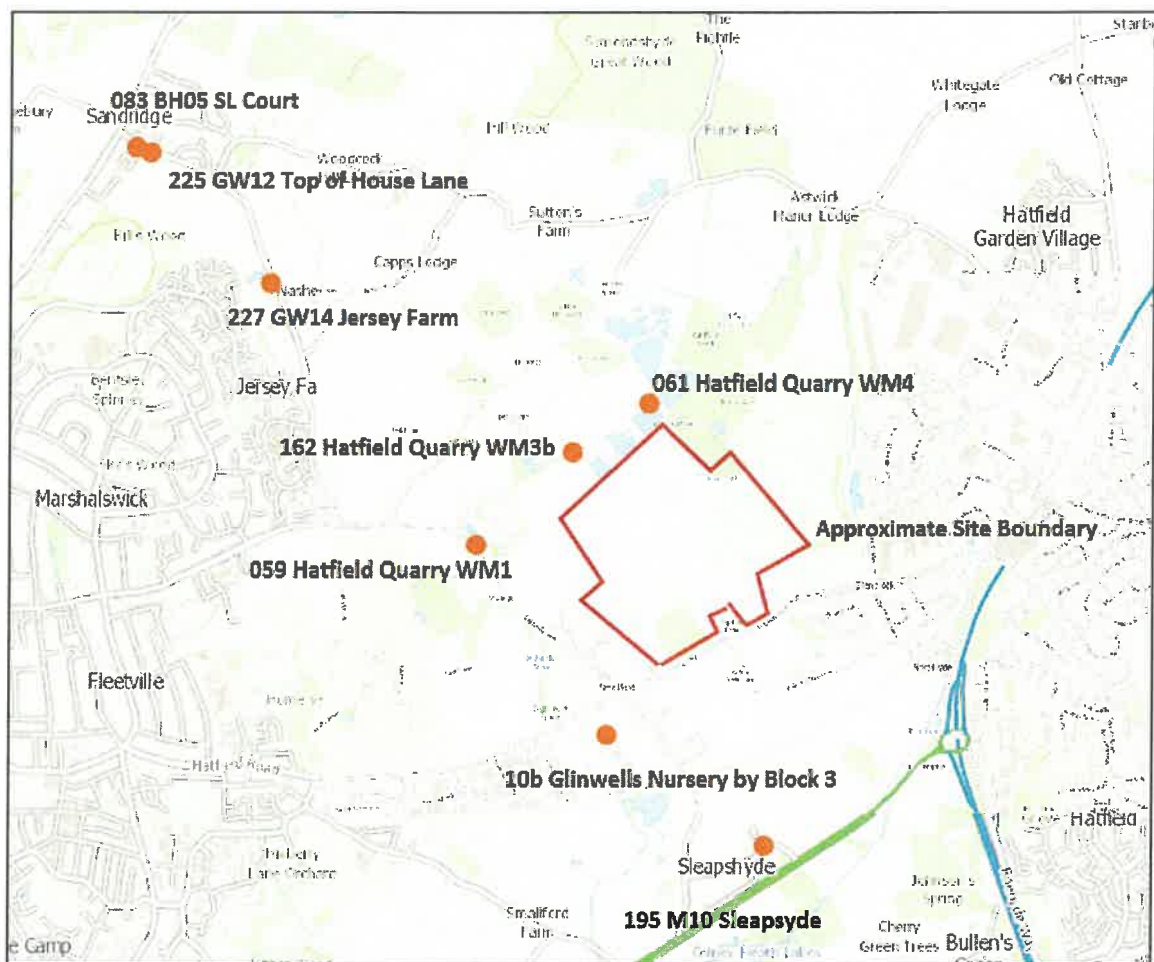
TO APPEND PRIOR TO FORMAL SUBMISSION (included in the EA SoC)

Appendix 2
Voluntary Remediation Statement (VRS)

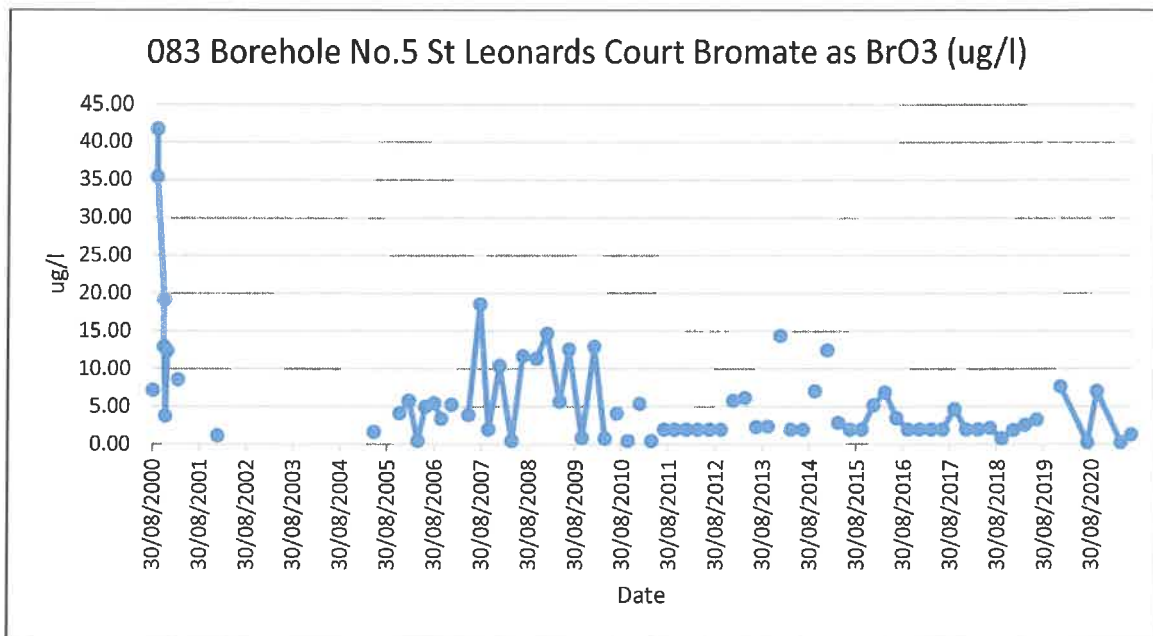
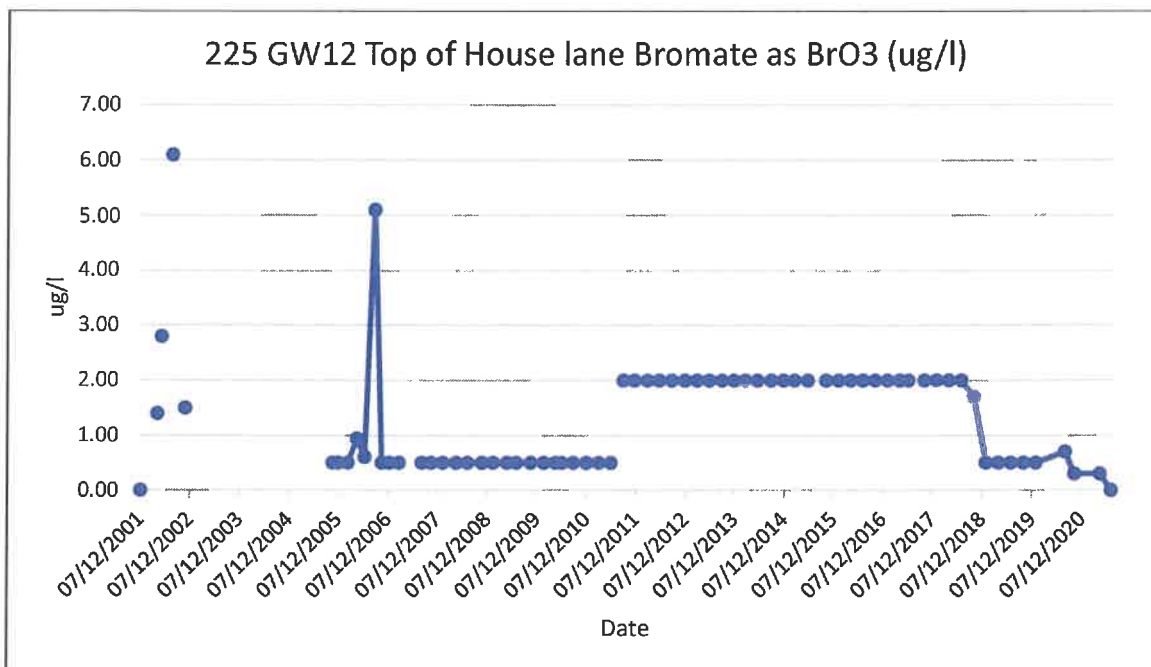
TO APPEND PRIOR TO SUBMISSION

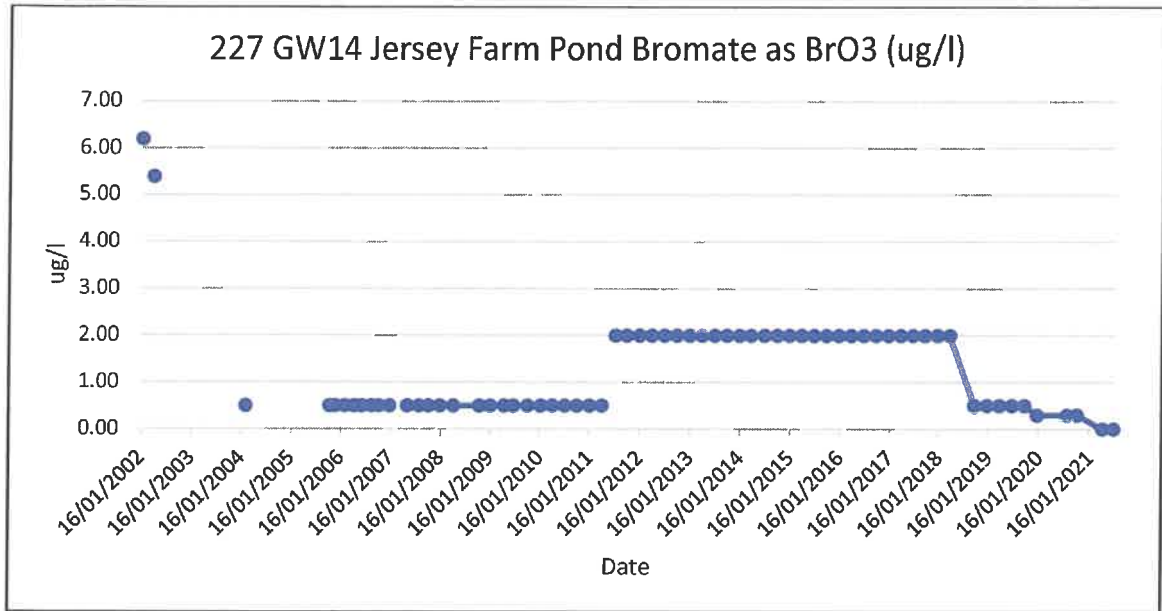
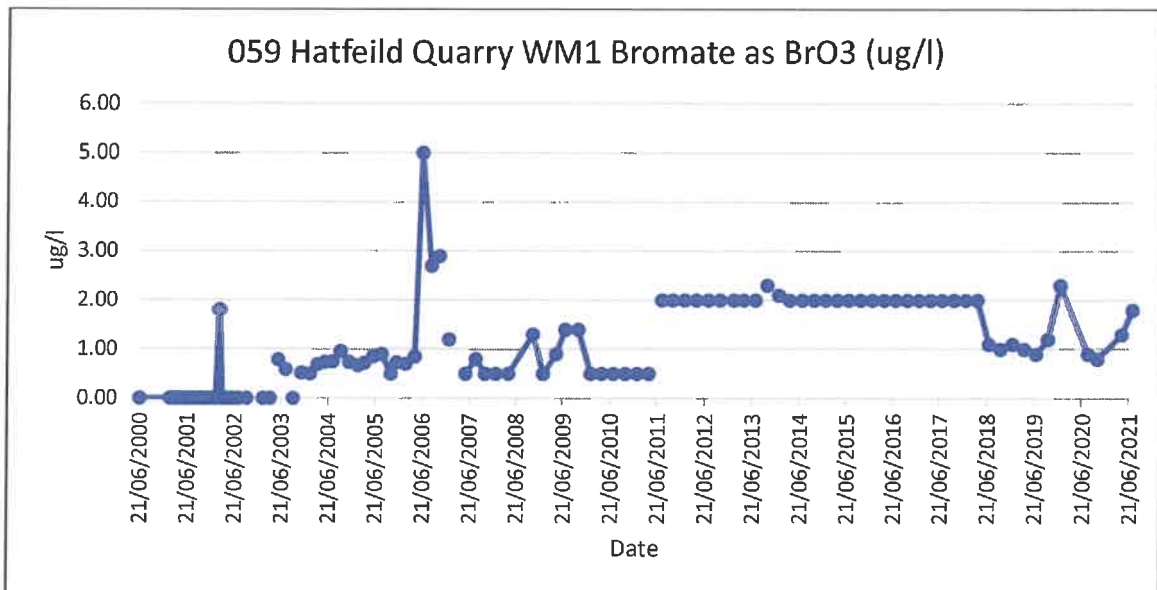
LOCATION PLAN AND TIMES SERIES GRAPHS FOR MONITORING POINTS ON SOUTHERN PLUME BOUNDARY

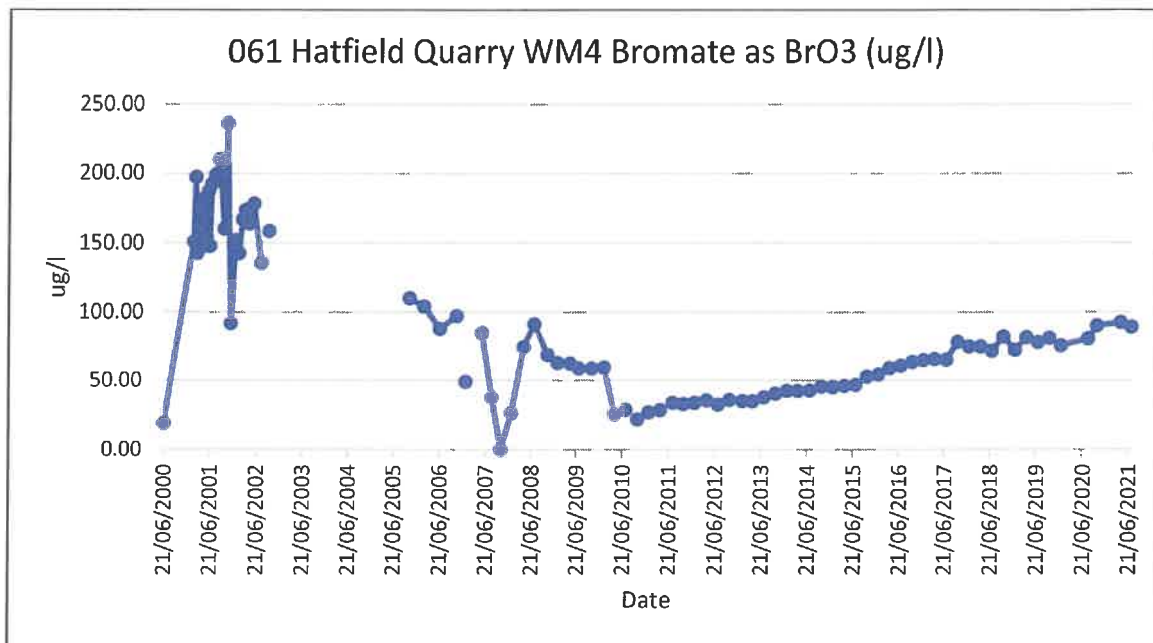
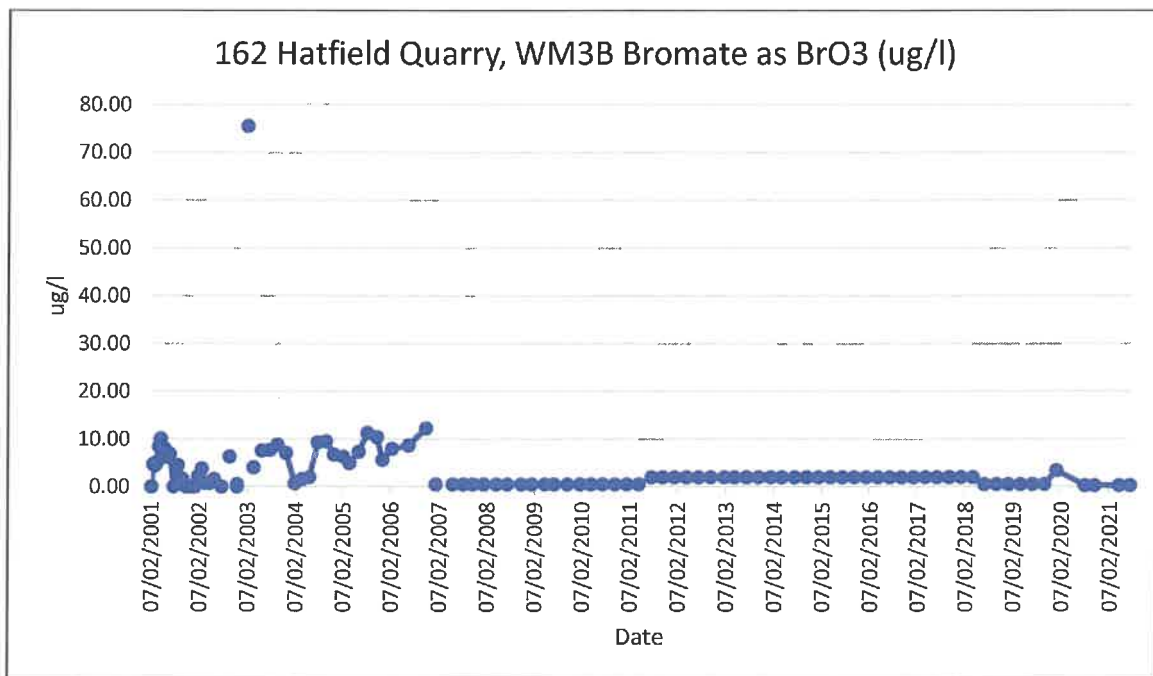
Figure A
Southern boundary monitoring locations for times series graphs from the ongoing works required under the Remediation Statement.

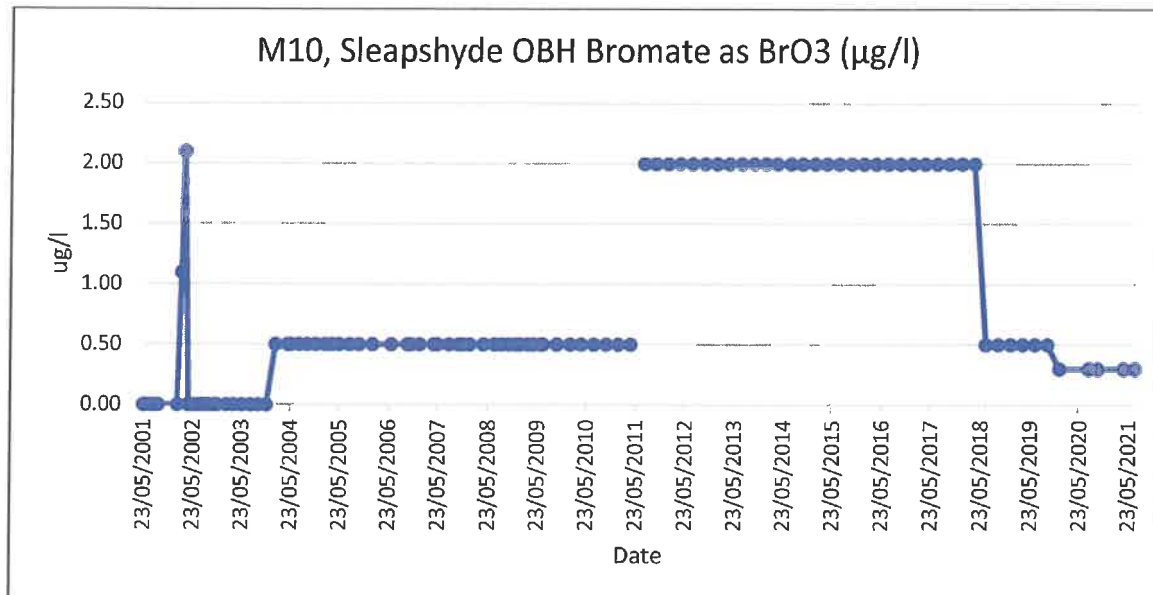
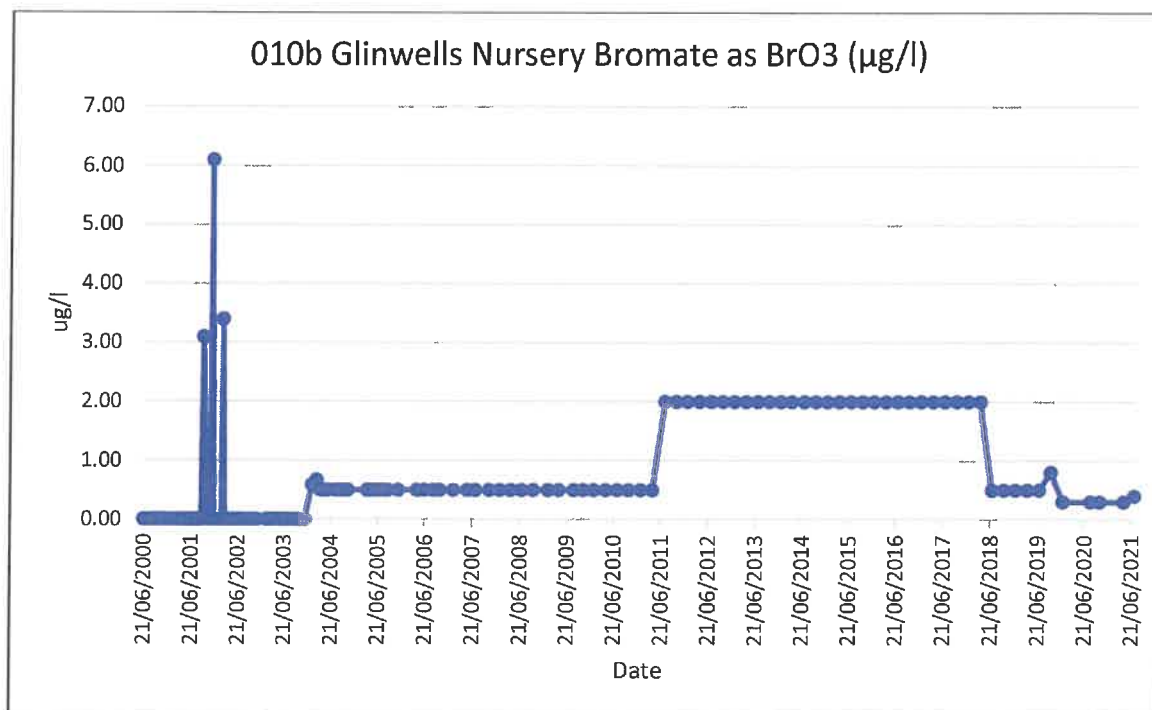


NB- Where concentrations are less than the limited of detection (LoD), results have plotted as the LoD, which is considered conservative. It should be noted that limits of detection (LoD) have varied across different monitoring time periods and locations., ranging between 0.3-2.00ug/l. Apparent changes 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.









The County Council has withdrawn the 8 reasons for refusal as set out in the decision notice.

The County Council has also submitted updated conditions dated 31/10/2024 CD 14.19

The County Council in its statement of case set out that it considered a pre-commencement planning condition requiring the submission of an updated deed of variation should be imposed. This is not covered by the conditions draft as above.

The S106 Agreement has now been signed though not engrossed.

