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Hertsfield Barn, Marden, Kent, TN12 9BW

STATEMENT OF

Dr Paul Ellis, BSc, PhD, CGeol

DATED

27th January 2025

Specialist Field: Hydrogeology and Flooding

On behalf of: Mr David Padden and the Hertsfield Residents Association

Prepared For: Planning appeal, for retrospective planning permission at Monk Lakes, Staplehurst Road, Marden, TN12 9BS. Application reference 11/1948. Appeal Reference - APP/U2235/W/20/3259300

Subject Matter: The potential for groundwater flooding resulting from the unauthorised development at the neighbouring property known as Monk Lakes.

Report reference: 70276R6vn1

Prepared by
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1 INTRODUCTION

I am pleased to present here my review in relation to the appeal made in relation to the Monk Lakes retrospective planning application for the retention and completion of the Lakes.

1.1 Qualifications and Experience

- 1.1.1 My name is Dr Paul Ellis. I am Managing Director of Geosmart Information Limited, a specialist land, water and sustainable development consultancy, based at Old Bank Buildings, Bellstone, Shrewsbury SY1 1HU. I lead a team of environmental consultants comprising hydrogeologists, hydrologists and environmental modellers.
- 1.1.2 I have over 25 years' experience as a geologist and hydrogeologist, with a BSc in Applied Geology and a PhD in Hydrogeology. I am also a Fellow of the Geological Society of London and a Chartered Geologist.
- 1.1.3 I have particular expertise in the mapping and assessment of groundwater flood risk and have undertaken numerous studies involving the analysis of drainage, flooding, and groundwater levels and flows and the interactions between surface water and groundwater systems. This includes research at Birmingham University and a lead role in the development of the Geosmart National Groundwater Flood Risk Map. I have worked with the national Flood Forecast Centre to develop a groundwater flood forecast system and produced groundwater sewer infiltration maps for several Water Companies. I was involved in reviewing the impact of groundwater flooding on development for Northamptonshire, West Sussex and Hertfordshire County Councils. I have been involved on behalf of Mr Padden in reviewing the impacts of the Monk Lakes development since 2014.
- 1.1.4 The evidence which I have prepared and provide for this appeal reference APP/U2235/W/20/3259300 in this proof of evidence is true and I confirm that the opinions expressed are my true and professional opinions. I understand my duty to the inquiry and have complied, and will continue to comply, with that duty.

1.2 Scope

- 1.2.1 Following on from my previous work, Mr Padden has requested that I prepare a proof of evidence concerning groundwater and flooding in relation to the unauthorised development at Monk Lakes. The work is on behalf of David Padden and the Hertsfield Residents Association. The work is an update to the statement of Paul Ellis dated 22nd March 2021 (CD9.42). Previous work has included an assessment of the site investigation undertaken by Mr Padden and the Appellant, plus a review of the hydrogeological and flood risk studies undertaken on the Appellants behalf. I have also reviewed supplemental information provided by the Appellant in response to consultees and hydrogeological advice provided to Maidstone Borough Council. Additional information provided since March 2021 has also been assessed in preparation of this proof of evidence. References to the relevant documents are provided in the subsequent sections of this report.
- 1.2.2 I have reviewed information provided within the statement of case (Pegasus Report reference P20-0831, Dated September 2020, CD 8.2), and the Appellants Addendum to Statement of Case, (December 2024, CD8.3). Plus the Environmental Statement (February 2019, CD1.1,) and the Environmental Statement Addendums (October 2019, CD1.2) and (February 2022, CD1.3) submitted in support of the appeal against the refusal for retrospective planning permission (planning reference: 11/1948). I have also referenced relevant consultee responses. Where necessary for additional

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supporting detail I have referenced previous review work for the planning enquiry in 2015 and the Environmental Impact Assessment in 2019.

- 1.2.3 It is understood that the SoS has made a further Reg 25 request and so a further ES Addendum is likely to be forthcoming over the next few weeks. I therefore reserve the right to review that information and update this Proof of Evidence as necessary.
- 1.2.4 Some of the plans and schemes presented by the Appellant are now 10 years old. In my previous review of the ES and Addendum (2021, CD9.42 and 2022, CD9.43) I raised a series of points that the Appellant could have addressed by this stage. It is unclear whether the further ES Addendum in 2025 will take the opportunity to respond to these criticisms.
- 1.2.5 Mr Padden has requested a review of the following concerns.
- 1.2.6 Mr Padden considers that sufficient attention has not been given to the monitoring, assessment and mitigation of the development's impact on groundwater and other sources of flooding prior to the proposed continuation of the development.
- 1.2.7 Mr Padden questions the appellants conclusion that the effect of the entire development, once complete, on the water environment is not significant. He wishes to assess if the impacts have been understated, specifically in relation to his property, Hertsfield Barn, a Grade 2 Listed Building.
- 1.2.8 Mr Padden has requested further consideration of the feasibility of the proposed flood mitigation measures. He is concerned, that they are inadequate and have insufficient supporting assessment to allow the planning permission to proceed through use of a planning condition.

1.3 Background

- 1.3.1 Mr Padden has reported waterlogged ground and multiple incidences of groundwater and surface water flooding that have affected his property (Hertsfield Barn) and neighbouring properties. There is strong evidence to suggest that this flooding is a result of the adjacent Monk Lakes unauthorised development.
- 1.3.2 A superficial aquifer (sand and gravel) extends beneath both Monk Lakes and the client's property (ESI, 2015, CD9.41), providing a pathway through which development activity at Monk Lakes could influence groundwater levels and water quality at Hertsfield Barn.
- 1.3.3 Groundwater monitoring was not in place before the unauthorised development took place, making it difficult to verify that an impact on baseline groundwater levels at Mr Padden's property has not occurred. It has therefore been necessary to consider how changes to the site may have influenced groundwater and flood risk at Hertsfield Barn.
- 1.3.4 It has been demonstrated that shallow groundwater levels at Monk Lakes are higher than adjacent levels at Hertsfield Barn which indicates groundwater flow, towards the Barn.
- 1.3.5 The original groundwater regime has been altered by the unauthorised Monk Lakes development, including removal of the original land drainage system, potential leakage

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from the lakes, removal of a section of aquifer and focused recharge of the aquifer along the western drainage ditch due to run-off from the steep slopes.

- 1.3.6 I consider that the potential impacts of the development have not been fully recognised or addressed. Supporting information for this has been presented previously (ESI, 2017, ESI, 2015 CD9.41, ESI 2014, Geosmart 2019a & 2019b -see Appendix A and B). Using the methodology for assessment set out in the latest ES addendum (February 2022, CD1.3) I consider there has been a fundamental effect on the water environment which has yet to be mitigated. Subject to mitigation measures and the proposed future development, I consider the development will have a Major to Moderate effect on the Water Environment. I have set out the reasons for challenging the conclusions of the appellants impact assessment in a later section of this report.
- 1.3.7 The Council's grant of planning permission was quashed following a Judicial Review judgement in January 2014 (Padden v MBC, 2014, CD5.1), on grounds that included, the Council had failed to properly investigate potential impact on localised groundwater.
- 1.3.8 Mr Padden requires mitigation of the development's impact on flooding prior to the proposed continuation of the development. The Appellant has not yet implemented a mitigation strategy for groundwater flooding or defined the criteria and trigger levels to measure the success of the mitigation. There is no current groundwater monitoring being undertaken in relation to Mr Padden's property to compare against and measure the performance of such a mitigation scheme.
- 1.3.9 The design of the proposed groundwater mitigation scheme, has not been updated in 10 years and remains in its initial outline form as a 'drainage strategy plan and typical details' (PBA, 2015, Drawing 29431/001/SK03, page 225, CD9.44). Detailed information is not provided on the current groundwater conditions to the west of the development and how these will be affected by the proposed mitigation measures. The feasibility of the scheme is uncertain.
- 1.3.10 Flood mitigation measures, including drains and attenuation basins are proposed along the western margin but have not been presented on the proposed site layout.

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Figure 1. View looking south of Hertsfield Barn and Monk Lakes 1 and 2 (October 2019).

- 1.3.11 Mr Padden continues to report ongoing impacts on his property: a reported loss of trees in his orchard due to waterlogging; flooding of his pond and driveway; infiltration to his sewage treatment plant; and internal damp affecting his property (a Grade II listed building). Photographs highlighting some of these impacts are presented in Appendix B and D. A photograph, taken from a drone, showing the close proximity of the unauthorised development and the vulnerability of Mr Padden's property is included above in Figure 1.
- 1.3.12 An update from Mr Padden in January 2025 indicated that he still frequently needed to pump out his pond, which is in continuity with the groundwater, to prevent over topping and flooding of his property. He indicated the lawn was regularly flooded and the areas of damp within his property are becoming more extensive 'which seems to be coming up through the floor'. A letter from Mr Padden's Engineer confirms ongoing issues with damp (Appendix E) including photographs.
- 1.3.13 Mr Padden purchased the property known as Hertsfield Barn in 2003. Mr Padden has reported an increase in water levels in his pond, which is likely to be in hydraulic continuity with the groundwater system. This has worsened over the years since circa 2008 and he now needs to pump out the pond on a regular basis to alleviate the effects of the flooding and prevent damage to his property. As stated in paragraph 6 of the judgement of Mackie in *Padden v Maidstone Borough Council* (2014) following the Judicial Review, Mr Padden has suffered 'serious interference which this flooding causes despite the work and cost of daily pumping'.
- 1.3.14 Mr Padden has reported that during excavation to establish the cause of damp currently damaging his property, water was observed running under the building foundations. He also states that excavations within the garden fill very quickly with water to just below the ground level for the majority of the year. Trial pits (ESI, 2015,

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CD9.41) indicate the presence of shallow groundwater contained in permeable horizons extending from 0.5 m to >2.1 m in thickness.

- 1.3.15 The Appellants claim (Hafren Water, 2017) that the increase in flooding at Hertsfield Barn is solely related to an increase in intense rainfall is not justified. Groundwater level contours presented by Mr Padden (Geosmart, 2019a, see Appendix A) indicate groundwater flow from Monk Lakes towards Hertsfield Barn.
- 1.3.16 Mr Padden has presented evidence (Geosmart, 2019a, see Appendix B) that indicates the lakes may be leaking, including the raised groundwater levels, and pictures from Mr Padden showing the drawdown in Lake levels during October 2019 and the requirement for additional pumping to top up the lakes.
- 1.3.17 Advisors to Maidstone Borough Council (MBC) have suggested that the risks can be managed through the use of planning conditions. I do not agree that such an approach is relevant in this case because much of the development has already been built and impacts have been observed. In this situation it is vital that further assessment is undertaken before planning permission is granted on the assumption that a mitigation scheme is feasible, as it may well not be.

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2 REVIEW OF THE STATEMENT OF CASE

I have reviewed the statement of case on behalf of Monk Lakes Ltd prepared by Pegasus Group Ltd (Dated September 2020, Ref P20-0831, CD8.2) and the addendum to statement of case (Dated December 2024, CD 8.3) in support of the planning appeal.

The addendum to the statement of case in December 2024 indicates that the original Statement remains valid and my following comments on the original statement remain relevant, with no changes as a result of the December 2024 addendum.

2.1 Response to Statement of Case CD 8.2, September 2020

2.1.1 Section 1.11 indicates an Updated Proposed Landscaping Plan (ref. P20-0831_02) has been submitted and states *'The proposed landscaping along the western and southern appeal site boundary remains the same'*. The proposed surface water attenuation strategy presented as part of the Environmental Statement (Next Phase, February 2019, CD1.1) has not been included within the design which suggests the Appellant has not considered how it will be incorporated within the landscaping of the development, given the limited space along the western margin and the need to avoid locating attenuation basins within the flood plain. The only drawing that I am aware of is the generic screen grab from the run-off model presented below.

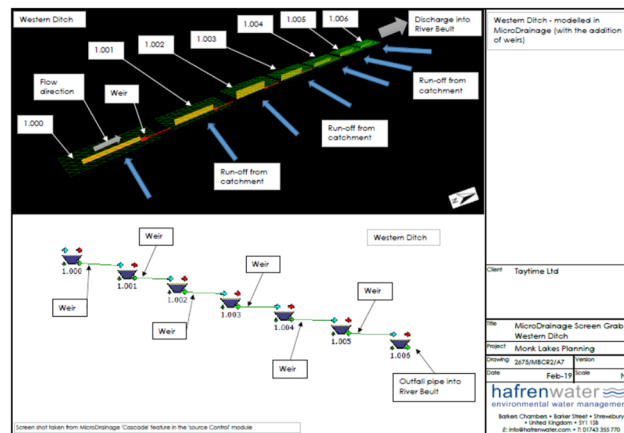


Figure 2, Schematic surface water attenuation scheme #
 (after 2675/MBCR2/A7, Vol2 part F of the ES, section 4.1 of Hafren 2019, pdf page 325 of the ES).

2.1.2 Section 3.16 indicates the Appellant has worked to satisfy the issues raised by the High Court. If planning permission is granted then it is assumed that MBC, as the party responsible for groundwater flooding, are satisfied that sufficient information has been supplied to *'properly investigate the potential impact on localised groundwater'* raised in the judicial review. As stated on many occasions through the process, the information collected is insufficient and there are strong arguments to suggest that Mr Padden's property, a Grade II listed building, has been adversely affected by the development as a result of groundwater flooding.

2.1.3 Section 4.4 states *'the current proposed development is similar to that which was previously approved by MBC in September 2012, with only minor alterations made between the two schemes. The western banks begin to rise around 6m closer to the western boundary in some places'*. From a flood risk perspective this is a significant

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change, as it is likely to increase the rainfall run-off that reaches the boundary with Mr Padden's property.

- 2.1.4 Section 4.23 relating to Drainage states *'The investigations carried out on site by the Appellant confirm that there are no groundwater issues associated with the site.'* I strongly disagree with this statement for all the reasons previously set out (Geosmart, 2019a & b).
- 2.1.5 In addition, MBC are relying on the Hydrogeological advice to Maidstone Borough Council in relation to planning application ref. 11/1948, dated July 2019, prepared by Mott Macdonald (MM, July 2019, CD3.13), which comments on the revised Environmental Statement (ES) (Next Phase, February 2019, CD1.1) as follows. MM state the ES *'does not present a comprehensive description (conceptual site model) of the assumed baseline hydrogeology, that includes all the available data for the site'* (section 1.3.3) and also *'The Revised ES and technical report does not address all of issues raised by stakeholders'* (section 1.3.4).
- 2.1.6 In addition, the MM July 2019 CD3.13 report (section 3.1.4) states *'The Hafren Water (2019) report does acknowledge the potential for an off-site impact on groundwater level but the overall tone of the document attempts to diminish the significance of the unmitigated effect. In doing so, the conclusions drawn are sometimes tenuous'*. Furthermore, the Appellant's Drainage Strategy Report (Peter Brett Associates (PBA), July 2015, Section 6.3.2, CD9.44) states *'It is possible that both ground and surface water flooding is occurring'*.
- 2.1.7 Section 4.23 of the statement of case (Pegasus, 2020, CD8.2) goes on to say *'Notwithstanding this, the drainage scheme has been designed to ensure that if there were any issues, the proposed mitigation set out in the Groundwater Monitoring Report (July 2015) and Drainage Strategy Report (July 2015, CD9.44), prepared by Peter Brett Associates and submitted as part of the Supplementary Environmental Statement, would adequately address and resolve these.'* This statement implies there are currently no issues with groundwater or drainage. I consider that unless the Appellant has a robust conceptual model for the site which incorporates the offsite impacts it is extremely unlikely that adequate mitigation measures can or will be developed.
- 2.1.8 Section 4.24 (Pegasus, 2020, CD8.2) states that *'It is proposed that the drainage scheme will be implemented in accordance with the scheme prepared by Peter Brett Associates which includes a groundwater inceptor drainage ditch and a surface water drainage system.'* However, as already noted above these are not shown on the revised landscape drawings submitted with the appeal (Pegasus,2020, Drawing ref. P20-0831_02).
- 2.1.9 Section 4.24 (Pegasus,2020 CD8.2) goes on to say *'These measures are considered sufficient to mitigate any flood risk and any potential ground water impacts arising from the proposed development.'* I consider it is not possible to justify this assertion. I support this using the following extracts including the MM (2019, CD3.13) review (item 3.1.7) which indicates that *'We agree that the proposed drainage system is a suitable solution but, the outline design needs to be refined.'*
- 2.1.10 In addition, section 6.3.3 of the Drainage Strategy Report (PBA, 2015, CD9.44) upon which the mitigation is based states *'A groundwater management system can be introduced to capture any possible elevated groundwater within the superficial deposits. It is important that any groundwater drainage is located above the water level of nearby ponds and watercourses as they may be recharged by groundwater. The*

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groundwater drainage system could, if incorrectly designed, create draw down of the water level in these features.'

- 2.1.11 MM (2019, CD3.13), section 2.3.12 states *'The design is reliant on a single water level measurement taken by ESI in 2015. It is recommended that this water level measurement is confirmed as accurate and that any other relevant off-site receptor elevations are sought prior to detailed design'*.
- 2.1.12 Drawing 29431/001/SK03 represents a proposed drainage strategy plan and typical details, it does not represent a detailed drainage design such as would be needed to be sure the scheme was feasible. It also does not benefit from the updated MBC 2019 topographic survey, nor does it incorporate the new details of the surface water attenuation scheme comprising attenuation basins and a weir system (see Vol2 part F of the ES CD1.1, section 4.1 of Hafren 2019 and Geosmart, April 2019, section on Flood attenuation storage within the western ditch).
- 2.1.13 Given that MM raise a number of feasibility issues with respect to the design, I suggest that the work needs to be done to demonstrate that the Appellant can achieve a robust practical solution to the issues. There is a significant risk that the proposals as currently constituted will fail. In fact, the outline design is not sufficient, given all the additional changes since the 2015 design, to conclude that the proposed mitigation measures would even be feasible, in the short or the long term.
- 2.1.14 Section 5.7 (Pegasus, 2020, CD8.2) indicates *'The purpose of the planning system is to contribute to the achievement of sustainable development'*. I note that building in the flood plain and the potential increase in groundwater flood risk resulting from the development does not support the environmental sustainability objective.

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3 REVIEW OF THE MBC PLANNING COMMITTEE REPORT – (JANUARY 2020) AND PROPOSED PLANNING CONDITIONS (DECEMBER 2024)

The MBC committee report (MBC, 2020, CD9.5) to the planning board (23 January 2020) as provided in Appendix 1B (Pegasus, 2020) has been reviewed with comments. The proposed planning conditions presented within Appendix 1 of the Statement of Common Ground, (MBC, December 2024, CD8.5) have also been reviewed.

3.1 Response

- 3.1.1 The summary of reasons for recommendation (approve subject to conditions) states that 'impacts relating to flood risk, surface water drainage, and groundwater drainage can be suitably mitigated.' I do not consider this statement is justifiable without presenting a detailed feasibility assessment based on the most recent site layout.
- 3.1.2 MBC (2020, CD9.5) also states '*The development has been adequately assessed against the pre-development state of the site (2003) and so the applicant has not gained an unfair advantage because this is predominantly retrospective development.*' As the groundwater monitoring program only commenced in September 2014, well after the development was put in place the Appellant has potentially gained a very significant advantage as it is extremely difficult to demonstrate changes in the groundwater system from the pre-existing conditions. Despite evidence to the contrary provided by Mr Padden the Appellant continues to maintain there has been no impact on groundwater flooding at Hertsfield Barn.
- 3.1.3 Sections 7.31 to 7.45 of MBC (2020, CD9.5) deal with issues relating to groundwater. These culminate in section 7.45 which states that '*Whilst disputed by the resident's consultant*' [in reference to Geosmart reports for Mr Padden] '*it is considered acceptable to require the fine detail of the mitigation via a condition. This is on the basis that the principle of this approach has been sufficiently assessed and scrutinised by MM and they are satisfied the ditch system is in principle a suitable solution and that the applicant's outline design is conceptually sound subject to refinement that the LPA can secure via conditions with the ongoing support of MM.*' I disagree with this statement and do not consider the outstanding items to be '*fine detail*' or that sufficient design work has been undertaken to confirm the proposed mitigation will be feasible as discussed above in my response to Pegasus 2020 section 4.23 and 4.24 (see above). In order for MBC to establish the groundwater mitigation is 'in principle a suitable solution' it would need to be established what the criteria for successful operation of the scheme will be and what the current and future impacts are. This has not yet been established by the Appellant.
- 3.1.4 Section 7.6 of MBC (2020, CD9.5) indicates a further 89,000 m³ of material would be required to complete the development which would require an Environmental Permit (EP). The EP will have to be in place prior to soil importation and will cover the operation and post-operation monitoring requirements. This will cover the materials being brought onto the site, pollution prevention measures, drainage, monitoring (gas, surface waters, noise, dust). The permit relates to the new material and I do not have information on whether the water quality monitoring will include any locations relevant

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to Mr Padden's Property or within the older waste material. I note that the acquisition of this permit is mentioned in the proposed heads of terms agreement .

3.1.5 Section 9.0 of MBC (2020 CD9.5) includes within the recommendations item 4 which states '*To complete the surface water and groundwater drainage mitigation along the western boundary within 9 months of permission being granted*'. I consider this is an ambitious timescale in which to complete a detailed design and implementation of a complex engineering scheme. It also does not allow time for potential boreholes to be installed and verification of water levels and hydrogeology offsite, including monitoring of water levels at Hertsfield Barn. I consider this essential to support an adequate design of the mitigation measures and meet the points set out in the Judicial Review (Padden vs MBC, 2014,CD5.1).

3.1.6 The relevant proposed planning conditions are set out in Appendix 1 of MBC 2024,CD 8.5, as follows:

3.1.7 Condition 3. '*Prior to the importation of any material or the carrying out of any further development, the detailed design of the groundwater interceptor drain shall be submitted to and approved in writing by the Local Planning Authority. The detailed design should be supported by site-specific data, calculations, and justified assumptions that fit with the established hydrogeological conceptual site model and shall include the following:*

a) Detailed construction drawings showing all elements of the groundwater and surface water drainage system;

b) Calculations of the anticipated volume of groundwater to be intercepted by the system.

c) Sensitivity testing of the design to allow for uncertainties, including aquifer thickness and permeability, hydraulic gradient and future increases in groundwater level (e.g. due to climate change).

d) Confirmation (where possible) of the elevations of relevant off-site receptors.

e) A narrative explaining the operating assumptions behind the design, including how the groundwater drainage system would interact with the site surface water system and discharge to the river under a range of groundwater level and river stage conditions. This should be supported by hydrogeological cross-sections illustrating the conceptual site model.

f) A maintenance plan for the groundwater interceptor drain and surface drainage ditch, to ensure its long-term integrity and functionality. This should identify who is responsible for maintenance and a means of demonstrating that the plan is being adhered to.

g) Demonstration that the design will resist long-term threats to its integrity and effectiveness, such as climate change, settlement, further developments at the site, etc.

The scheme shall be completed in accordance with the approved details.

Reason: To protect neighbouring properties against potential groundwater level impacts.'

3.1.8 In relation to point (d) I have been recommending offsite monitoring was undertaken as part of the Environmental Impact Assessment from an early stage. As yet this has not been undertaken, and without it, it will not be possible to devise a robust mitigation

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scheme. I therefore consider the stipulation '*where possible*' to be inappropriate. Mr Padden has indicated that there have been issues in the past with the Appellant not making a formal request for access to his property in advance.

- 3.1.9 Appropriate trigger levels have not been agreed which would define when an impact has occurred and if the mitigation is successful. As discussed previously it is difficult to have confidence that the Appellant will develop a suitable scheme without acknowledging that an impact has occurred.
- 3.1.10 In relation to point (e), the hydrogeological cross sections should extend beyond the site boundary to include the receptors the mitigation scheme is supposed to protect (eg Hertsfield Barn and pond). This will require geological information from potentially new boreholes and the previous site investigation work done by Mr Padden (ESI,2015). It is considered that this information should already have been included within the Environmental Impact Assessment as I requested previously. For example, the amended cross section presented by the Appellant does not extend the geology beyond the site boundary which would clearly show the potential risk of an influence on groundwater levels beneath Mr Padden's property. See Drawing 2675/MBCR2/03 (Hafren Water 2019) in the Environmental Statement, (Next Phase, 2019, CD1.1, page 244 of the Environmental Statement pdf).
- 3.1.11 The proposed condition is detailed and complex which highlights the uncertainty surrounding the feasibility of the mitigation scheme. There is no clear indication of the conditions the scheme is trying to achieve. It is imperative that feasibility assessment is undertaken before planning permission is granted.
- 3.1.12 Condition 4. *'Prior to the importation of any material or the carrying out of any further development, the following details shall be submitted to and approved in writing by the Local Planning Authority:*
- a) A site inspection and groundwater level monitoring plan, to be implemented during construction of the groundwater interceptor drain and associated works, to verify that site conditions are consistent with the established hydrogeological conceptual site model and design assumptions. This should include a protocol for responding to any deviations that would impact on the effectiveness of the approved design, and reporting these to the Local Planning Authority.*
- The groundwater level monitoring data shall be collated for submission to the Local Planning Authority in a verification report, upon completion of the groundwater interceptor drain works. The verification report shall also include the following information:*
- i) Photographs of the excavations before and after placement of the drainage system components;*
- ii) As-built drawings showing the surveyed elevations of installed drainage system components.*
- Should any deviations from the established hydrogeological conceptual site model or design assumptions be identified, the contractor shall cease works and agree any*

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proposed alterations to the design with the Local Planning Authority in writing, prior to their implementation.

Reason: To protect neighbouring properties against potential groundwater level impacts.'

- 3.1.13 The proposed condition requires a monitoring plan which I suggest should include monitoring of water levels on Mr Padden's property. The monitoring plan will rely on an *'established hydrogeological conceptual site model and design assumptions'* neither of which have yet been defined. It seems more logical that this is undertaken before planning permission is granted.
- 3.1.14 Condition 5. *'Prior to the importation of any material or the carrying out of any further development, the detailed design of the surface water drainage system, which shall be based on the strategy presented in Drawing 29431/001/SK03 prepared by Peter Brett Associates (3 July 2015, CD9.44), shall be submitted to and approved in writing by the Local Planning Authority. The scheme shall be completed in accordance with the approved details.*
- Reason: To mitigate any flood risks associated with surface water.'*
- 3.1.15 The condition references the strategy presented in Drawing 29431/001/SK03 prepared by Peter Brett Associates (3 July 2015, CD9.44) nearly a decade previously. I note that this does not include the sustainable drainage, surface water attenuation basins and check dams that were agreed with Kent County Council (see Vol2 part F of the Environmental Statement, CD1.1, section 4.1 of Hafren 2019). Neither have these measures been included on the updated Landscape plans submitted with the Appeal. I recommend that these measures are considered further prior to planning permission being granted given the space constraints along the western margin and the need to avoid placing mitigation measures within the flood plain.
- 3.1.16 The planning conditions purport to cover many of the issues raised in my previous correspondence in relation to groundwater and flooding, highlighting the inadequacies of the Environmental Statement and the need for further assessment, design and mitigation. What is sought on appeal is the grant of planning permission and the deferral of the necessary additional work under planning conditions with agreed time frames. However, as many of the conditions relate to confirmation of the feasibility of the mitigation measures these should be considered before permission is granted to ensure the mitigation proposed is suitable and there are no further delays in installation.
- 3.1.17 It is advisable that suitable monitoring and mitigation is in place before additional waste material is brought on site to complete Lake 1. This is to ensure any changes to the groundwater and surface water regime will be identified and mitigated.

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4 REVIEW OF THE ENVIRONMENTAL STATEMENT ADDENDUM CONCERNING THE EFFECTS OF THE DEVELOPMENT ON THE WATER ENVIRONMENT.

I have reviewed the environmental statement addendum prepared on behalf of Taytime Ltd by Pegasus Group Ltd (Dated February 2022, Ref P20-0831, CD1.3) in support of the planning appeal. The Environmental Statement Addendum responds to the Regulation 25 request for Further Information made on 1 April 2021. I have focussed the review on Chapter 6.0 which relates to the methodology and assessment of the likely significant effects of the development in relation to potential effects on the Water Environment.

The appellant has been asked for 'a clear explanation of the methodologies adopted to define the likely significant effects of the development.' I have reviewed the appellants methodologies and the outcome of the impact screening undertaken. I have identified several receptors relating to flood risk that are missing from the assessment, and the significance of the impacts has been understated. I have put forward evidence for this and my estimates of the impact of the development using the same framework set out by the appellant.

4.1 Response - Sensitivity of Receptors

- 4.1.1 The appellant is required to provide information on the sensitivity of individual receptors. The further information request states 'although impacts are described the sensitivity of individual receptors is not'.
- 4.1.2 The February 2022 (CD 1.3) addendum acknowledges the presence of two Listed Buildings including Hertsfield Barn (Grade II) within close proximity to the western boundary. However, Section 7 on cultural heritage makes no reference to the potential impact from increased flood risk on Hertsfield Barn, neither is this covered in section 6.0 on the Water Environment. Section 7.73 (Page 145) states 'It should also be reiterated that the significance of the Grade II Listed Barn is mostly embodied within its remaining physical fabric and historic interest as a rare, 15th century former agricultural building'. Mr Padden has made frequent representations that his property is being adversely affected by flooding as a result of the development (Appendix E). I consider Hertsfield Barn should be included as a receptor within the assessment of the likely significant effects of the development on the water environment.
- 4.1.3 The addendum highlights the risk to Monk Lakes due to fluvial flooding, however, it fails to adequately relate the impact of the development to the surrounding receptors outside the site boundary. The addendum should highlight, in addition to fluvial (river flooding) the other recorded flood risks to the site and the surrounding area from surface water, groundwater flooding and a breach in the fishing lake embankments. The proposed development has a material impact on all these forms of flooding which will also impact upon Hertsfield Barn.
- 4.1.4 The addendum, Table 2.3 indicates that Climate Change is assessed as part of the 'Water Environment' which is of direct relevance to the proposals being in close proximity to the River Beult. I also note that climate change will impact on the other sources of flooding that may affect Hertsfield Barn as a result of the development which are highly likely to be increased as a result of climate change. The effect of climate

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change on the water environment interacting with the development and increasing risk to offsite receptors should be considered within the EIA.

4.2 Flooding

- 4.2.1 In reference to Table 6.1: Criteria for Assessing Sensitivity of Receptors, I note that in line with government guidance the assessment should incorporate all sources of flooding and include potential increases in risk off site. The appellant has focused on assessing the impact on fluvial flood risk as being the main receptor and should also include a specific assessment of the other sources flooding in the surrounding area.
- 4.2.2 Government guidance states for the purposes of applying the National Planning Policy Framework, “flood risk” is a combination of the probability and the potential consequences of flooding. Areas at risk of flooding are those at risk of flooding from any source, now or in the future. Sources include rivers and the sea, direct rainfall on the ground surface, rising groundwater, overwhelmed sewers and drainage systems, reservoirs, canals and lakes and other artificial sources. Flood risk also accounts for the interactions between these different sources. [Reference <https://www.gov.uk/guidance/flood-risk-and-coastal-change>, Paragraph: 001 Reference ID: 7-001-20220825, Revision date: 25 08 2022]
- 4.2.3 In addition, the objectives of a site-specific flood risk assessment are to establish: whether a proposed development is likely to be affected by current or future flooding from any source; whether it will increase flood risk elsewhere; whether the measures proposed to deal with these effects and risks are appropriate; the evidence for the local planning authority to apply (if necessary) the Sequential Test, and; whether the development will be safe and pass the Exception Test, if applicable. [Reference <https://www.gov.uk/guidance/flood-risk-and-coastal-change>, Paragraph: 020 Reference ID: 7-020-20220825, Revision date: 25 08 2022]
- 4.2.4 According to the Environment Agency Website (<https://www.gov.uk/check-long-term-flood-risk>), Hertsfield Barn is at High Risk of Surface water flooding , Moderate Risk of Fluvial Flooding and within the extent of reservoir flooding when there is also flooding from rivers. The Environment Agency don't publish groundwater flood risk maps, but information from the British Geological Survey indicates that Monk Lakes and Hertsfield Barn are at risk of groundwater flooding at the surface.
- 4.2.5 Section 6.55, Table 6.4 refers only to flood risks to the site and ignores flood risk to adjacent receptors. The table also indicates that there is only potential for fluvial flood risk and screens out the potential for surface water flooding, groundwater flooding and flooding from infrastructure failure. However, as indicated in the Figures I present below, the site and surrounding area are at risk from these other sources of flooding, which should be included within the impact assessment in accordance with the appellants own EIA methodology. Table 6.1 identifies a High sensitivity receptor as an area that is at high risk from flooding (greater than 3.3% annual exceedance probability (AEP). A Medium sensitivity receptor is identified as an area that is at moderate risk from flooding (3.3% AEP to 1% AEP). There are clearly areas of flood risk both within the application area and in adjacent areas which should be included within the impact assessment.

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4.2.6 Fluvial (River Flooding)

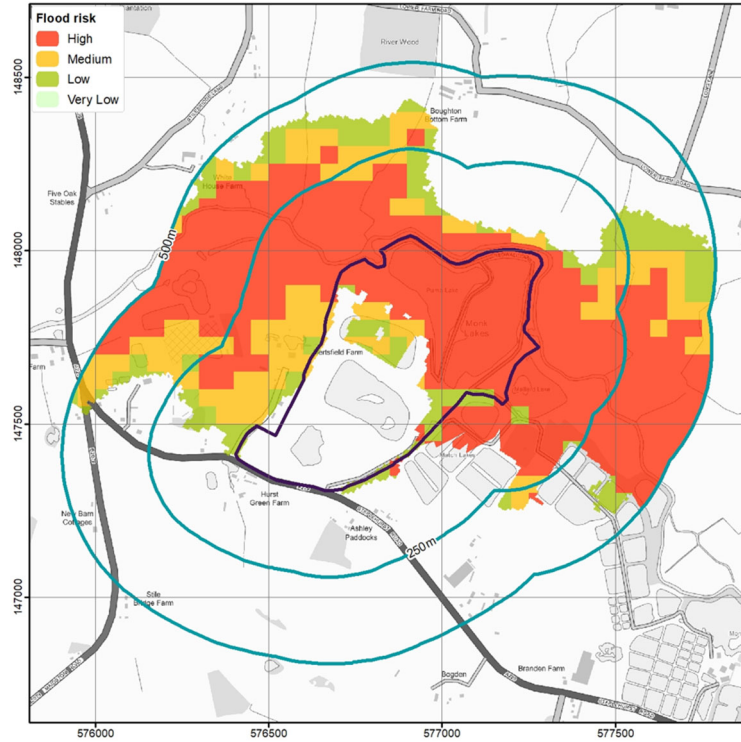


Figure 3 Environment Agency Risk of flooding from Rivers and Sea (ROFRAS)

Fluvial flooding is acknowledged as a risk, and will require the implementation of a flood storage compensation scheme to mitigate the impact on other receptors. I note that parts of the site currently designated at Low risk in Flood Zone 1, are likely to have been at a lower elevation (and therefore at higher risk) under baseline (pre-development) conditions. It is evident from the data in Figure 3, the Environment Agency model used to define the flood zones is using the recent topography after land raising has occurred.

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4.2.7 Groundwater Flooding

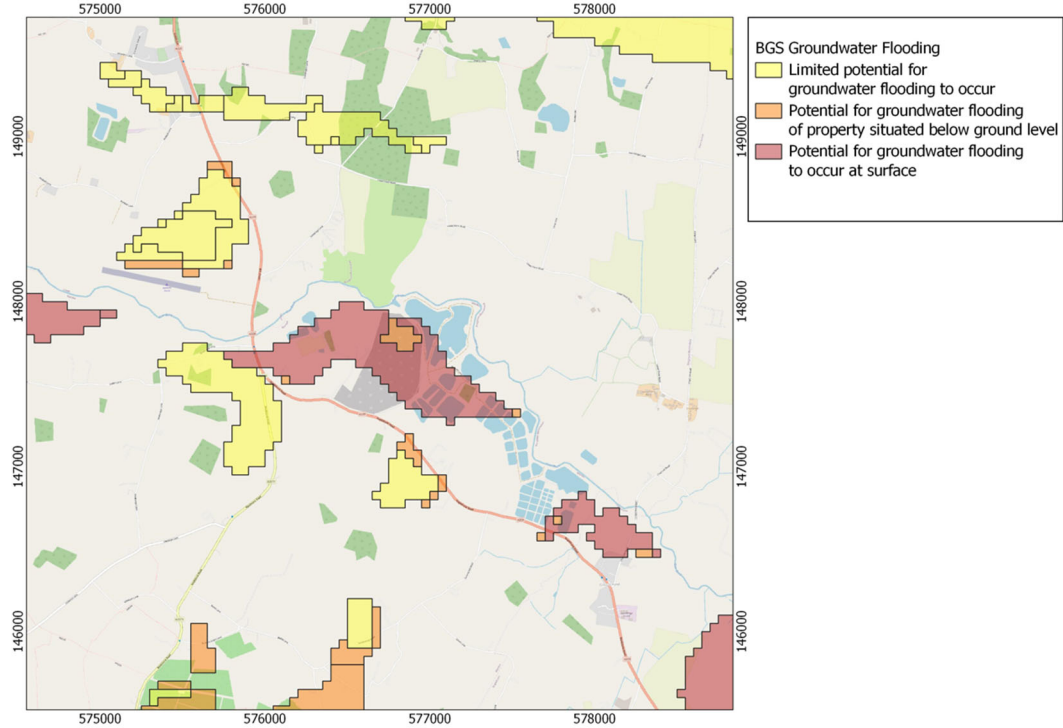


Figure 4 Susceptibility to groundwater flooding map, version 6.1, British Geological Survey.

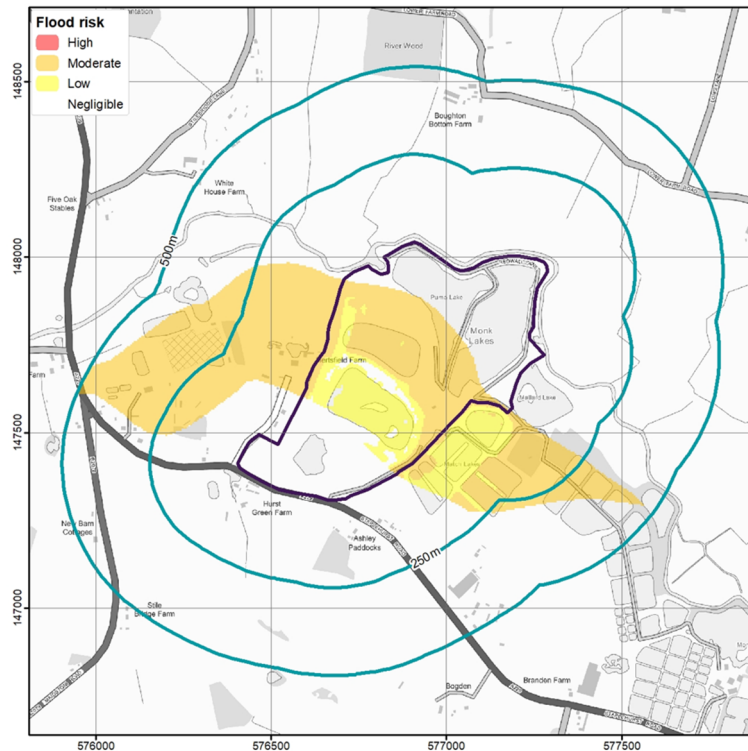


Figure 5 Groundwater Flood Risk Map GW5, Geosmart Information, National Map.

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Two commercially available, national data sets identify both Monk Lakes and Hertsfield Barn to be at risk of groundwater flooding. This is likely as a result of the shallow groundwater table within the permeable superficial deposits. As indicated in my previous statements there is evidence to suggest that the development has increased the risk of groundwater flooding.

4.2.8 Surface Water

Information on the pluvial (surface water) flood depth is presented showing the extreme (1 in 1000, 0.1% AEP) and medium risk (1 in 100, 1% AEP) scenarios. The extreme case has a low probability of occurring, but highlights the risk areas around Hertsfield Barn and the A229 to the south. The risk of surface water flooding is likely to be increased along the western margin of the development due to the presence of a steep slope and the low permeability of the material used to create the raised lake. The cumulative impact of the development on the existing off-site, surface water flood risk should therefore be considered within the impact assessment.

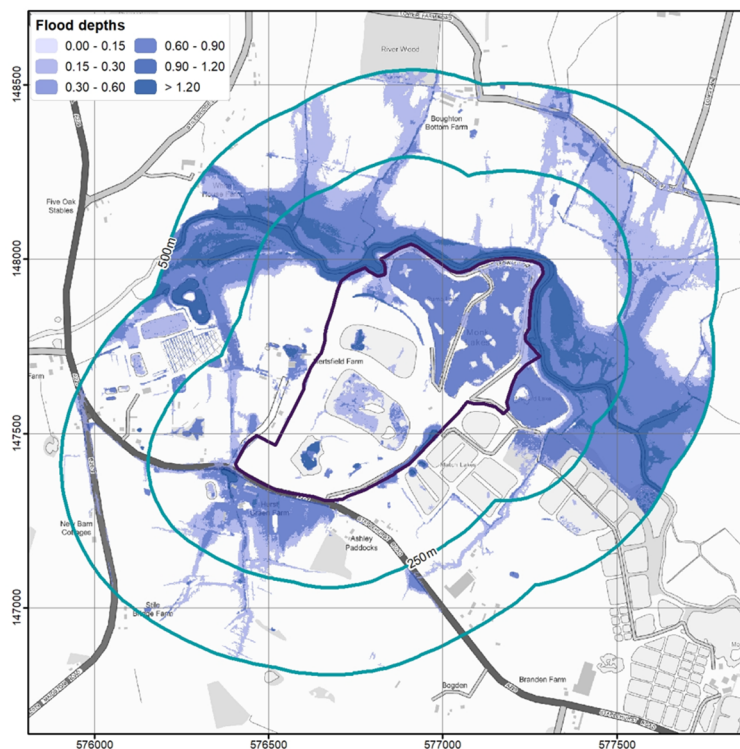


Figure 6 Environment Agency Surface Water flood depths for the 1 in 1000 year event.

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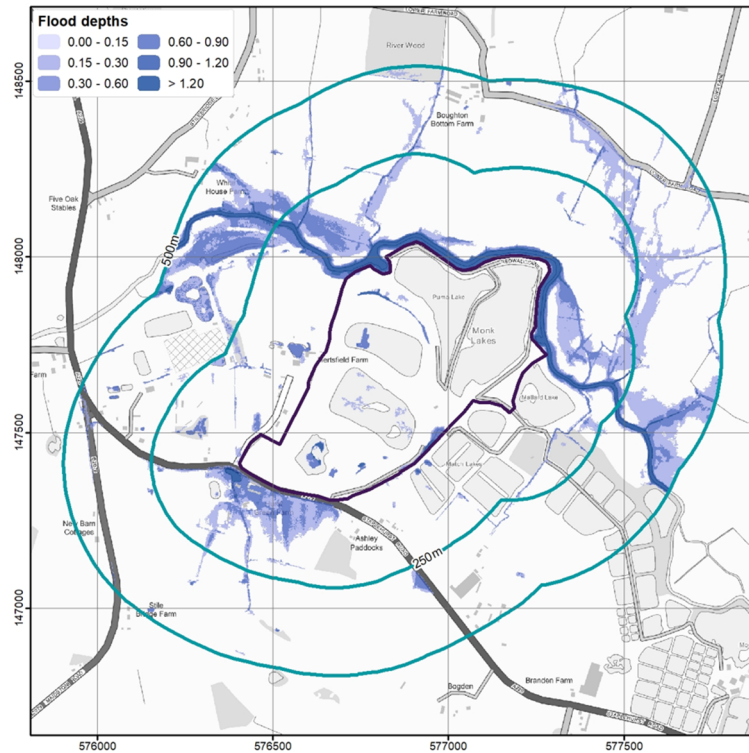


Figure 7 Environment Agency Surface Water flood depths for the 1 in 100 year event.

4.2.9 Reservoir Flooding

As indicated in Figure 8, Hertsfield Barn lies within the extent of reservoir flooding when there is also flooding from rivers. There will be additional cumulative risk from the adjacent raised reservoir which should be included within the impact assessment. There will remain a residual risk for as long as the raised fishing lakes are in operation, and the degree of risk will depend on the ongoing inspection and maintenance of the lake banks. To provide context, Figure 1 is a photograph taken from a drone showing the close proximity of Hertsfield Barn to the raised lakes.

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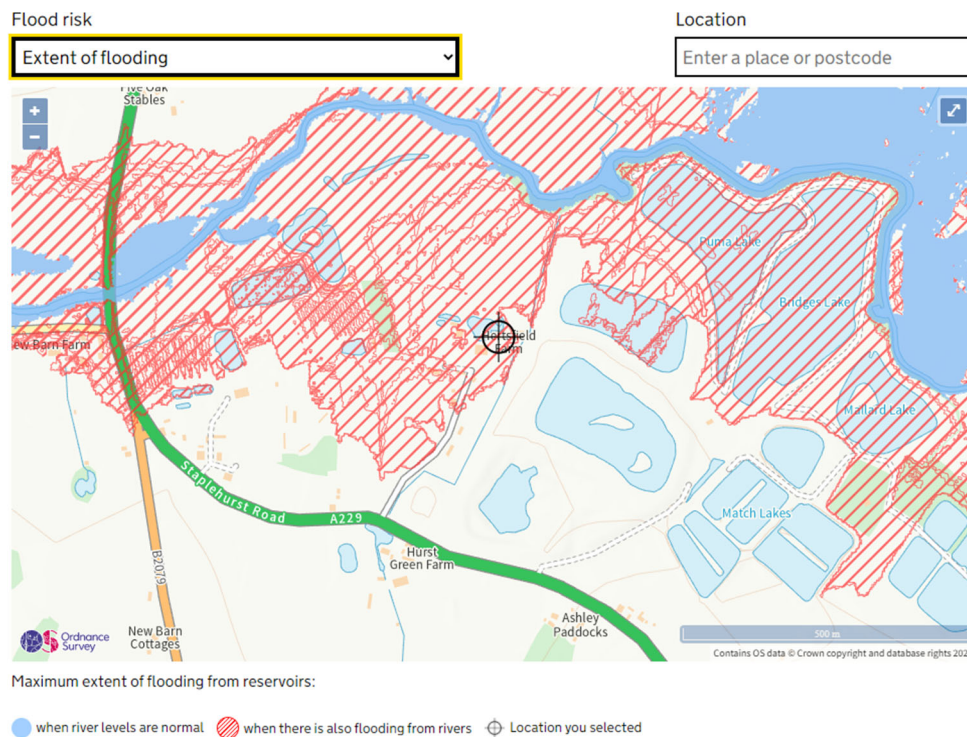


Figure 8 Environment Agency Maximum extent of flooding from reservoirs.

- 4.2.10 In relation to Table 2.3: Environmental Themes Scoped In/ Out of the EIA (page 6), I note under Accidents and Disasters it states 'It is also acknowledged that as a number of the lakes are 'raised' there is a residual risk of failure of the embankments if not constructed properly'. However, it then goes on to scope this out of the EIA on the grounds that it is covered under the reservoir act. I disagree that this should be scoped out of the EIA, given that the design of the development has led to the creation of this long-term residual risk, which could be mitigated by altering the design to reduce the height of the fishing lake above ground level. The raised design of the fishing lakes ('reservoir') is a key part of the planning application and therefore the construction and safety of the proposal should be considered within the impact assessment, particularly as the residual risk will remain without ongoing mitigation through regular inspection.
- 4.2.11 The findings of the breach analyses undertaken by N. Reilly in his calculations dated 5/10/2011 (page 540 of the pdf of the Environmental Statement, Next Phase, February 2019, CD1.1) states 'A breach of either of lakes 1 or 2 on the west side would seriously affect properties in Old Hertsfield. Velocities of flow at the foot of the embankment would approach 10 m/s although they would slow rapidly to much less while at the same time becoming deeper. Around 50 m from the toe a depth of about 0.5 m could be expected with a velocity of around 1 m/s'. In the event of a failure the impact on Hertsfield Barn could clearly be significant.
- 4.2.12 As discussed in a subsequent section of this report there is uncertainty regarding the proper supervision, construction and filling of the reservoirs, with evidence from the Environment Agency, dated September 2015 (Appendix C), that it may have been undertaken without the supervision of a reservoir panel engineer. The flood risk related

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to the reservoir should therefore be considered relevant to the retrospective planning and lie within the scope of the EIA.

4.3 Response - Significance of Impacts

- 4.3.1 According to Table 6.2 (ES Addendum, February 2022, CD1.3), a major change can be defined as 'Fundamental (long term or permanent) changes to the baseline hydrology, hydrogeology and water quality'. I consider the importation of thousands of tonnes of waste material to create a series of raised lakes has fundamentally changed the baseline water environment, including changes to the recharge of the underlying aquifer and the loss of field drains, field boundary ditches and ponds which would have positively drained the Site (as indicated in Section 6.38). A fundamental change to the River flood plain has occurred resulting in a loss of flood plain storage which will require extensive mitigation.
- 4.3.2 Section 6.38 (ES Addendum, February 2022, CD1.3), states that for the pre-development scenario small volumes of groundwater are likely within the river terrace deposits' and ' groundwater would be anticipated to flow generally northwards'. I therefore assume that any changes in these conditions would be identified as an impact using the applicants EIA methodology. As mentioned in my previous work, groundwater level contours presented by Mr Padden (Geosmart, 2019a) indicate groundwater flow in a northwesterly direction from Monk Lakes towards Hertsfield Barn, evidence that a change in flow direction from baseline conditions has occurred.
- 4.3.3 Section 6.38 notes the loss of several field drains, field boundary ditches and ponds which would have positively drained the Site and conveyed water to the River Beult. The development has therefore created a fundamental change from the baseline water environment.
- 4.3.4 The development has created a significant change from the baseline water environment. Mitigation measures are proposed but have not yet been implemented. Therefore, the current magnitude of change resulting from the existing development is considered to be Major within the site boundary, and Major to Moderate along the western boundary and at Hertsfield Barn. The long-term performance of the mitigation measures is unknown and reliant on regular maintenance, which may be difficult for the buried drainage system proposed for the mitigation of high groundwater levels. It is therefore not possible to assume that the proposed measures will mitigate the long-term flood risk caused by the development.
- 4.3.5 As mentioned previously the proposed attenuation basins for the surface water run-off are not shown on the proposed development plans, and so it is not clear that there is sufficient space to accommodate them within the proposed landscaping.
- 4.3.6 Surface water flooding should be highlighted as a potential risk to the site and adjacent receptors. The information I have presented above highlights locations at high, medium and low risk both within the site and on the land immediately adjacent to the site. This complies with the appellants own definition of high, medium and low sensitivity receptors in Table 6.1(ES Addendum, February 2022, CD1.3).
- 4.3.7 The appellant has acknowledged the increase in surface water flood risk which has necessitated a flood attenuation scheme along the western margin of the development (see section 6.101).
- 4.3.8 It is considered likely that Hertsfield Barn would be classified as a moderate to highly sensitive receptor based on the current probability of flooding and Grade II listed status (Table 6.1). The Monks Lakes development has potentially created additional risk

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which may have a cumulative impact on the existing surface water flood risk, consequently resulting in a Major to Moderate significance of effect (Table 6.3, ES Addendum, February 2022, CD1.3). I consider this to be the current impact status of the 'Retrospective Development' as mitigation measures have not been implemented. Surface water flooding should therefore be assessed more rigorously within the EIA.

- 4.3.9 Groundwater flooding is not considered a significant risk by the appellant, despite the published data to the contrary presented in Figures 4 and 5, and the long history at the site surrounding the investigation of groundwater flooding, including a previous judicial review. The applicant's boreholes have proved the existence of a shallow groundwater table and BGS mapping supported by site investigation data from Mr Padden indicates the aquifer extends beneath Hertsfield Barn. As discussed in my previous report (Geosmart, 2019a – see Appendix A) groundwater contours indicate potential groundwater flow from Monk Lakes, towards Hertsfield Barn.
- 4.3.10 The appellant states within Table 6.4 'Any shallow groundwater located within the overlying river terrace and alluvium deposits is likely to be in hydraulic conductivity with the River Beult and therefore risk from this source of flooding to the Site is considered low'. I do not agree that continuity with the river reduces the flood risk. In fact, it is likely to increase the risk of groundwater flooding, as a rise in river level can cause a rise in shallow groundwater levels in response. This mechanism of groundwater flooding from Permeable Superficial deposits (PSD) is well established and used within both the Geosmart and BGS national groundwater flood risk maps. For example, the British Geological Survey define this type of groundwater flooding in a shallow unconsolidated sedimentary aquifer setting as follows.
- 4.3.11 'Groundwater flooding is often associated with shallow unconsolidated sedimentary aquifers which overly non-aquifers. These aquifers are susceptible to flooding as the storage capacity is often limited, direct rainfall recharge can be relatively high and the sediments may be very permeable, creating a good hydraulic connection with adjacent river networks. Groundwater levels are often close to the ground surface during much of the year. Intense rainfall can cause a rapid response in groundwater levels; rising river levels, as the upstream catchment responds to the rainfall, can create increased heads that drive water into the aquifer (<https://www2.bgs.ac.uk/groundwater/flooding/unconsolidated.html>).
- 4.3.12 The applicant has elsewhere acknowledged the potential increase in groundwater flood risk which has necessitated the proposal for a groundwater drainage system in an attempt to mitigate the flood risk along the western margin of the development. Mr Padden has presented evidence of groundwater flooding to his property on several previous occasions (ESI, 2015 CD9.41 & Geosmart, 2019 – see Appendix A).
- 4.3.13 It is considered likely that Hertsfield Barn would be classified as a moderate to highly sensitive receptor based on the current probability of flooding and Grade II listed status (Table 6.1). The Monks Lakes development has potentially created additional risk which may have a cumulative impact on the existing groundwater flood risk, consequently resulting in a Major to Moderate significance of effect (Table 6.3), which is potentially the current impact status of the 'Retrospective Development' as mitigation measures have not been implemented. Groundwater flooding should therefore be assessed more rigorously within the EIA.
- 4.3.14 Flooding from infrastructure failure: the applicant has indicated that, 'the Site is not reliant of any offsite infrastructure and is therefore not considered to be at risk'.

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However, as indicated in Figure 6 the site is identified as at risk from off-site reservoirs. The applicant also states that 'a detailed assessment of potential breach scenario of the lakes has been undertaken and shown that risk of inundation due to a breach is considered very low as the impoundment features will be managed under the Reservoirs Act 1975'. The potential magnitude of the impact on Hertsfield Barn resulting from a breach in the lakes could be very significant, despite the probability of the breach occurring being low. The reference to a breach analyses undertaken by N.Reilly in 2012, predates the final construction and filling of Lake 2 and relies upon appropriate construction methods being employed.

- 4.3.15 As indicated in my previous report (Geosmart, 2021, CD9.42) The construction of Lakes 1, 2, and 3 should have been subject to continuous supervision as required by legislation. Based on the aerial imagery presented in Figure 7 of the PBA (2015, CD9.44) drainage report, Lake 2 was unfinished in July 2011, and completed and filled by 15th February 2014. Google Earth Imagery further refines the timeline and indicates Lake 2 was unfilled on the 9th July 2013. However, a letter from the Environment Agency dated 8th September 2015 (page 471 of the ES pdf) states that 'No new reports have been submitted to our Reservoirs team and no certificate has been submitted to show that the lakes can properly be filled with water'.
- 4.3.16 A freedom of information request was submitted to the Environment Agency by R.Lord (Geosmart, 2021 – See Appendix C) and supplied on 10/12/2020 detailing various correspondence in relation to the Monks Lake development. An email dated 6/08/2014 from Nick Reilly (reservoir construction engineer) to Richard Knight (EA) states 'I have heard nothing for well over a year from the Harrisons re Monk Lakes and was beginning to suspect that their plans had been abandoned. As you know I assisted them to formulate their planning application with the aim (on their part) that I would act as Construction Engineer under the Act. I have never been formally appointed to this role and my intention was that I would not accept it unless they regularised their approach to be more professional in design, testing and supervision etc'.
- 4.3.17 There remains uncertainty regarding the proper supervision, construction and filling of the reservoir which may have been undertaken without the supervision of a reservoir panel engineer. I consider this is relevant to the impact of leakage on groundwater flooding and has other implications for flood risk and safety. It should therefore be considered relevant to the determination of the planning appeal rather than just a matter for the Environment Agency under the Reservoirs Act 1975. Regular inspection by a panel engineer may be considered as a mitigation measure, but it does not remove the residual risk created by the formation of the raised fishing lakes adjacent to Hertsfield Barn.
- 4.3.18 Section 6.57 indicates further development is not proposed in flood zones 2 and 3. However, the flood zones defined by the Environment Agency on the basis of the current topography may well have been more extensive before the land raising took place.
- 4.3.19 On the basis of the multiple sources of flooding and the surrounding receptors identified above, I disagree with Section 6.58 which states 'Flooding risk to the Site is therefore considered low, however there is a limited potential for an increased risk of surface water flooding downstream of the Site as a result of the Proposed Development yet to be completed.'
- 4.3.20 I have identified fluvial, surface water, groundwater and reservoir flooding as flood risks associated with the retrospective planning permission for the site as it currently stands

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rather than only for the proposed development yet to be completed. Mitigation measures have not been implemented in the majority of cases and therefore the impact of the current development is significant.

4.3.21 Section 6.74 acknowledges that surface water regime has been modified by the Retrospective Development but then states this is only a localised effect. I strongly disagree that this is only a local short to medium term effect. According to Table 6.2 the magnitude of the change would be considered Major, with a long term change to both the hydrology and hydrogeology, with the loss of drainage ditches beneath the fill material and the permanent creation of steep slopes and increased run-off along the margins, potentially creating permanent impacts outside of the application area. Mitigation measures have not been installed and therefore the magnitude of the impact of the Retrospective Development is permanent and remains Major. If mitigation measures are installed there is a long term requirement to maintain these features and I consider insufficient information has been provided to confirm that they will work in the long term. On this basis I consider the impact of the retrospective development on the water environment to be as follows.

Receptor	Sensitivity	Magnitude of Change	Significance of effect
Surface water flooding along the western margin	Medium to High: Run-off from the retrospectively developed steep slopes flows towards Hertsfield Barn which lies within 50m of the western boundary. Hertsfield Barn contains areas at High and Moderate risk of surface water flooding (>3.3% and 3.3% to 1% AEP). Previous flooding has been reported from the western perimeter ditch and mitigation measures, although proposed have not been installed. The development is contributing to an increase in flood risk.	Major (potentially reducing to Moderate if mitigation installed). The hydrology of the area along the western boundary has been fundamentally changed with deposition of inert waste material, installation of steep slopes resulting in increased run-off and changes to the hydrodynamics of the western boundary ditch, plus loss of much of the pre-existing drainage system beneath the lakes. Mitigation has not been installed for	Major (With mitigation the significance would be Moderate based on the sensitivity of the receptor and the permanent nature of the change)

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		the Retrospective development.	
Groundwater regime and flooding along the western margin	<p>Medium to High: The predeveloped site and adjacent area is identified as being at risk of a shallow water table and groundwater flooding at surface, within at least the moderate risk category (3.3% to 1% AEP). Potential sources for increases in groundwater level (and flooding) as a result of the retrospective development have been identified including focussed recharge along the western margin, removal of the pre-existing land drainage, possible leakage from the lakes, and compaction/obstruction of the aquifer beneath the lakes.</p> <p>I have presented evidence that groundwater flows towards Hertsfield Barn which lies within 50m of the western boundary. Mr Padden has reported frequent problems with groundwater flooding.</p> <p>Mitigation measures, although proposed have not been installed. The</p>	<p>Major (potentially reducing to Moderate if mitigation installed). The hydrogeology of the area along the western boundary has been fundamentally changed with deposition of inert waste material causing permanent changes in the aquifer recharge pattern, loss of previous land drainage and potential alteration to groundwater storage and flow directions. Baseline monitoring was not undertaken prior to the development and therefore it is difficult to prove exactly what changes have occurred. However, there is strong evidence presented by Mr Padden that an impact is currently occurring which has not been addressed by the applicant, as offsite monitoring data has not been included in the assessment.</p>	<p>Major</p> <p>(With mitigation the significance would be Moderate based on the sensitivity of the receptor, the uncertainty of the proposed mitigation and the permanent nature of the change)</p>

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	development is contributing to an increase in flood risk.	Mitigation has not been installed for the Retrospective Development. As stated previously I do not consider that sufficient assessment has been undertaken to confirm the proposals will be successful or effective in the long term.	
Fluvial Flooding – construction within the flood plain along the northern and western margins	<p>Medium to High: The predeveloped site and adjacent area is identified as being at High and Medium risk of fluvial (>3.3% and 3.3% to 1% AEP). A significant volume of inert waste has been deposited within the flood plain resulting in the loss of 42,550 m² of flood plain storage.</p> <p>Mitigation measures, although proposed have not been undertaken. The development is contributing to an increase in flood risk.</p>	<p>Major (potentially reducing to Moderate if mitigation installed). The hydrology of the flood plain along the River Beult has been fundamentally changed with deposition of inert waste material causing permanent changes in the flow across the flood plain.</p>	<p>Major</p> <p>(With mitigation the significance would be Moderate based on the sensitivity of the receptor, the uncertainty of the proposed mitigation and the permanent nature of the change)</p>
Flood Risk from Reservoir Flooding	<p>Medium to High: The predeveloped site and adjacent area is identified as being at Risk of flooding from reservoirs when there is also flooding from the River. In</p>	<p>Major (potentially reducing to Moderate if mitigation measures are undertaken). The risk from reservoir flooding to the area</p>	<p>Major</p> <p>(With mitigation the significance would be Moderate based on the sensitivity of the</p>

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	<p>addition, according to the appellants supporting information, if a breach were to occur in the western margin of Lake 2, Hertsfield Barn would be seriously affected, with a potential flood depth of 0.5 m and a velocity of around 1 m/s.</p> <p>The development is contributing to an increase in flood risk.</p>	<p>along the western boundary has been fundamentally changed with the creation of the embankments and lakes raised 6m above ground level. A significant new flood risk has been created and there is uncertainty over the supervision and construction of the lakes. Construction records have not been provided.</p> <p>Mitigation is reliant upon regular inspection by a panel engineer in the long term.</p>	<p>receptor, the uncertainty of the proposed mitigation and the permanent nature of the change)</p>
<p>Pollution of groundwater and surface water</p>	<p>Medium.</p> <p>A significant quantity of waste material (assumed to be inert) from a variety of sources was imported to create the lakes through an exemption from the requirement for an environmental permit. Spillage from mobile plant may have occurred. Sediment accumulation may be generated by run off from temporary surfaces.</p>	<p>Moderate reducing to Minor on the basis that supporting records are provided demonstrating the inert nature of the imported waste material and the short term nature of any potential impact. Future work would require an environmental permit and discharge consent</p>	<p>Moderate (With mitigation and regular water quality sampling the significance would be Minor assuming contamination was not detected)</p>

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		supported by regular monitoring. Mitigation supported through the use of Environmental Permits is not yet in place for the site.	
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Table 1 – Significance of the effect of the development along the western margin

- 4.3.22 Table 1 has been produced on the basis of my review of the available data and the definitions provided in tables 6.1,6.2 and 6.3 of the 2022 addendum. Significant long-term impacts have already occurred as a result of the retrospective development and mitigation measures will be required to reduce the significance of these effects. The proposed construction activity related to the importation of more inert waste to create Lake 1 will result in an additional major and fundamental change to the groundwater regime and the drainage system along the western margin. The infilling of the existing pit and creation of the new raised landform with steep slopes will increase run-off and focus additional flow through the western drainage ditch. There will be an increase in surface water flood risk, plus the risk from a breach in the new reservoir and potentially groundwater flooding related to additional recharge along the western margin.
- 4.3.23 I disagree with the statement in Section 6.116 that the effect of the whole development (Retrospective and Proposed) on receptors is assessed as Negligible and not significant in EIA terms. I have identified a number of receptors in the vicinity of the site, that have not been appropriately assessed. This includes areas adjacent to the site with pre-existing surface water and groundwater flood risk which according to Table 6.1 would be classed as moderate to highly sensitive receptors. The sources of flood risk are in addition to the fluvial flood risk which has been identified by the appellants. Hertsfield Barn is a grade II listed building which lies within both a groundwater and surface water risk zone with a reported increase in flood risk since the retrospective development has taken place. It should therefore be considered as a sensitive receptor covered within the EIA.
- 4.3.24 My assessment of the current retrospective development is that it has had a Major effect on the water environment and associated receptors based on Table 6.3. Mitigation measures have not yet been installed to mitigate the impact of the retrospective development. With mitigation the significance of the effect could be reduced to Moderate to Major, based on the sensitivity of the receptor, the uncertainty of the proposed mitigation and the permanent nature of the change that has already occurred. The proposed future development involves the importation of further waste material and will create additional surface water, groundwater and reservoir flood risk which will require mitigation. I recommend that the impact of the retrospective development is mitigated as a priority to ensure the proposed measures operate as predicted before additional material is imported. I also recommend that alternative

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designs for the proposed development are considered that remove the increase in flood risk. To reduce the risk from a lake/reservoir breach I recommend avoiding the creation of additional above-ground lakes and reducing the bund height of Lakes 2 and 3, potentially by infilling of the adjacent void on the site of Lake 1.

- 4.3.25 I consider the proposed development will have a Major effect on the water environment and associated receptors. With mitigation the significance of the effect could be reduced to Moderate to Major, based on the sensitivity of the receptor, the uncertainty of the proposed mitigation and the permanent nature of the change that has already occurred.
- 4.3.26 I disagree with the statement in Section 6.119 that all in-combination effects have been considered. I have identified areas of pre-development groundwater and surface water flood risk that may have been negatively impacted by the development.

4.4 Contamination

- 4.4.1 Table 2.3 of the 2022 ES addendum CD1.3 indicates ground conditions and contamination have been scoped out of the ES and includes the statement ‘the risk of unknown ground contamination is low’. However, the applicant has not provided any records of the imported material deposited on site beyond limited retrospective sampling. The site was not operated under an Environmental Permit and still does not have an Environmental Permit to cover the ongoing discharges from the site. A construction report, which should form part of the reservoir construction process, has also not been provided. I therefore do not agree that contamination should be scoped out of the EIA on the basis that the risk of unknown ground contamination is low.
- 4.4.2 Section 6.103 of the 2022 ES addendum CD1.3, mentions the need to obtain a discharge permit. I note that the site has been in operation for a number of years and the appellant is aware of the need for discharge consents from the Environment Agency for the current operation. These permits have not yet been obtained and provide an indication of the appellants attitude to regulatory requirements. Mitigation measures for the proposed development rely on obtaining a number of permits and good practice measures set out in Table 6.6 . I note that it is unclear if any of the assessment and water quality monitoring required for the permits in relation to the proposed development will incorporate the retrospective development. Continued water quality and groundwater level monitoring of the existing site will help identify and mitigate any potential impact from the retrospective development.

4.5 Review of the Water Environment

The following points summarise my review of the Environmental Statement and Addendums in relation to the water environment.

- 4.5.1 Section 6.2 lists a number of reports produced on behalf of the applicant but fails to list any of the additional relevant material produced by other stake holders which will be relevant to the EIA. In particular expert reviews produced for Maidstone Borough Council (Mott Macdonald, 2019. Hydrogeological advice to Maidstone Borough Council in relation to planning application ref. 11/1948, dated July 2019, CD3.13). In

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addition, reports submitted by Mr Padden containing evidence of the hydrogeology around Hertsfield Barn are also extremely relevant to supplement the applicants assessment of risk (including ESI, 2015. Report on “The potential for groundwater flooding resulting from the unauthorised development at the neighbouring property known as Monk Lakes” - reference RL1-63346R2 CD9.41 & Geosmart 2021, Statement on Hydrogeology and Flooding, CD9.42).

- 4.5.2 Section 6.4 lists the work undertaken to prepare the ES Addendum, but as discussed above the methodology of the February 2019 ES (and subsequent Addendum), should include a review of all the relevant data.
- 4.5.3 Section 6.6, as discussed in the previous reports (Geosmart, 2020) I do not agree that all hydrology, hydrogeological, flooding, and drainage issues can be satisfactorily addressed and mitigated by the development, subject to planning conditions and/or legal agreement. The principle of planning conditions is to allow the development to proceed subject to undertaking certain work. In this case the majority of development has already proceeded so the use of consent with conditions is not appropriate for the assessment of impact.
- 4.5.4 The issue of whether there has been an impact on the neighbouring properties should be assessed and a conclusion reached before a decision on the development can be made. The only exception to this logically would be if a scheme was installed that would be guaranteed to remove the risks, which in this case would entail more work before feasibility can be confirmed. This should include agreement of criteria to judge if the mitigation measures are successful. It is not possible to agree with the applicants assessment that there is an insignificant risk to the water environment and Hertsfield Barn.
- 4.5.5 In relation to Section 6.65 I have previously raised concerns regarding the monitoring frequency and resolution required to pick up information on leakage from the lakes and infiltration from the western ditch to the underlying groundwater system. In addition, the groundwater assessment is deficient in its lack of offsite monitoring, particularly in regard to the potential for groundwater flooding at Hertsfield Barn (Geosmart, 2021). Information on groundwater levels and geology collected through site investigation work by Mr Padden at Hertsfield Barn has been provided and should have been included within the Environmental Impact Assessment as requested previously. For example, the amended cross section presented by the Appellant does not extend the geology beyond the site boundary which would clearly show the potential risk of an influence on groundwater levels beneath Mr Padden’s property. See Drawing 2675/MBCR2/03 (Hafren Water 2019) in the Environmental Statement, (Next Phase, 2019, CD1.1, page 244 of the Environmental Statement pdf).
- 4.5.6 Given the lack of the key information within the EIA I disagree with the statement 6.68 that the study ‘provides a clear understanding of the baseline conditions both for the Retrospective Development and the Proposed Development’.
- 4.5.7 I have demonstrated that shallow groundwater levels at Monk Lakes are higher than adjacent levels at Hertsfield Barn which indicates groundwater flow, towards the Barn. The impact assessment doesn’t acknowledge this evidence or account for the potential increased flood risk to the Barn. Appropriate trigger levels have not been agreed which would define when an impact has occurred and if the proposed mitigation is successful.

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It is difficult to have confidence that the Appellant will develop a suitable mitigation scheme without acknowledging that an impact on groundwater levels has occurred.

- 4.5.8 I disagree with section 6.74 which states 'previous assessments have confirmed that the importation of inert materials on groundwater was considered to be minor and no significant change in groundwater levels or flows, including offsite groundwater flooding, had been noted as a result of the Retrospective Development'. I have presented evidence on several previous occasions that suggests that groundwater flooding has been increased by the development and this is supported by comments from other expert reviews.
- 4.5.9 For example, the Hydrogeological advice to Maidstone Borough Council in relation to planning application ref. 11/1948, dated July 2019, prepared by Mott Macdonald (MM, July 2019, CD3.13), which comments on the revised Environmental Statement (ES) (Next Phase, February 2019) as follows. MM state the ES 'does not present a comprehensive description (conceptual site model) of the assumed baseline hydrogeology, that includes all the available data for the site' (section 1.3.3) and also 'The Revised ES and technical report does not address all of issues raised by stakeholders' (section 1.3.4).
- 4.5.10 In addition, the MM July 2019 CD3.13 report (section 3.1.4) states 'The Hafren Water (2019) report does acknowledge the potential for an off-site impact on groundwater level but the overall tone of the document attempts to diminish the significance of the unmitigated effect. In doing so, the conclusions drawn are sometimes tenuous'. Furthermore, the Appellant's Drainage Strategy Report (Peter Brett Associates (PBA), July 2015, CD9.44, Section 6.3.2) states 'It is possible that both ground and surface water flooding is occurring'.
- 4.5.11 Section 6.101 provides information on the proposed groundwater mitigation measures and states pipes will be installed to a level of 14.7m AOD and the groundwater drainage conveyed to the River Beult. I note that it is highly likely that the drainage will be below the water table and potentially require dewatering which will have a short-term impact on the water environment, followed by the long term impact of the drain on groundwater levels. I note that the design of the groundwater drainage system is based on very limited data, as off site monitoring has not been undertaken by the appellant. A review by Mott Macdonald on behalf of Maidstone Borough Council (2019), section 2.3.12 states 'The design is reliant on a single water level measurement taken by ESI in 2015. It is recommended that this water level measurement is confirmed as accurate and that any other relevant off-site receptor elevations are sought prior to detailed design'.
- 4.5.12 In addition, an analyses of the operation of the system when the river levels are high (potentially above the proposed invert level) is also required. Trigger levels should also be set to establish when the system is operating correctly. Without a detailed analyses of the operation and effectiveness of the proposed groundwater drainage system it is difficult to agree with the assumption that the risk from groundwater flooding will be mitigated.
- 4.5.13 A series of weirs and associated basins are proposed to attenuate surface water run-off, however, these basins have not been included in the proposed development plans. Given the space constraints along the western margin, it is not possible to be certain that the basins can be installed successfully within the currently proposed landform.
- 4.5.14 I have presented national maps, including data from the British Geological Survey showing the site is at risk from groundwater flooding. I also note that the appellant is

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proposing to install groundwater mitigation measures, which acknowledges the potential risk from groundwater flooding.

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5 RESERVOIR FLOODING AND LEAKAGE

- 5.1.1 MBC (2020, CD9.5) Section 7.66 states *'With regard to reservoir safety, this is dealt with under separate legislation and the Environment Agency has confirmed that there are currently no breaches under the Reservoirs Act at the site.'* I consider that the safe construction of reservoirs is also relevant to the determination of the planning application, given that the original plans have changed. The raised lakes should be registered under the Reservoirs Act 1975, supported by a construction report and panel engineer to undertake regular inspection. As far as I am aware this information has not been provided to support an up-to-date flood risk assessment incorporating verification of the reservoir construction as a mitigating factor for the potentially severe impact on Hertsfield Barn from a reservoir breach. There is also potential that the lakes may be leaking if they have not been constructed in a controlled manner with suitable material.
- 5.1.2 The construction of Lakes 1, 2, and 3 should have been subject to continuous supervision as required by legislation. Based on the aerial imagery presented in Figure 7 of the PBA (2015) drainage report Lake 2 was unfinished in July 2011, and completed and filled by 15th February 2014. Google Earth Imagery further refines the timeline and indicates Lake 2 was unfilled on the 9th July 2013. However, a letter from the Environment Agency dated 8 September 2015 (page 471 of the ES pdf) states that *'No new reports have been submitted to our Reservoirs team and no certificate has been submitted to show that the lakes can properly be filled with water under the supervision of the Construction Engineer who we were notified in April 2015 as Mr Geoffrey Wilson.'*
- 5.1.3 A freedom of information request was submitted to the Environment Agency by R.Lord and supplied 10/12/2020 (Appendix C), detailing various correspondence in relation to the development. An email dated 6/08/2014 from Nick Reilly (reservoir construction engineer) to Richard Knight (EA) states *'I have heard nothing for well over a year from the Harrisons re Monk Lakes and was beginning to suspect that their plans had been abandoned. As you know I assisted them to formulate their planning application with the aim (on their part) that I would act as Construction Engineer under the Act. I have never been formally appointed to this role and my intention was that I would not accept it unless they regularised their approach to be more professional in design, testing and supervision etc.'*
- 5.1.4 The email goes on to say *'I have been approached by Roger Lewis who is seeking to ascertain the status of the project and in particular who is the Construction Engineer. As you will appreciate the Harrisons are technically in breach on a number of counts but particularly in relation to nr 2 reservoir which exists but has not been registered or certified although it was inspected by Stewart Cale in November 2007. At my last involvement it had not been filled and was probably not capable of being filled so provided this is still the case there is only a compliance problem and not a risk problem'*. Based on the aerial photography it appears that the reservoir construction and filling may have been completed without a supervising engineer. This has implications for leakage from the reservoir and potentially flood risk from the reservoir.
- 5.1.5 Section 2.3.4 of the PBA (2015, CD9.44) groundwater monitoring report states *'Whilst the assessment of the design and construction of the lakes and their embankments is outside the scope of this report, given that a Reservoir Panel Engineer (Scott Wilson 2007 and Scott Wilson 2010) was involved in reviewing the design and construction of the lakes it is considered that the appropriate stability, overflow capacity and water-*

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tightness measures have been undertaken. This, in conjunction with an assessment of monitoring of water levels and that the client has indicated that lake levels have not needed to be topped up, suggests that the likelihood of significant leakage is negligible. This statement should not however be taken as conclusive evidence of the condition of the sides and bases of the lakes.'

- 5.1.6 I note that the aerial imagery suggests the majority of Lake 2 was constructed and filled after the Scott Wilson reports had been completed. Based on the FOI request (R.Lord, 2020, Appendix C) it is understood that an inspection was undertaken by Stewart Cale on 07/11/2007 at which time the existing embankments for Lake 2 were formed from earth fill excavated from the existing fishing lakes. It is clear, that the construction details have changed considerably since this time, with the importation of additional fill.
- 5.1.7 MM 2019 (page 6) state *'The Applicant has not presented (as requested by MBC) a water balance that demonstrates whether or not recharge from lake leakage could be contributing to increased groundwater water levels.'*
- 5.1.8 There remains uncertainty regarding the proper supervision, construction and filling of the reservoir which may have been undertaken without the supervision of a reservoir panel engineer. I consider this is relevant to the impact of leakage on groundwater and has other implications for flood risk and safety. It should therefore be considered relevant to the determination of the planning application rather than only a matter for the Environment Agency.

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6 OUTSTANDING ISSUES

I have summarised the outstanding items which should be finalised during this appeal:

- 6.1.1 The conceptual model of the groundwater system presented in the ES needs to be updated after suitable further investigation and monitoring, to recognise the potential impact on groundwater flooding at Hertsfield Barn and support the design of mitigation measures. In particular, the source of flooding and water damage identified by Mr Padden should be investigated to confirm whether this has been caused by the Monk Lakes development. I consider that unless the Appellant has a robust conceptual model for the site which incorporates the offsite impacts it is extremely unlikely that adequate mitigation measures will be developed.
- 6.1.2 The feasibility of the proposed measures to mitigate groundwater flooding have not been demonstrated to a sufficient standard to be confident that further design would result in a satisfactory outcome. The basis for the design is 10 years out of date from PBA (2015, CD9.44), Drawing 29431/001/SK03 and represents a proposed drainage strategy plan and typical details, it does not represent a detailed drainage design. The strategy is reliant on a single water level measurement taken by ESI in 2015, CD9.41.
- 6.1.3 Advisors to MBC have suggested that the risks can be managed through the use of planning conditions for the 'fine detail'. I do not agree that the understanding of the site is far enough advanced or that such an approach is relevant in this case. The majority of the development adjacent to Mr Padden has already taken place and impacts have been observed. In this situation it is vital that further assessment is undertaken before planning permission is granted. In order for MBC to establish the groundwater mitigation is *'in principle a suitable solution'* it would need to be established what the criteria for successful operation of the scheme will be and what the current and future impacts are. This has not yet been established by the Appellant. The proposed planning conditions are complex and highlight the uncertainty surrounding the feasibility of the mitigation scheme. Feasibility assessment must be undertaken before planning permission is granted.
- 6.1.4 The significant uncertainties in the extent and behaviour of the groundwater system along the western margin should be reduced through monitoring to provide confidence in the proposed mitigation measures.
- 6.1.5 As the groundwater monitoring program only commenced in September 2014, well after the development was put in place the Appellant has potentially gained an advantage as it is extremely difficult to demonstrate changes in the groundwater system from the pre-existing conditions. Despite evidence to the contrary provided by Mr Padden the Appellant continues to maintain there has been no impact on groundwater flooding at Hertsfield Barn.
- 6.1.6 The Appellant has failed to demonstrate that the flooding events at Hertsfield Barn are connected to extreme rainfall alone (Geosmart 2019a&b). They have not been able to demonstrate that the lakes are not leaking and that the proposed construction activities to form the lakes have not affected the aquifer, causing a rise in the groundwater at Hertsfield Barn and damage to the Grade II listed barn.
- 6.1.7 Updated plans for the planning appeal (ref. P20-0831_02) do not include the new details of the surface water attenuation scheme. Section 4.6 of the ES addendum, 2022 describes the changes from the originally proposed development. However, the proposed plans (Volume 2, Appendix 4, The 'Proposed Site layout' page 13) have not

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been altered to accommodate the proposed surface water attenuation scheme comprising attenuation basins and a weir system to mitigate flood risk along the western boundary (see Figure 2675/MBCR2/A7, Vol2 part F of the ES, section 4.1 of Hafren 2019 and Geosmart, April 2019). This suggests the Appellant has not considered how the basins will be incorporated within the landscaping of the development, given the limited space along the western margin and the need to avoid locating flood attenuation basins within the flood plain. Without a correct understanding of the proposed site topography and its relationship to the adjacent receptors I do not consider it feasible for appropriate conclusions to be reached from the Environmental Impact Assessment.

- 6.1.8 Approval of the final proposed surface water management plans and drawings should be provided by the lead local flood authority before planning permission is granted. To date, technical drawings of the new surface water scheme have not been presented.
- 6.1.9 More comprehensive water quality assessment is required to cover the broad range of contaminants that could be associated with the historic deposition of waste materials on the site. An environmental permit will be required for the importation of 89,000 m³ of new material to complete the development. However, the permit may not incorporate monitoring relevant to Mr Padden's property and is administered by the Environment Agency. The permit will be determined after planning permission has been granted. Therefore, the permit is not relevant to the assessment of water quality impacts associated with the retrospective aspect of the planning application.
- 6.1.10 Alternative options for the final scheme and completion of Lake 1 have not been considered to any significant extent by the Appellant.
- 6.1.11 I consider that sufficient information has not been supplied to '*properly investigate the potential impact on localised groundwater*' as raised in the judicial review of 2014. The points following from the judicial review remain outstanding as further investigation and mitigation is required before planning permission is granted so that the impact on groundwater is fully understood.
- 6.1.12 The raised lakes are registered under the Reservoirs Act 1975, and should be supported by a construction report and panel engineer to undertake regular inspection. Evidence has not been provided to indicate this was the case during the whole period of construction. Information from the Environment Agency dated September 2015 states that no certificate had been submitted to show that the lakes could be properly filled with water under the supervision of the Construction Engineer. Aerial imagery indicates the Lakes had been constructed and filled by 15th February 2014. Email correspondence with the EA indicates that a construction engineer may not have been in place to supervise this.
- 6.1.13 Based on the potential leakage from the lakes, and difficulty inspecting the embankments due to vegetation growth, I consider that the reservoir cannot yet be assumed as safe for the purposes of determining the planning application.

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7 CONCLUSION

- 7.1.1 I consider that the groundwater regime has been altered by the Monk Lakes development, which has probably caused a rise in groundwater levels at Hertsfield Barn. Contributing factors include removal of the original land drainage system, potential leakage from the lakes, removal of a section of aquifer and focused recharge of the aquifer along the western drainage ditch due to run-off from the steep slopes.
- 7.1.2 I consider the findings of the Judicial Review judgement in January 2014 (Padden v MBC, 2014, CD5.1), relating to the failure to properly investigate potential impact on localised groundwater, remains the case. Sufficient investigation remains outstanding before the impact on groundwater is fully understood and effective mitigation put in place.
- 7.1.3 The Appellant has not yet implemented a mitigation strategy for groundwater flooding or defined the criteria and trigger levels to measure the success of the mitigation. To effectively design a successful scheme will require a detailed conceptual hydrogeological model of the area surrounding the development, comprising plans and cross sections, including off site receptors and identifying the groundwater contour levels and flows the mitigation scheme is seeking to achieve compared to the current situation. This should be supported by appropriate modelling and calculations to demonstrate the feasibility of the scheme before planning permission is granted.
- 7.1.4 The feasibility of the proposed groundwater mitigation scheme, developed to an outline stage in 2015, has not been sufficiently assessed to support retrospective planning permission. Nearly a decade has passed and the proposed groundwater mitigation strategy has not been updated to include additional information or analyses. It remains in its initial outline form as a 'drainage strategy plan and typical details' (PBA, 2015, Drawing 29431/001/SK03, page 225, CD9.44). The scheme has not been assessed in sufficient detail to determine its effect on water levels to the west of the site. The Appellant has not established sufficient monitoring in relation to Mr Padden's property to measure the performance of such a mitigation scheme, or defined how good performance will be assessed.
- 7.1.5 Flood mitigation and sustainable drainage measures, proposed in 2019, including drains and attenuation basins for surface water, have not been fully incorporated in the revised drawings submitted in support of the appeal (Pegasus, 2020, ref. P20-0831_02). As such it is unclear if the proposed system will be feasible given the steep slopes and limited space on the western margin.
- 7.1.6 The Environmental Statement should include receptors both on and offsite, including Hertsfield Barn which lies adjacent to the western boundary. In addition, the section on flooding is too limited and should include all the sources of flooding which are identified including: fluvial, groundwater, surface water and reservoir, which comply with the applicants criteria for identifying sensitive receptors.
- 7.1.7 I consider that the retrospective development has caused a fundamental change to the water environment resulting in a Major effect which has not been mitigated effectively and will require significant remedial action. I have identified receptors in the vicinity of the site, including groundwater and surface water flood risk and Hertsfield Barn, that

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have not been appropriately assessed. Importation of further waste material to create an additional raised lake with an associated increase in flood risk is proposed.

- 7.1.8 I do not agree with the conclusion of Chapter 6 of the ES addendum (2022, CD1.3) that 'Subject to adaptation of good practice methods and obtaining the relevant permits and permissions, no adverse significant effects on the Water Environment are predicted during the construction and operation of the entire development'. With mitigation measures installed the effect of the entire development is considered Moderate to Major, unless significant alterations are implemented to the proposed design.
- 7.1.9 The principle of planning conditions is to allow the development to proceed subject to undertaking certain work. In this case the majority of development has already proceeded so the use of consent with conditions is not appropriate for the assessment of impact.
- 7.1.10 Conditions may still be appropriate for management of water safely at the site, but the issue of whether there has been an impact on the neighbours should be assessed and a conclusion reached before a decision on the development can be made. The only exception to this logically would be if a scheme was installed that would be guaranteed to remove the risks, which in this case would entail more work before feasibility can be confirmed. This should include agreement of criteria to judge if the mitigation measures are successful.

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8 REFERENCES

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Geosmart, 2021. Statement of Paul Ellis dated 22nd March 2021, The potential for groundwater flooding resulting from the unauthorised development at the neighbouring property known as Monk Lakes, reference 70276R3, CD9.42.

Geosmart, 2022. Note in Response to Applicant ES Addendum (February 2022) – Matters relating to the Water Environment, dated 13th April 2022, reference 70276R4, CD9.43.

Hafren Water, February 2019. Response 2 To Maidstone Borough Council Regarding Water Issues at Monk Lakes' provided on behalf of Taytime.

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Scott Wilson, 2007. Report on the Inspection of Monk Lakes (Lake 2) Reservoir Under the Reservoirs Act 1975. Reference D118024 \R17858\SAC November 2007.

Appendix A:

Geosmart Letter, April 2019a, Hertsfield Barn: response to EIA statement for Monk Lakes, reference 70276R1.

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12 April 2019

David Padden
The Rear Barn
The Manor Farm
124 Manor Road North
Thames Ditton
Surrey
KT7 0BH

Ref: 70276R1

Dear David,

Re: Hertsfield Barn: response to EIA statement for Monk Lakes

Introduction

A review of the amended Environmental Impact Assessment Statement (EIA) for Monk Lakes, dated February 2019, has been undertaken by Dr Paul Ellis, Director of Geosmart Information Limited, environmental specialists in land, water and sustainable drainage. Dr Ellis has over 20 years' industry experience with particular expertise in the analysis of drainage, flooding, and interactions between surface water and groundwater systems, plus development of Geosmart's National Groundwater Flood Risk Map.

This review has focused on the impact of the development in relation to groundwater, surface water and flood risk. Dr Ellis (previously at ESI Ltd (ESI)) has been involved since 2014 on behalf of the client (David Padden) with several phases of investigation and impact assessment of the Monk Lakes development in relation to the client's property at Hertsfield Barn.

Particular attention has been given to Part F of the amended EIA 'Response 2 To Maidstone Borough Council Regarding Water Issues at Monk Lakes' provided by Hafren Water (Hafren) on behalf of Taytime in February 2019, which has not been previously reviewed. The latest response from Hafren follows on from issues raised by consultees in response to Hafren's previous report included as Part G of the amended EIA 'Response to Maidstone Borough Council regarding water issues at Monk Lakes' provided by Hafren Water in July 2017 and reviewed by ESI in September 2017. Hafren Water have focused their response on comments raised by Maidstone Borough Council (MBC) Kent County Council and the Environment Agency (EA) (Hafren, 2019, Appendix 2675/MBCR2/A1). We have reviewed the responses and additional

information provided in relation to our understanding of the site and linked this to the comments raised by MBC and EA where these are pertinent to Hertsfield Barn.

Background

Mr Padden has reported waterlogged ground and several incidences of flooding that have affected his and neighbouring properties. There is strong evidence to suggest that this flooding is a result of the adjacent Monk Lakes development. A review undertaken by ESI of the evidence for this has been presented previously (ESI, 2017, ESI, 2015 and ESI 2014). Mr Padden continues to report ongoing impacts on his property: a reported loss of trees in his orchard due to waterlogging; flooding of his pond and driveway; infiltration to his sewage treatment plant; and damp affecting his property. Photographs highlighting some of these impacts are presented in Appendix A.

Previous review by ESI (2015, 2017) of the potential environmental impact from the development identified the following key issues that should be understood and mitigated to prevent a negative environmental impact from the Monk Lakes development:

- Shallow Groundwater Pathway - a superficial aquifer extends beneath both Monk Lakes and the clients property, providing a pathway through which development activity at Monk Lakes could influence groundwater levels and water quality at Hertsfield Barn.
- Impacts relating to flooding and raised groundwater levels are reported by the client (and other neighbours), which they state were not experienced prior to the development.
- Evidence collected by both Mr Padden and Taytime Ltd suggests that the groundwater regime has been altered by the Monk Lakes development, which has caused a rise in groundwater levels at Hertsfield Barn.
- The potential impact of the development on Hertsfield Barn has not been considered appropriately within the Environmental Impact Assessment.
- The evidence base upon which the assessment has been undertaken is not sufficient, in spatial extent or frequency.
- The potential impact on water quality has not been fully assessed.
- The potential impacts of the development have not been fully recognised or addressed. The originally proposed mitigation measures have been altered and are not subject to detailed design or assessment of potential benefits or negative impacts. The mitigation measures would need to operate in perpetuity to ensure there is no recurrence of impact should the system fail.

We have reviewed the responses prepared by Hafren Water 'RESPONSE TO THE MBC LETTER OF 18th OCTOBER 2018 AND E-MAIL OF 25th JANUARY 2019' (Hafren Water, 2019, page 3), presented in the Environmental Statement (ES) on page 204 of the pdf document. We have grouped our comments on the responses into several main areas as summarised below and explained in more detail in the following sections.

- The relationship between the groundwater system, the western ditch and Hertsfield Pond including the influence of the Monk Lakes development beyond the western site boundary (MBC comments 3, 6, 9, 11)
- Changes in the groundwater regime and water balance post development (MBC comments 1, 2, 4a, 5, 7, 8)
- The proposed western ditch mitigation measures (MBC comments 4b, 10)
- Adequacy of data collation and review of flooding at Hertsfield Barn (MBC comment 12)

The relationship between the groundwater system, the western ditch and Hertsfield Pond including the influence of the Monk Lakes development beyond the western site boundary (MBC comments 3, 6, 9, 11)

A full understanding of the water environment is required to estimate the impact from the development on Hertsfield Barn. Any omissions or errors could result in an under estimate of the impact of the unauthorised development and reduce the effectiveness of the proposed mitigation measures.

Groundwater levels along the boundary with Monk Lakes appear to be higher than the natural pre-development conditions. Post-development groundwater levels monitored both within Monk Lakes, and on adjacent land, indicate a groundwater flow gradient in a north westerly direction, towards Hertsfield Barn.

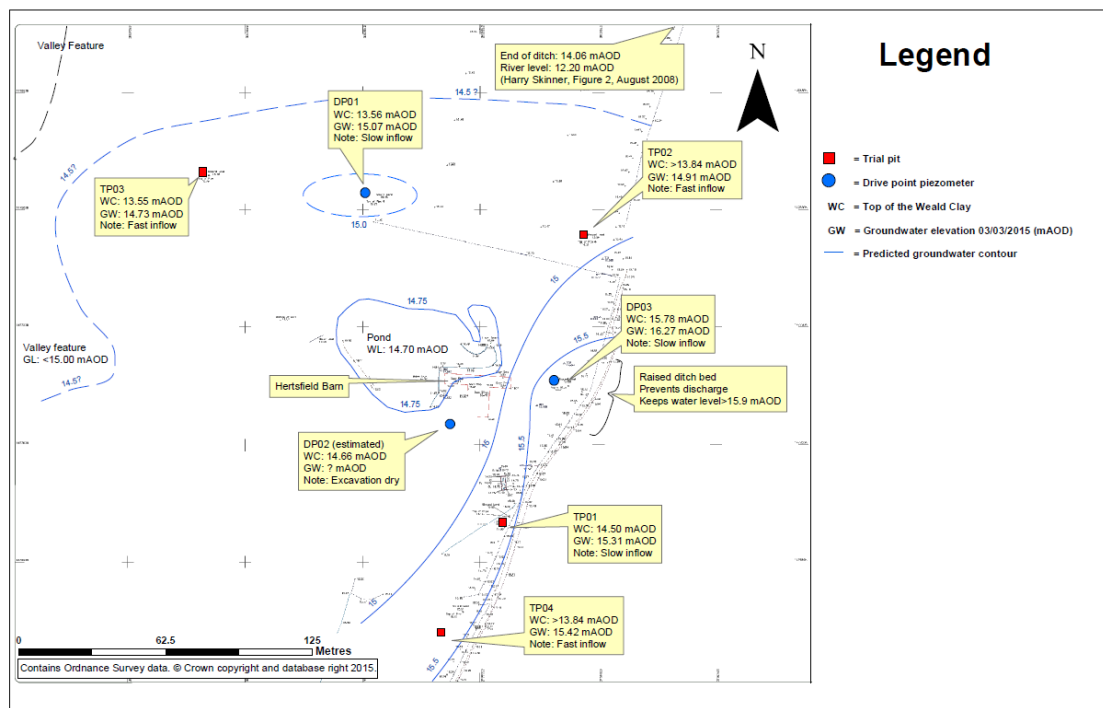
Ground levels around Hertsfield Barn are approximately 15 mAOD and generally below invert levels in the adjacent ditch, known as the 'western ditch'. The newly created steep banks surrounding the Monk Lakes development are considered to have created additional runoff and provided flow for the western ditch. The ditch often holds standing water, is unlined, and the additional runoff then infiltrates and has saturated the shallow groundwater system and resulted in a local rise in groundwater levels. The invert level of the ditch is often above ground levels further to the west. It was previously recommended that further investigation should be undertaken, including installing a data logger in the ditch and adjacent boreholes to establish the relationship between ditch water and groundwater levels. This recommendation has not been implemented.

The latest submission includes an updated cross section referred to in ES 6.15. The cross section has been amended with the elevation of Hertsfield Barn pond shown as 14.7m. The revised cross section is in response to the MBC comment 3:

'By setting the pond water level approximately 1.3m higher than a measured value the hydraulic gradient from the made ground west towards the pond is not revealed'.

The amended cross section is presented as Drawing 2675/MBCR2/03 (page 244 of the ES pdf). It confirms groundwater flow direction is likely to be towards Hertsfield Barn which is consistent with other shallow groundwater data (ESI, 2015). Unfortunately, the additional ESI data, which is provided below in Figure 1, is not shown on the amended cross section. Amended groundwater contours are presented in Drawing 2675/MBCR2/03 in Hafren Water 2019 (page 248 of the ES pdf) which confirm that flow is likely to be towards Hertsfield Barn. The contours do not include any estimates of groundwater levels outside of the Monk Lakes site, i.e. at Hertsfield Barn.

Figure 1 Estimated groundwater contours (from ESI,2015, Figure 8)



Groundwater contours should include the groundwater low around Hertsfield pond and make reference to the earlier trial pit and groundwater data presented in ESI 2015. As Taytime have not collected any data outside the Western Boundary then the information provided within the ESI report should be considered. If this information is disregarded, then the applicant should state the reasons for this and provide an alternative explanation for the high groundwater and flooding observed.

The groundwater level labelled on the revised contour plot for BH04 is incorrectly labelled as 15.66mAOD when in fact it should be 15.26mAOD, the level recorded on

26/01/19, the reference date used for all the other boreholes on the plot (Hafren 2019, Appendix A2, ES pdf page 270).

The recent groundwater level readings of 02/02/2019, presented in the ES pdf (page 242) report some of the highest levels on record for the site. Previous peaks in groundwater level may have been missed by the infrequent monitoring events. A recorded level of 15.67 mAOD in BH04, the closest to Hertsfield Barn, was above the floor level of Hertsfield Barn dwelling, where the lowest exterior wall base level is measured at 15.16 mAOD (ESI, 2015). The Hertsfield pond level is 14.70 mAOD and ground levels are as low as 15.03 mAOD in places. The elevated groundwater levels at the Monk Lakes development therefore clearly have the potential to cause groundwater flooding at Hertsfield Barn, as well as creating saturated soil conditions which may lead to increased risk of surface water flooding, and the loss of trees in the orchard reported by Mr Padden. The recent peak in groundwater levels also creates some doubt over the analyses of long term declining trends presented in Hafren, 2019, Table 2675/MBCR2/T1, page 8 (ES pdf page 209). It would also suggest that insufficient monitoring data has been obtained historically to accurately reflect any short term fluctuations.

ES 6.15 states *'It should be noted that the 2D cross sections do not provide a definitive guide to groundwater flow direction; the sections appear to indicate flow from the site at Hertsfield pond, whereas in reality this may well not be the case'*. Groundwater levels are higher than pond level and ground levels at Hertsfield Barn. Groundwater will flow from high to low elevations in the direction of Hertsfield Barn, through the aquifer system whether confined or unconfined. No evidence to support an alternative groundwater flow model has been presented and therefore the conclusion remains that flow is towards Hertsfield Barn until proven otherwise.

Changes in the groundwater regime and water balance post development (MBC comments 1, 2, 4a, 5, 7,8)

The Hafren Report 2019, page 32 (ES pdf page 233) states that

'the modification to the landform, hence local water environment, has altered the groundwater regime, insignificantly. Groundwater levels appear to have increased in some cases (BHs 1 and 8), but by decimetres only'.

This statement significantly understates the potential impact of the development on the water table and Hertsfield Barn.

The Hafren report confirms the following factors which will have had a significant impact on the post development groundwater conditions, such as removal of the majority of the drainage system:

'Removal of the surface drainage system. Prior to the development there was a drainage system comprising (buried) field drains and open ditches. The loss of this drainage provision

could potentially have produced higher groundwater levels by reducing the ability of water to egress from the area.' (Hafren, 2019, page 13, ES pdf page 214)

and creation of a new ditch along the western perimeter:

'There has been a significant change in its [the western ditch's] characteristics between the 'before' and 'after' situations, indeed the majority of the ditch did not exist in 2003.' (Hafren, 2019, page 15, ES page 216).

The scale of any change in groundwater levels is difficult to assess without baseline predevelopment data. However, even a variation of decimetres, as suggested by Hafren, can be very significant when considering groundwater flooding in relation to property floor levels.

Hafren confirm the placement of low permeability material will have reduced any pre-existing potential for direct (rainfall) recharge to the River Terrace deposits. The Hafren report confirms there is no data relating to pre-development groundwater levels within the River Terrace deposits and have concluded it cannot be determined whether levels have altered, but *'the apparent increase in groundwater levels, at some locations, may be due to the removal of a confining layer (potentially the Alluvium) allowing previously confined groundwater to rebound'* (ES pdf p210). Evidence to support this theory from borehole logs, showing the removal of the alluvium is not presented and we consider that the range of other factors presented above are also likely to have had a significant impact.

Hafren consider seepage from Lakes 2 and 3 as unlikely as they were lined with Weald Clay and compacted using a sheep's foot roller. However, there is no evidence presented to confirm the construction and no quality assured documentation recording this process. The report indicates that Lakes 1 & 2 are topped up by pumping from Lake 1, and anecdotal evidence from our client indicates pumping from the River Beult to the Monk Lakes site takes place on a regular basis throughout the year thereby implying leakage losses. As discussed previously, a leakage test from the ponds with adequate, high frequency monitoring, should be undertaken by an independent expert to confirm whether leakage is occurring from the lakes, as there is evidence, based on high water levels in BH1A to suggest this is the case.

It is accepted that much of the fill material on site is described as 'clay' in borehole logs which is of generally low permeability. However, the nature of imported material is such that it is often variable and may contain some permeable material. It is noted that groundwater levels are recorded within the fill material. We therefore do not accept that sufficient evidence is provided to demonstrate that groundwater could not flow through the fill material.

The assertion that groundwater levels in at least four of the monitoring boreholes are declining, should be revisited on the basis of the very high groundwater levels recorded on the 02/02/19. We note that the reduction in recharge to the site is likely to have occurred over a longer time frame (since 2003) than covered by the site monitoring,

and discussion of any potential trends in groundwater levels should consider this, i.e. a reduction in groundwater levels due to low permeability cover would probably already have occurred before the start of the 2014 monitoring period discussed. A significant control on groundwater levels will be the seasonal and interannual variation in rainfall, which has not been considered in relation to the water balance and trends in groundwater levels.

Hafren agree that works associated with the development have modified the landform and pre-existing water environment. They conclude that the total volume of groundwater within the site is considered likely to have been reduced due to the reduction in recharge, both direct and indirect. However, they have failed to consider the specific local variations along the western boundary adjacent to Hertsfield Barn where there is strong evidence to suggest an impact due to a rise in groundwater levels. The discussion of the changes in the water environment does not consider the focused recharge along the western ditch.

In response to Point 5 of the MBC letter, despite the earlier responses from Hafren that indicate changes to the groundwater regime have occurred, Hafren state *'The effects of the development on groundwater have been assessed. It is considered that if any do exist, they are small.'* We strongly disagree with this statement which does not agree with the evidence presented by our client on several previous occasions (ESI 2015, 2017) which demonstrates significant impacts occurring along the western boundary. This data is available but has not been considered in any significant detail within the Environmental Impact Assessment.

A suitable explanation is not presented to explain the source of recharge that is maintaining the high groundwater level in BH1A (in cross section 2675/MBCR2/03, ES pdf page 244) which is significantly higher than levels to the west, east, and north. The cross section does not extend to the south, however, the river terrace deposits do not occur much further south, instead giving way to the outcrop of the weald clay, plus there are perimeter ditches around the site and the large void area of Lake 1 which will intercept groundwater inflow from the south. The water balance, Hafren, 2019, page 17, (ES pdf p218) confirms this *'the rainfall catchment and groundwater catchment are delineated by the road to the south of the site, therefore 'interflow' and 'run-off' can be discounted from the balance as they do not contribute water to the site'*.

As stated elsewhere in the Hafren 2019 report it would be anticipated that the low permeability cover of imported material would reduce rainfall recharge and therefore groundwater levels, *'The total volume of groundwater within the site is considered likely to have been reduced due to the reduction in recharge'* (Hafren, 2019, page 10, ES pdf p211). The question is therefore: what is the source of the water that maintains the high level in BH1A, which is located in a significant thickness of permeable river terrace material and would be expected to drain fairly rapidly? This evidence suggests a source of recharge, potentially related to leakage from the lake.

Baseline Groundwater Levels

Without definitive baseline conditions from monitoring data, estimates must be made of what pre development conditions were prior to 2003.

The previous use of the land adjacent to Hertsfield Barn was primarily agricultural (see ES pdf page 783), with sufficient drainage to support arable crops and orchards. The drainage system is clearly observed in the Lidar data, Figure 2675/MBCR2/05, ES pdf page 246. We would therefore expect that groundwater levels were significantly below ground level over much of the area historically, otherwise the land would have been prone to waterlogging and not suitable for agriculture.

For example Hafren report 2019, page 7, (ES pdf page 208) states *'Prior to development the natural water regime was modified by man-made drainage provision; specifically the presence of field drains, field-boundary ditches and ponds. The installed systems would produce efficient drainage of areas overlying Weald Clay, in the south of the site, as well as reducing the volume of water available to recharge the River Terrace deposits. Conveyance of water to the River Beult would have been efficient'*.

Hafren have responded to comments made by Kent County Council in their letter of 21st September 2017: *"if groundwater levels appear to be close to or higher than the pre-development ground levels, it would be reasonable to conclude that the development has altered the hydrogeological regime'*.

Water levels are recorded within the imported made ground material at many of the observation boreholes indicating a likely change in the groundwater regime.

There is potential that some material, such as the topsoil, may have been removed prior to the deposition of the imported material. Hafren have undertaken an estimation of the pre-existing ground levels based on Lidar data and compared this to measured groundwater levels. As indicated in the Hafren Report 2019, page 32 (ES pdf page 233), the maximum post development groundwater levels in relation to the predevelopment ground levels are:

- In BH01 83cm above estimated pre-development ground level (GL);
- In BH02 within 8cm of GL;
- In BH04 within 15cm of GL;
- In BH1A within 52cm of GL;
- In BH2A within 87cm of GL; and
- BH3A within 40cm of GL.

If we assume that predevelopment groundwater levels were below predevelopment ground levels, as evidence of previous land use and drainage systems suggests, these

apparent shallow groundwater depths are considered sufficiently high to indicate a change in the groundwater regime as a result of the Monk Lakes development.

The new 2018 topographic survey (Hafren 2019, Appendix 2675/MBCR2/A4 and ES, pdf page 282) has raised some potential discrepancies in the surveyed borehole collar elevations and the original datums used to calculate groundwater levels in support of the ES impact assessment. Further assessment of BH04, located closest to Hertsfield Barn, using the new 2018 topographic survey data (Hafren 2019, Appendix 2675/MBCR2/A4 and ES, pdf page 282) indicates a ground level at the borehole of 17.89 mAOD and an apparent collar level of 18.16 mAOD. We note the datum level, presumably the borehole collar, used to derive the groundwater level hydrographs (Hafren, 2019, Appendix 2675/MBCR2/A2, ES pdf page 270) is 17.756 mAOD. This discrepancy needs further investigation as it could result in an underestimation of groundwater levels; for example, if the maximum groundwater level in BH04 was recalculated as 16.5 mAOD. The log for borehole BH4 (Hafren, 2017, Appendix 2375/WIA/A2, ES pdf page 485) suggests there is 2.3m of made ground over natural sandy clay deposits. Therefore, the minimum historic ground level could have been as low as 15.59 mAOD. The difference should be clarified to ensure the accuracy of data reported and the conclusions of the ES assessment.

Groundwater levels recorded in the made ground are potentially above the estimated pre-existing ground level, indicating a potential alteration in conditions post-development. As indicated in the Hafren Report (2019) the introduction of imported cover material which was of low permeability should have resulted in lower groundwater levels beneath the site. The increase in groundwater levels therefore indicates that a source of recharge to the groundwater system, such as leakage from the lakes or focused infiltration from the ditch, has occurred as a result of the development.

Leakage from Lakes - It is possible that leakage from the adjacent Monk Lakes is contributing to a rise in groundwater levels, as mentioned in the discussion of groundwater contours below. Paragraph 6.52 of the ES states:

'...it is noted that seepage from Lakes 2 and 3 is unlikely as they were lined with Weald Clay, and compacted using a sheepsfoot roller. Furthermore the imported material is consistently described as "clay" in the borehole logs'.

Detailed evidence has not been provided to confirm an adequately quality assured process was adhered to during the lining of the lakes, particularly given the potentially varied nature of the imported fill material. A limited amount of site investigation data is available to demonstrate the nature of the lining material. A rise in groundwater levels around the lakes could indicate a potential leak and an adequate water balance, supported by data of suitable resolution including a seepage test, should be provided if the potential for leakage is to be discounted.

Water Balance – in the MBC e-mail of 25th January 2019 (Hafren, 2019, page 16; ES pdf page 217) a water balance is requested along with the statement *'Calculating an average*

for the whole site is not detailed enough given the potential local effects'. The email also specifically references the requirement for an assessment of the additional runoff produced from the reservoir side slopes on the west. The water balance presented in Hafren, 2019, does not provide the required level of detail. It is a high-level assessment for the whole site, based on an old regional data set from the Ministry of Agriculture Food and Fisheries (MAFF).

A more accurate water balance should focus on discrete areas of the site to identify changes to the post development water balance. It would require detailed site specific information on rainfall, evapotranspiration, pumping volumes and changes in storage. We note that the post development water balance does not include any water pumped into the system, for example from the River Beult, and only includes water pumped out as a negative term. The findings of the water balance are that groundwater levels should be significantly reduced, however this finding does not appear to be consistent with the elevated groundwater levels observed along the western boundary. A water balance for the western section of the development is not presented, but would be likely to show a greater volume of rainfall recharge being concentrated along the western boundary of the site.

Insufficient evidence is presented to justify the conclusion that the development has had an insignificant impact at the western boundary and on neighbouring properties such as Hertsfield Barn. In fact, in our opinion there is strong evidence to suggest that a significant impact has occurred.

The proposed western ditch mitigation measures (MBC comments 4b, 10)

The Hafren Report 2019 (page 2, ES pdf page 203) states that *'the installation of an engineered drain is a fundamental aspect of future site work'* which we assume to mean the adequate operation and management of the site. The drain is based on the details of an engineered western ditch, previously prepared by PBA, which would manage both groundwater and surface water. *'The groundwater control which would be achieved by the proposed ditch, which incorporates the installation of a perforated pipe, would ensure that off-site effects of variations to groundwater level, would be mitigated'.*

A revised topographic survey dated December 2018 is presented in the ES VOLUME 2 – PART E, pdf page 182. It is understood this is different from the topographic survey used in the previous assessments, including the PBA design for the western drainage ditch and presumably the surface water run-off calculations and flood risk assessment. Confirmation is required to determine if the updated survey will significantly alter the findings of the earlier studies. Hafren Water (2019) have used the previous PBA MicroDrainage model for the run-off calculations but have not indicated if the model required updating with the revised topography.

The feasibility of the proposed mitigation measures

The Hafren 2019 report appears to maintain that off-site effects might not have occurred, despite the evidence to the contrary. ES paragraph 6.62 states

'The effects of the development on groundwater have been assessed. It is considered that if any do exist, they are small. Despite the small anticipated magnitude of impact upon groundwater distribution a robust scheme has been designed to mitigate against potential effects, particularly to the west of the development. Mitigation will be achieved via works on the western boundary ditch.'

Without a full appreciation of the potential off-site effects of the development it is difficult to see how these have been quantified adequately to assign a magnitude of impact for the EIA or how a suitably robust mitigation scheme can be developed. For example, when assessing the impact of other types of developments (e.g. a quarry or drainage infiltration system) on the water environment it is common practice to estimate the change in typical groundwater level at the receptor. This has not been undertaken for the Monk Lakes ES.

We note that off-site measurements have not been undertaken by Taytime to support the design of the proposed mitigation system. Instead it relies on the work undertaken by PBA in 2015, without the benefit of any of the additional information collected since (see ES Part K Drainage Strategy Report, Peter Brett Associates, July 2015) and ES Part L Groundwater Monitoring Report (Peter Brett Associates, July 2015).

The PBA design Drawing 29431/001/SK03 (ES pdf page 855) presents a water management strategy to both intercept surface run-off and reduce groundwater levels. The strategy provides typical details but does not include a comprehensive detailed modelling assessment to demonstrate suitability in principle and support full detailed design. It should therefore not be considered to adequately support the EIA as an effective mitigation measure.

Detailed analyses and modelling of the impact on groundwater level and inflow rates is not presented in support of the design. The strategy focusses on a single level of 14.70m AOD for Hertsfield Barn pond and does not present any hydrogeological calculations on how effective the groundwater interception trench will be and what mitigation it could achieve. In addition, it should be confirmed if the drain will operate effectively when water levels in the River Beuilt are high which would cause a backing up of water levels in the drain rendering it ineffective.

Further work including an assessment of the operation of the outfall, hydrogeological cross sections and modelling would be required to demonstrate the groundwater drain will intercept the key permeable zones and operate as proposed.

The PBA design has not been updated since 2015 on the basis of the more recent water level and topographic survey data, or the alterations to the design proposed by Hafren to accommodate flood attenuation measures, as discussed below.

Flood attenuation storage within the western ditch

The potential to cause and exacerbate flooding should be a key planning consideration. The Hafren report (2019, page 30) and ES pdf (page 231) indicates:

'discussions relating to the western ditch were held with Alex Brauninger (Senior Flood Risk Project Officer) at Kent County Council, via telephone on 18th January 2019. Hafren state the restriction of discharge to 2 l/s/ha would require a significant amount of attenuation storage, which, is agreed, would be difficult due to limited space within the rainfall catchment of the ditch.'

We note that the EIA should assess the impact of the development in relation to pre-development conditions, not the current site conditions. The development covers an extensive area, with ample room to install flood attenuation features for mitigation. The creation of steep gradients within the unauthorised development have led to the surface water flooding issues and in, our opinion, mitigation should be on the basis of the pre-development conditions. Allowances should not be made to accommodate this unauthorised development and reductions in the required standard of mitigation to accommodate the current site conditions are not acceptable.

Hafren 2019 (Page 30, ES pdf page 231) have revisited PBA's MicroDrainage calculations to include the 1 in 100-year plus 20% climate change event and a weir at the outfall of each 100 m (subcatchment) section of the ditch in an attempt to attenuate run-off. Given the potential impact of the Monk Lakes development on the adjacent vulnerable residential properties we consider that additional climate change increases should be incorporated within the assessment in line with the latest Environment Agency guidance. A maximum increase in rainfall due to climate change of up to 40% should be considered.

Hafren Water (2019, page 31, ES pdf page 232) have used the previous 2015 model from PBA to assess attenuation requirements for water stored in the western ditch using a series of weirs. This is a significant change to the design of the perimeter ditch which has not been updated. Details are presented within the main text of the maximum discharge rates but not of the required storage volumes to be held in the ditch. The storage volumes are fundamental to the design of the ditch and as such should be assessed to see if the proposed storage volumes are possible, and what changes in landform will be required to accommodate them. It is essential that additional water is not stored in unlined features which may allow infiltration to the shallow groundwater system and further exacerbate groundwater flooding off-site. Without an accurate detailed drawing of the proposed weir system, including topographic and accurate storage volumes it is not possible to determine the feasibility or effectiveness of the proposed system which has altered considerably from the initial 2015 PBA drainage strategy.

We have reviewed the MicroDrainage calculations presented in Hafren 2019, Appendix 2675/MBCR2/A7. The sections of the ditch adjacent to Hertsfield Barn appear to correspond with sections 1.003 and 1.004. Calculations for the 1 in 100 return period

plus climate change (ES pdf pages 372 and 377) indicate significant volumes will accumulate in these systems (307m³ and 182m³ respectively) and the occurrence of a flood risk is highlighted by the model. These are significant volumes to incorporate within the proposed 100m sections of ditch, which the PBA drainage strategy indicates to be 0.75m in depth, and 0.5m base width, 1.5m wide at the bank top. Ignoring any gradient, which will reduce the storage, it is estimated that storage in the current PBA 100m ditch sections would be 75 m³. This means a potential requirement for an increase of 4 times in ditch width to 6m, with associated changes to the steep slope supporting the reservoirs required to accommodate the additional storage. In addition, the MicroDrainage calculations utilise invert levels of 15.35 mAOD and 15.15mAOD which could potentially result in the stored water being significantly above ground levels at Herstfield Barn.

Hafren (2019) anticipate that the interceptor drain will mitigate any adverse effects upon the water environment. However, as stated above, a detailed design for the ditch has not been provided to incorporate the proposed changes in flood attenuation, including an increased allowance for climate change. Nor has sufficient investigation been done into the effectiveness of the proposed mitigation and the offsite implications of the proposed drainage strategy. In addition, as discussed in the later section on water quality an adequate risk assessment has not been undertaken, the discharge from the ditch may therefore be subject to the requirement for a review by the Environment Agency under the environmental permitting regime as the groundwater and surface water are likely to have been in contact with the imported waste material forming the made ground. Until it is determined that the appropriate permissions would be forthcoming (supported by a water quality risk assessment) then the proposed mitigation scheme should not be considered feasible.

The proposed mitigation strategy would need to operate in perpetuity in order to prevent a recurrence of impact on Hertsfield Barn, therefore adequate supporting information and a maintenance schedule is required to ensure the system does not fail. For example, if there is a breach in the lining of the ditch or deterioration in the groundwater drain then problems of high groundwater could return or even increase at Hertsfield Barn. The detailed drainage design should include a clear definition of the party responsible for the maintenance of the western perimeter surface ditch and the groundwater drain in perpetuity, plus adequate financial provision for whoever will take responsibility for the system.

Adequacy of data collation and review of flooding at Hertsfield Barn (MBC comment 12)

As set out in ES 1.52 data gathering and surveys provide the information required to assess potential impacts from the retention and completion of the lakes for recreational angling purposes. According to the ES, where available baseline information has been considered to be insufficient, site surveys to supplement the

baseline information have been carried out where appropriate. However, in our opinion the level of detail and quality of data provided is insufficient to adequately determine the impact of the development on the environment, in particular in relation to the following items:

- Monitoring of groundwater levels and potential impacts outside the site boundary, to support design of the proposed mitigation measures
- Sufficient data to assess the impact of the Monk Lakes development, including the water balance and potential leakage from Lakes 1,2,3, accurate pumping records from the River Beult, sufficiently frequent monitoring and a lake leakage test.
- The quality assurance audit trail for the lake/reservoir construction and lining, plus a Construction Environment Management Plan (CEMP) as requested by the Environment Agency
- Comprehensive water quality monitoring and leachate testing to assess the impact of waste materials of unknown origin on the surrounding water environment.

The dataset supporting the EIA is not sufficiently comprehensive to discount the risk posed to the client's property or to support the design of adequate mitigation measures. As previously recommended, additional temporal and spatial coverage is required to support an adequate assessment of the environmental risk associated with the unauthorised development.

Hafren suggest that the proposed mitigation measures will represent 'betterment' when compared to the 2003, baseline, conditions. However, as set out in previous discussions, to date the development is considered to have had a significant negative impact resulting in a rise in groundwater levels on the western boundary. Mr Padden continues to suffer from the impact of high groundwater levels as represented in the photographs provided by them in Appendix A. As recently as the beginning of February 2019 (4th, 6th & 8th) the pump from Hertsfield Pond required operation for 3 days in order to reduce levels and prevent flooding. Other neighbours also continue to be affected by water ingress to septic tanks and flooding of gardens.

Taytime have not undertaken any monitoring off site along the western boundary or made arrangements to do so with the various landowners.

The Hafren Report, 2019, page 3 (ES pdf page 204) indicates that access was denied to Taytime's surveyor in December 2018. Our clients have indicated that no formal request was made for access in advance. The surveyor indicated he was working on behalf of the council but had no identification to support his access request and so our client wished to await formal confirmation. The council have indicated that the surveyor was not working for them.

Water Quality

Previous work by Hafren (2017) states that the made ground present at Monk Lakes includes anthropogenic and waste material. Detailed sampling and leachate testing of the made ground has to date not been presented. A limited amount of sampling of surface and groundwater has been undertaken. All samples were analysed for a suite of parameters which included organics but excluded metals and polycyclic aromatic hydrocarbons. Given the nature of the made ground, the analytical suite should include a wider range of parameters. The information presented is insufficient to fully assess the risk of the waste deposition at Monk Lakes on the surrounding water environment.

A further round of water quality monitoring was undertaken in July 2017 and is presented in the Hafren report (2019) supplied within the ES. Samples were obtained from the same eleven monitoring locations as previous. These did not include any sampling off-site on Mr. Padden's property. Parameters recorded again included petroleum hydrocarbons and other water quality indicators (chemical oxygen demand COD, ammoniacal nitrogen, conductivity, and pH). The suite did not include a sufficient range of the potential contaminants, including metals, which could be associated with and derived from waste deposition.

Elevated COD was recorded in the western ditch (118mg/l), BH01 (168mg/l), BH01A (270mg/l), BH06 (270mg/l) compared with a mean concentration of 36mg/l in the other 7 locations. This would imply some connectivity between groundwater in the west of the Monk Lake site and the ditch. The COD recorded in the western ditch was higher than in the previous monitoring data. This could be related to variation in the base flow / loading of the ditch due to normal deviations.

Petroleum hydrocarbons were analysed in 5 of the 11 samples (BH06, Bridges Lake, Puma Lake, River Beult and the western ditch). A small amount of heavy end aliphatic hydrocarbons were noted in BH06 only. The water quality parameters selected still do not cover the broad range of contaminants which could be associated with the deposition of waste materials of unknown origin on site. Again, no monitoring of the off-site surface water or groundwater receptors has been undertaken.

Both shallow groundwater and the adjacent surface water (River Beult, Western Ditch, Hertsfield Barn Pond) should be considered as controlled water receptors. Any impact on groundwater quality as a result of the importation of waste will have potential water quality impacts on the water emerging on Mr Padden's property and potential risks associated with this. A more comprehensive sampling program is therefore recommended and should include sampling of groundwater on Mr Padden's property.

In accordance with the Environment Agency letter of 20th September 2017, a discharge permit may be required for the groundwater and surface water discharge to the western drain that will form part of the proposed mitigation scheme. It should be confirmed that such a permit can be obtained before the scheme can be considered feasible. The groundwater and surface water entering the ditch is likely to have come

into contact with the imported waste material and will require an appropriate risk assessment as part of the Environmental permit or waste recovery application.

Floodplain Compensation Scheme

Hafren Water, 2019, Appendix 2675/MBCR2/A3 provides a response to Environment Agency comments on the loss of floodplain storage due to the encroachment of the Lake 3 embankments. We note that the replacement storage, which is more than 300m from the river, should be assessed using a fluvial model to ensure the effects of Lake 3 further downstream are mitigated by the changes proposed upstream of the Lake 3 embankment. The additional storage should be 'live' storage allowing flow through the new area, rather than simply filling up and not contributing to the cross sectional area for flow. The best way to check this will be through the use of a fluvial model, which has not been undertaken.

The proposed minimum elevation (15.40 mAOD) of the flood storage area is below the existing ground level and there may be issues with the accumulation of surface water and groundwater, which would reduce the available storage. For example, in the cross section, Hafren Water, 2019, Figure 2675/MBCR2/03, groundwater levels in BH08 seem to extend above 15.40mAOD and the latest groundwater reading was 16.41 mAOD (Hafren 2019, Figure 2675/MBCR2/01). The storage area will also potentially require changes to the PBA 2015 drainage strategy in this area which includes the overflow from the Lily Ponds at 16.40 mAOD.

Alternative Schemes

As part of the Environmental Impact Assessment there is a requirement to consider alternative options which could limit the environmental impact of the proposed scheme. This has not been done to a sufficient extent, rather the strategy put forward is to stay close to the original scheme which we consider to have significant environmental impacts.

We note that there is a significant volume of natural clay material available on the site which could be used for the construction and lining of the lakes without the need to import waste material from off-site. The justification for the original design to create fishing lakes using imported waste material which forms the basis for the EIA is therefore questionable.

It is proposed to import additional material to complete the scheme, particularly in relation to Lake 1. An alternative solution which should be considered is to lower the water levels in Lakes 2 and 3 to a level in keeping with the original ground level. This would significantly reduce the potential impact of leakage from the ponds and the associated rise in groundwater levels that are impacting adjacent properties.

As part of the re-design of the lakes, material would be removed from the embankments, thereby reducing the rainfall run-off to the western perimeter ditch and the associated impact on the adjacent properties. The impact on floodplain storage from the encroachment of the Lake 3 embankment would also be mitigated.

Instead of the current proposal to import additional inert waste, material from the embankments could be used in the final construction of Lake 1 and water levels reduced to below ground level or as close as possible to the estimated pre-existing conditions. As part of the revised scheme, adequate lining of the lakes could be demonstrated through a quality-controlled process to eliminate the potential for leakage. In addition, the information collected from the recent boreholes (which were not available prior to the original lake/reservoir construction) can be used to support an appropriate design, verified by a reservoir engineer.

Lower lake levels and minimal leakage will also reduce pumping costs making the development more sustainable in the longer term and reducing the operational carbon footprint. Below ground level lakes may also remove the requirements for reservoir inspection and minimise any risk of a breach causing risk to residents and adjacent property.

Alternative schemes could achieve the same end result of creating fishing lakes with a lower environmental impact on flooding, water quality and sustainability.

Yours sincerely



Dr Paul Ellis
Enc

Appendix A – Photographs provided by the client David Padden from Hertsfield Barn (04/04/2019)

References:

ESI, October 2017. Technical note - Hertsfield Barn - Review of new technical data. Reference 62852L04Rev01.

ESI, 2015. Report on “The potential for groundwater flooding resulting from the unauthorised development at the neighbouring property known as Monk Lakes” - reference RL1-63346R2.

ESI, 2014. Hertsfield Barn - Groundwater Flood Risk Assessment. 62852R1, August 2014



Hafren Water, February 2019. Response 2 To Maidstone Borough Council Regarding Water Issues at Monk Lakes' provided on behalf of Taytime.

Hafren Water, July 2017. Response to Maidstone Borough Council regarding water issues at Monk Lakes provided on behalf of Taytime.

Appendix A – Photographs provided by the client David Padden from Hertsfield Barn (04/04/2019)

1. Holes filling with water from when the fence along our boundary with 3 Oast, was replaced 18/1/2016. Every hole they dug, from our entrance gate down to the pond, filled up with water.



2. Garden of our neighbours at 3 Oast, which is beside the fence that was replaced.
Photo taken May 2018.



3. Sodden ground in Hertsfield Orchard – May 2018.



4. Despite “vegetation” that they say will help with any groundwater issues – we certainly have “vegetation” in the ditches – never been cleared since the day they were badly dug – but doesn’t make a difference.



5. After rain, the water in the ditch sits – it doesn’t drain away immediately, it doesn’t run down the ditch channel - it sits in the ditch and then drains through the ground.



6. Klargester brickwork is constantly damp.



7. Numerous trees have died in the orchard now.



8. Water across our driveway. The area is waterlogged after rain, and runs across the drive into the garage, plus onto the garden at the front and side.



9. The pump in operation from the River Beult at Monk Lakes on 4th April 2019. There is an object which has a pipe going into the water and a pipe coming from Monk Lakes.



10. 12th February 2016 photograph from Alan Mathie, who is in the cottage next to Leigh Highwood and has lost 3 fruit trees. Shows the western ditch behind the fence.



Appendix B:

Geosmart Letter, December 2019b, Hertsfield Barn: Addendum to response to EIA statement for Monk Lakes, reference 70276R2.

GeoSmart Information Ltd.
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3 December 2019

David Padden
The Rear Barn, The Manor Farm
124 Manor Road North, Thames Ditton
Surrey, KT7 0BH

Ref: 70276R2

Dear David,

Re: Hertsfield Barn: Addendum to response to EIA statement for Monk Lakes

We are pleased to present here our review in support of the latest phase of your response to the consultation on the Monk Lakes retrospective planning application for the retention and completion of the Lakes.

1. Scope of work

Following on from our previous work (April 2019, included as Appendix 1) we have reviewed the additional information relevant to groundwater and flooding that has been submitted in relation to the planning application since April 2019 by Taytime Ltd and Maidstone Borough Council (MBC). The additional information has been combined with the findings of our previous work to provide a summary of the key environmental impacts on the water environment in relation to the Monk Lakes retrospective planning application. Our letter discusses developments since our previous report in section 4, an analysis of the new data in section 5, a review of outstanding issues in section 6 and recommendations in section 7.

2. Summary of potential impacts

A number of outstanding issues remain in relation to the ongoing impact on Hertsfield Barn (and neighbours), including the potentially increased flood risk, which in our opinion should preclude the granting of planning permission unless a robust mitigation is achieved. Only limited work has been done by the applicant (Taytime) since the last review we provided in our letter dated 12th April 2019 (Appendix 1) and our original observations remain relevant, modified by the additional material submitted to the planning authority since this time. In summary the following issues have been identified:

- Evidence collected by both Mr Padden and Taytime Ltd suggests that a superficial aquifer extends beneath both Monk Lakes and the client's property,

providing a pathway through which development activity at Monk Lakes could influence groundwater levels and water quality at Hertsfield Barn. We consider that the groundwater regime has been altered by the Monk Lakes development, which has probably caused a rise in groundwater levels at Hertsfield Barn.

- The potential impact of the development on Hertsfield Barn has not been considered sufficiently within the Environmental Impact Assessment.
- The evidence base upon which the assessment has been undertaken is not sufficient, in spatial extent or frequency.
- The implications of the recent survey data provided by MBC have not been fully assessed.
- The potential impact on water quality has not been fully assessed. We are not aware of any environmental permit applications being submitted in relation to the management of the imported waste material on the site, or in relation to the proposed groundwater discharge from beneath the site via the proposed groundwater drainage scheme.
- An up to date flood risk assessment provided by a single responsible party, including all flood sources, incorporating all changes to the proposal and the proposed mitigation measures, has not been provided. In particular, there is a lack of verification and inspection of the reservoir construction which was proposed in the original FRA submission in 2011 as a mitigating factor for the potentially severe impact on Hertsfield barn from a reservoir breach.
- The potential impacts of the development have not been fully recognised or addressed adequately. The originally proposed mitigation measures have been altered significantly and are not subject to a robust updated design or assessment of potential benefits or negative impacts. Neither have the updated mitigation measures been included on the revised proposed development plans. The mitigation measures would need to operate in perpetuity to ensure there is no recurrence of impact should the system fail. The feasibility of the proposals for this long-term operation have not been shown.

3. Background

Mr Padden has reported waterlogged ground and several incidences of flooding that have affected his and neighbouring properties. There is strong evidence to suggest that this flooding is a result of the adjacent Monk Lakes development. A review undertaken by ESI of the evidence for this has been presented previously (ESI, 2017, ESI, 2015 and ESI 2014). An example showing the proximity of the western ditch and the flooding of Mr Paddens property is included below and further photographs are presented in the previous reports. It is understood that some minor remedial works were undertaken on the ditch by the applicant, but as seen from the recent topographic survey the ditch is still not designed to provide adequate drainage.



Figure 1. Flooding from Monk Lakes western ditch beside Hertsfield Barn package treatment works (taken 13/10/13) from ESI (August 2014).



Figure 2. View looking south of Hertsfield Barn and Monk Lakes 1 and 2 (taken October 2019).

Mr Padden continues to report ongoing impacts on his property: a reported loss of trees in his orchard due to waterlogging; flooding of his pond and driveway; infiltration to his sewage treatment plant; and damp affecting his property. Similar impacts are also reported by other residents in the vicinity. Mr Padden estimates his pond to have been approximately 10cm higher this summer than previous years despite the dry weather. Recent Drone pictures provided by Mr Padden (Figure 3a) show levels in Lake 3 on the 10th of November 2019 to be low, exposing a significant section of the bank despite a very wet Autumn, which could be evidence of leakage from the Lake. Pumping was subsequently observed into Lake 3 resulting in a very significant rise in lake levels by 29th November 2019 (Figure 3b). It is assumed that the large volume of pumping was undertaken to replenish losses from the pond under the terms of the site abstraction licence, regulated by the Environment Agency.



Figure 3. View south of Hertsfield Barn to Lake 3 on a) 10/11/19 top b) 29/11/19 bottom, showing significant variation in water levels.

Previous work has focused on the impact of the development in relation to groundwater, surface water and flood risk. Dr Ellis (previously at ESI Ltd (ESI)) has been involved since 2014 on behalf of the client (David Padden) with several phases of investigation and impact assessment of the Monk Lakes development in relation to the client's property at Hertsfield Barn. Most recently Dr Ellis undertook a review of the amended Environmental Impact Assessment Statement (EIA) for Monk Lakes, dated April 2019, (included in Appendix 1). Dr Paul Ellis is a Director of Geosmart Information Limited, with over 20 years' industry experience with particular expertise in the analysis of drainage, flooding, and interactions between surface water and groundwater systems.

4. Developments since our previous report

Taytime's (October 2019) submission comprised updated plans and cross sections, plus a recalculation of flood storage loss within the flood plain. It did not contain any response to the outstanding issues raised in our letter dated April 2019.

Maidstone Borough Council (MBC) commissioned its own survey of the Monk Lakes site area around Lakes 1 to 3 in August 2019 and have provided this data to the applicant and consultees in the form of plans and sections of the current situation on site. Taytime were requested to update the ES on the basis of the new information.

MBC have presented advice they have received on the groundwater situation along the western boundary, which indicates a number of shortcomings within the Environmental Statement (ES). The Hydrogeological advice to Maidstone Borough Council in relation to planning application ref. 11/1948, dated July 2019, prepared by Mott Macdonald (MM, July 2019) states that the revised Environmental Statement 'does not present a comprehensive description (conceptual site model) of the assumed baseline hydrogeology, that includes all the available data for the site' (section 1.3.3) and also 'The Revised ES and technical report do not address all of issues raised by stakeholders' (section 1.3.4). However, section 1.3.4 goes on to state 'the Council is not precluded from reaching a view on the suitability of the proposed mitigation. This is based on a reasonable worst-case assessment of the impacts.' As discussed in the following sections we do not consider that the applicant has considered the worst case scenario in sufficient detail or demonstrated the feasibility of the proposed mitigation measures.

In addition, the MM July2019 report (section 3.1.4) states 'The Hafren Water (2019) report does acknowledge the potential for an off-site impact on groundwater level but the overall tone of the document attempts to diminish the significance of the unmitigated effect. In doing so, the conclusions drawn are sometimes tenuous'.

We consider that unless Taytime have a robust conceptual model for the site and address the concerns of stakeholders it is extremely unlikely that adequate mitigation measures will be developed. Given the significant uncertainty in the proposed

mitigation design and supporting data, it is not possible to show that the proposed mitigation measures will be feasible.

Despite highlighting significant short-comings in the ES the MBC advice appears contradictory as it also indicates the level of investigation and the proposed mitigation solution may be acceptable subject to planning conditions, a position with which we disagree. Our reasons for this conclusion are set out below.

We do not agree that the 'Revised ES addresses most of the specific issues highlighted by consultees adequately'. Specifically, the applicant has not acknowledged the evidence suggesting a link between the development and an impact on groundwater flooding at Herstfield Barn or responded to any of the issues raised in our submission of April 2019. We consider that the ES should acknowledge the impacts that have been highlighted and provide effective mitigation solutions, taking into account any recent changes to the proposed development, to demonstrate the feasibility of the proposed scheme.

A discussion of the outstanding issues is set out below, and where relevant we have referenced further detail from our previous letter (Geosmart, April 2019) that highlights the issues with supporting evidence on why the current impact assessment and mitigation measures are deficient. (Appendix 1).

5. Analysis

Analysis of the additional information provided since April 2019 is set out below.

5.1 Review of additional information from Taytime Ltd

The applicant Taytime Ltd have provided an addendum to the Environmental Impact Assessment Statement (EIA) for Monk Lakes, dated October 2019, submitted by Next Phase on behalf of Taytime

Maidstone Borough Council (MBC) commissioned its own survey of the Monk Lakes site area around Lakes 1 to 3 in August 2019. The survey showed differences in comparison to the previous topographic plans submitted by Taytime. On the basis of this new information and concerns from the Environment Agency, Taytime commissioned Hafren Water (response dated 4th October 2019) to comment on the loss of flood storage due to the encroachment of Lake 3 into flood zone 3. We note that the recent Hafren Water report only addresses this specific issue, and does not address any of the other implications that changes in the topographic data will have on the Environmental impact assessment, neither does it address the issues raised in our previous review (Geosmart, April 2019).

In order to adequately address the implications of the change in topography the differences between the new and the original survey data should be presented and a systematic analyses of the potential affects of this on the different aspects of the ES

provided. At present it appears that only the flood storage issue related to Lake 3 has been investigated and therefore it is difficult to justify the statement in section 1.7 of the Taytime submission 'the differences do not fundamentally alter the conclusions raised in the individual Environmental Statement Chapters'.

Hafrens findings (October 2019) indicate that the impact on flood plain storage is less than previously calculated, however, this has been done on the basis of a volumetric calculation using a flood level derived from previous work and topographic LIDAR data available from 2002. LIDAR data is also available from 2008 and shows ground levels to be significantly lower than the 2002 levels (Figure 4), presumably as a result of soil removal and other activities.

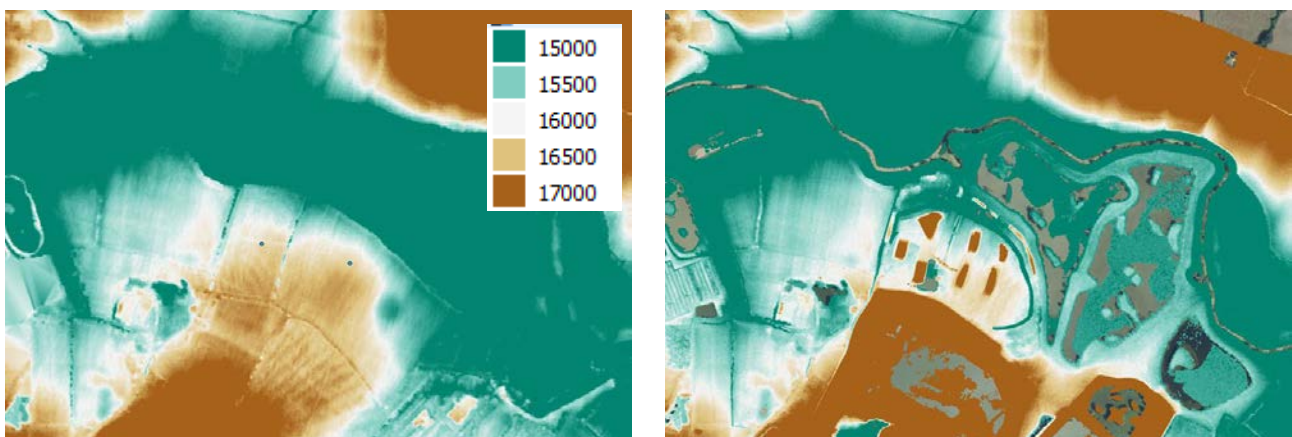


Figure 4 LiDAR data showing elevation in mm. Left 2002, Right 2008.

The flood level used in the storage calculation is 16.3 mAOD, which is understood to be derived from flood modelling undertaken by the Environment Agency (EA), labelled '2011 flood line' in the 2012 FRA. It is not known whether the EA model was developed using the 2002 or 2008 LIDAR. If the 2008 data was used for the flood modelling then it would not be appropriate to compare the 16.3 mAOD model output with the 2002 LIDAR levels, as the flood levels would be lower, because the underlying ground levels from which the flood levels were derived would also be lower.

It is noted that the revised flood storage calculations do not address the impact of the raised embankments around Puma and Bridges Lakes. As indicated in the Environment Agency letter dated 20th September 2017 the perimeter of both lakes has increased by 0.5 to 1m and Taytime (ES, March 2019, sec 6.95) indicate the bank levels to have changed by between 0.11m and 1.83m since 2002. We note that although the maximum bank heights are apparently below 15.5 mAOD, and would therefore admit flood water during the extreme 1 in 100 year event (16.3 mAOD), more frequent floods below 15.5 mAOD would not benefit from the flood storage within Puma and Bridges Lakes. This would increase the flood levels during these events due to the loss of storage and flow impedance caused by the embankments. Flood compensation for these events should therefore be provided.

A robust method for assessing the flood storage compensation requirements would be to construct a new flood model or adapt the existing Environment Agency model to incorporate the latest topographic data and predict the impact the development has had on the fluvial flood regime.

Of significant concern is that the revised topographic maps provided by Taytime do not include the updated proposals for the surface water and groundwater management schemes which would allow an appropriate assessment of the feasibility of the proposed mitigation measures.

5.2 Review of additional information from MBC

Hydrogeological advice was provided to Maidstone Borough Council in relation to planning application ref. 11/1948, dated July 2019, prepared by Mott Macdonald (MM). The MM report considers only groundwater flooding issues and considers some of the points raised in our April 2019 report. In many cases the report is in general agreement with our observations that the ES has 'not discounted the potential for increased groundwater levels to the west of the site boundary' and that 'we must conservatively assume that the reported off-site waterlogging may be caused by the development and, that mitigation is therefore required' (Motts, 2019, section 3.1.11).

There are also some apparent contradictions within the MM report which generally indicates the ES is unsatisfactory but then appears to support the option to proceed with the planning application subject to conditions.

We disagree with the findings of the Motts review (item 3.1.1) that 'In our view, the total work undertaken to investigate the potential for off-site groundwater flooding impacts is proportional to the level of risk and, commensurate with our expectations for a proposed development of this nature.' Despite previous recommendations the applicant has undertaken no offsite monitoring or investigation and the conclusions of the ES still maintains that the impact on groundwater levels is minimal despite evidence to the contrary. Furthermore, whilst the level of assessment may be typical for a planning application of this scale, planning conditions are relied on in such cases to allow risks to be managed through the development. This is not relevant to the current situation, where the development has already taken place and there is evidence suggesting adverse impact has already occurred. In this situation it is essential that such impacts are addressed reliably before any decision on the retrospective application is appropriate.

The applicant has made no effort to mitigate the ongoing impact from the development, for example ensuring an adequate gradient on the western ditch to ensure drainage and prevent the standing water that is contributing to recharge of the superficial aquifer and the associated groundwater flooding issues.

We also disagree with the conclusion (item 3.1.3) 'The Revised ES addresses most of the specific issues highlighted by consultees adequately...' We note that we have not had a response from the applicant to the issues raised by Mr Padden over several

rounds of consultation, indeed the review undertaken by Motts highlights many deficiencies in the ES which does not recognize the significant potential for offsite impacts on Hertsfield Barn. We note also that the remit of the Motts review has been confined to the potential impact of the development on groundwater flooding and so does not encompass the other impacts on flooding, water quality and the feasibility of accommodating the proposed surface water attenuation scheme along the western margin.

The MM review (item 3.1.7) indicates that 'We agree that the proposed drainage system is a suitable solution but, the outline design needs to be refined.' However, given that they raise a number of feasibility issues with respect to the design, we suggest that the work needs to be done to demonstrate that the applicant can achieve a robust practical solution to the issues. There is a significant risk that the proposals as currently constituted will fail. In fact, the outline design is not sufficient, given all the additional changes since the 2015 design, to allow this conclusion or demonstrate that the proposed mitigation measure would be feasible, both in the short and the long term.

No effort has been made by the applicant to advance the design of the mitigation measure or acknowledge that the mitigation measures are required. There may be significant problems with operation of the groundwater drain during high river stages and in combination with the updated surface water management plan. The potential water quality implications for discharge have also not been investigated (see Appendix 1, page 15, section on Water Quality). It is essential that a clear and agreed statement of the flow mechanisms and risks be achieved before the mitigation measures are finalized in order to allow confirmation that the mitigation addresses the risks.

MM section 2.3.10 states 'The proposed design therefore appears to have insufficient capacity to ensure its long-term effectiveness'. MM section 2.3.12 states 'The design is reliant on a single water level measurement taken by ESI in 2015. It is recommended that this water level measurement is confirmed as accurate and that any other relevant off-site receptor elevations are sought prior to detailed design'. We agree with this statement and in our opinion, until additional assessment has been undertaken the proposed mitigation measures cannot be considered feasible.

MM section 3.1.10 states 'Our review of the design presented for the groundwater interceptor system indicates that the proposed 150mm carrier pipe may have insufficient capacity for the anticipated volume of groundwater inflow'. This supports the case that the proposed mitigation measures have not been considered to a suitable standard such that the feasibility of such measures can be confirmed to a reasonable degree.

MM section 2.3.15 states 'The conceptual site model is highly uncertain, due to a lack of baseline data and limited off-site, post-development data. However, this is not unusual for proposed developments, which are often progressed based on conservative assumptions to manage the associated risks.' We note that the development has already taken place and given rise to some significant perceived impacts. Given the very high likelihood that these impacts will continue unless

mitigated effectively, there needs to be a high level of confidence that the proposed mitigation measures will work before planning permission is granted. The current ES does not contain an adequate assessment of the proposed mitigation measures.

5.3 Uncertainties in the site conceptual model

The following section includes consideration of the uncertainties in the conceptual model raised within the MM report (MM, July 2019).

The MM report gives support to alternative reasons for high groundwater levels that are unrelated to the development which have less supporting evidence, compared to the suggested impact from the development. In relation to MM July 2019 Table 1, item 5, under the post development changes, we consider that the removal of the existing field drainage system is likely to have contributed to a rise in the groundwater levels, rather than a reduction. Other contributing factors to the rise in groundwater levels and associated groundwater flooding include potential leakage from the lakes, removal of a section of aquifer and focused recharge along the western drainage ditch due to run-off from the steep slopes of the fishing lakes. A detailed discussion of the evidence for these contributing factors is presented in Appendix 1 under the section 'The relationship between the groundwater system, the western ditch' (Geosmart, April 2019, page 3).

We have addressed some points MM have raised in relation to the ditch water levels and the geological log for drivepoint piezometer DP03 installed on behalf of Mr Padden which add uncertainty to the conceptual model.

MM July 2019, section 2.2.2 item 1b discusses evidence of the site investigation works commissioned by Mr Padden, in the absence of any off-site investigation by the applicant. MM states 'The groundwater elevation recorded in March 2015 was 16.27mAOD, which is above the 15.9mAOD level that water in the ditch rises to (as a result of its uneven gradient).' We note that 15.9 mAOD represents the topographic level recorded by the applicant, presumably the base of the ditch, and therefore water levels in the ditch could potentially be significantly higher. Therefore, when combined with potential measurement errors, and without specific monitoring of the ditch and groundwater interaction (previously recommended) it is difficult to draw an accurate conclusion on this.

In addition the statement 'It is also above the maximum groundwater levels recorded at the closest on-site boreholes to the Hertsfield Barn (BH04, BH1A, BH2A, BH3A,)' is relying on very limited frequency of sampling (fortnightly) in the adjacent boreholes, which may not be coincident with the level taken in DP03 and may miss peaks in fast responding boreholes. In addition, there is a significant spread of additional evidence available (which should be considered within the ES) from the trial pits (TP1,TP2,TP4) and the Hertsfield pond level, demonstrating the presence of a shallow groundwater system at lower elevations than site groundwater levels along the western site boundary of Monks Lakes. Following on from this the conclusions drawn in section 1c

are also based on limited data which doesn't benefit from coincident recorded water levels in the ditch or to the west on Mr Paddens property.

In locations where the shallow aquifer appears to thin due to the presence of clay (potentially DP03), the groundwater can still flow around this to impact on Mr Paddens property where the aquifer is present in greater thicknesses as seen in the trial pits along the western boundary. Therefore, the clay detected in DP03 does not diminish the potential for groundwater impacts at Herstfield Barn and highlights the uncertainties that need to be considered within a robust mitigation scheme.

In relation to the statement by MM in point 6b that 'no clear long-term rising trend is visible in any of the groundwater level datasets, that would support the idea that leakage is occurring'. As discussed previously the data monitoring period is very limited and leakage from the lakes may already have caused a rise in groundwater levels to occur when the lakes were constructed before monitoring commenced in 2014. Therefore, a rising trend may not be within the period of the monitoring record and so it is not possible to discount leakage from the lake on this basis.

5.4 The relationship between the groundwater system, the western ditch and Hertsfield Pond

A recorded level of 15.67 mAOD in BH04, the closest to Hertsfield Barn, was above the floor level of Hertsfield Barn dwelling, where the lowest exterior wall base level is measured at 15.16 mAOD (ESI, 2015). The Hertsfield pond level is 14.70 mAOD and ground levels are as low as 15.03 mAOD in places. The elevated groundwater levels at the Monk Lakes development therefore clearly have the potential to cause groundwater flooding at Hertsfield Barn, as well as creating saturated soil conditions which may lead to increased risk of surface water flooding, and the loss of trees in the orchard reported by Mr Padden. The relationship between the groundwater system, the new lakes, the western ditch and Hertsfield Pond is discussed in further detail in Appendix 1.

Revised cross sections have been made available based on new topographic data supplied by MBC. Section A of the MBC cross sections clearly shows the threshold level of Herstfield Barn at a level of 15.51 mAOD, below the base of the western drainage ditch and below the Lake 2 water level of 21.16 mAOD.

In order to design an effective mitigation scheme the applicant should consider in detail the conceptual model for the groundwater system along the western boundary, supported by sufficient monitoring data and geological cross sections extending west across the site boundary to adequately address the offsite impacts and allow adequate assessment of the feasibility of the proposed mitigation measures.

In conclusion, the evidence of harm is consistent with impacts expected from the development of the Monk Lakes. Whilst there is uncertainty in reaching conclusions

on this, these are due to the inadequacy of the applicants investigation and analysis. We suggest it is for the applicant to complete the necessary investigation and demonstrate whether the impacts are due to the development, and if so, what robust mitigation can be achieved which will be demonstrated to mitigate these impacts effectively.

6. Outstanding Issues

As discussed the latest submission by Taytime fails to address a number of key issues which are discussed in the following sections.

6.1 Feasibility of the Proposed Mitigation System

The proposed mitigation system relies on the work undertaken by PBA in 2015, without the benefit of any of the additional information collected since (see ES Part K Drainage Strategy Report ,Peter Brett Associates, July 2015) and ES Part L Groundwater Monitoring Report (Peter Brett Associates, July 2015).

The PBA design Drawing 29431/001/SK03 (ES pdf page 855) presents a water management strategy to both intercept surface run-off and reduce groundwater levels. The strategy provides typical details but does not include a comprehensive assessment to demonstrate suitability in principle. It should therefore not be considered to adequately support the ES as demonstration of the feasibility of an effective mitigation measure.

The creation of steep gradients within the unauthorised development have led to surface water flooding issues. Taytime propose to mitigate this through the use of attenuation basins and a weir system (see Vol2 part F of the ES, section 4.1 of Hafren 2019 and Geosmart, April 2019, section on Flood attenuation storage within the western ditch). Further work is required to assess whether the proposed changes in landform to accommodate the basins can be integrated successfully within the previously proposed outline drainage strategy set out by PBA. Given the limited space constraints along the western boundary, the feasibility of this solution has not been demonstrated or included in sufficient detail within the proposed development plans.

The Lead Local Flood Authority, Kent County Council (KCC), should be consulted on the final surface water management strategy. KCC provide an approval checklist (Page 25, https://www.kent.gov.uk/_data/assets/pdf_file/0010/13006/Making-it-Happen-C2-Drainage-systems.pdf) for consideration with detailed design which requires a comprehensive set of information including a minimum of a topographic survey, plans and construction drawings. Updated surface water system drawings have not been provided showing the attenuation basin system and the integration of this with the groundwater drain. Neither have the topographic plans been updated to include this information and the changes in landform this will entail.

The PBA design for the groundwater drainage mitigation scheme has not been updated since 2015 on the basis of the more recent water level and topographic survey

data, or the alterations to the design proposed by Hafren to accommodate flood attenuation measures. Further work, including an assessment of the operation of the outfall, hydrogeological cross sections and analysis is required to demonstrate the groundwater drain will intercept the key permeable zones and operate as proposed without causing other unintended impacts such as dewatering of the Hertsfield pond.

In addition, an adequate water quality risk assessment has not been undertaken. The discharge from the ditch may be subject to the requirement for a review by the Environment Agency under the environmental permitting regime as the groundwater and surface water are likely to have been in contact with the imported waste material. Until it is determined that the appropriate permissions would be forthcoming (supported by a water quality risk assessment) then the proposed mitigation scheme should not be considered feasible.

The dataset supporting the EIA is not sufficiently comprehensive to discount the risk posed to the client's property or to support the design of adequate mitigation measures. As previously recommended, additional temporal and spatial coverage is required to support an adequate assessment of the environmental risk associated with the unauthorised development. Comprehensive water quality monitoring and leachate testing is required to assess the impact of waste materials of unknown origin on the surrounding water environment.

6.2 Reservoir Flood Risk

As indicated in the Environment Agency letter dated 9th September 2019 submitted to MBC, 'If the volume of water to be stored above ground in the new lakes is (>25,000m³) there may be a requirement to register them with the Environment Agency and to inspect and report on their condition annually. The Act (Reservoirs Act 1975) also has requirements around supervision during construction. The applicant must register anything which will become a statutory reservoir and then apply the design and construction standards required under the Act.' However, we have not received any information indicating that these actions have been completed. The original FRA from 2012 states the reservoir capacities to be above 40,000m³ and indicated that a Construction Engineer from the All Reservoirs panel has already been appointed. However, we have not been provided with any updates relating to the stability or quality of the reservoir construction and it appears that the Environment Agency are also still awaiting this information.

We have presented evidence previously that indicates the lakes may be leaking, including the raised groundwater levels, the most recent pictures from Mr Padden showing the drawdown in Lake levels during October 2019 and the requirement for additional pumping to top up the lakes. Mr Padden indicates there is substantial vegetation growth around the lakes making inspection of the embankments for seepage or settlement difficult.

The FRA prepared by N.Reilly in 2012 (P4) indicates the impact of a breach on the adjacent properties could be severe, but that the chance of failure is less than 1 in a

million. The report implies that confidence in this statement would be supported by regular visits and annual reports provided by the appointed reservoir engineer. We await confirmation that the reservoir assessment and regular visits have actually taken place. We also note that the original FRA (2011) was undertaken on the basis of survey data which has been shown to be incorrect, plus proposed modifications to the surface water drainage strategy, and changes to the landscaping and excavation in the side slopes and at the base of the reservoir embankment.

A comprehensive flood risk assessment is not provided which combines the various changes and updates to the proposal. It is therefore very difficult to achieve a clear view of the potential impacts and proposed mitigation measures. The review of flooding undertaken in the ES (Appendix F of Volume 3) does not present a comprehensive flood risk assessment but rather responds to applicants questions and references parts of earlier (potentially out of date) flood risk studies. The last reference to a formal Flood Risk Assessment dates from February 2012 since which time there have been many changes to the design, topographic levels, surface water and groundwater management strategies. Multiple parties have been involved but it appears that no overall responsibility has been assumed by the applicants consultants for an overarching flood risk assessment covering the most recent status of the proposed development. It appears that much of the ES is relying on the flood risk assessment undertaken in 2011/12.

6.3 Adequacy of data collation

As discussed in our previous review (Geosmart, April 2019) the dataset supporting the ES is not sufficiently comprehensive to discount the risk posed to the client's property or to support the design of adequate mitigation measures. As previously recommended, additional temporal and spatial coverage is required to support an adequate assessment of the environmental risk associated with the unauthorised development in relation to the following:

- Monitoring of groundwater levels and potential impacts outside the site boundary, to support design of the proposed mitigation measures
- The quality assurance audit trail for the lake/reservoir construction and lining, plus a Construction Environment Management Plan (CEMP) as requested by the Environment Agency
- Comprehensive water quality monitoring and leachate testing to assess the impact of waste materials of unknown origin on the surrounding water environment.

6.4 Water Quality

The made ground present at Monk Lakes includes anthropogenic and imported waste material. Detailed sampling and leachate testing of the made ground has to date not been presented. A limited amount of sampling of surface and groundwater has been undertaken which excluded metals and polyaromatic hydrocarbons. Given the nature

of the made ground, the analytical suite should include a wider range of parameters. . Sampling off-site on Mr. Padden's property has not been undertaken. The information presented is insufficient to fully assess the risk of the waste deposition at Monk Lakes on the surrounding water environment.

The water quality parameters selected do not cover the broad range of contaminants which could be associated with the deposition of waste materials of unknown origin on site. Again, no monitoring of the off-site surface water or groundwater receptors has been undertaken.

Both shallow groundwater and the adjacent surface water (River Beult, Western Ditch, Hertsfield Barn Pond) should be considered as controlled water receptors. Any impact on groundwater quality as a result of the importation of waste will have potential water quality impacts on the water emerging on Mr Padden's property and potential risks associated with this. A more comprehensive sampling programme is therefore recommended and should include sampling of groundwater on Mr Padden's property.

In accordance with the Environment Agency letter of 20th September 2017, a discharge permit may be required for the groundwater and surface water discharge to the western drain that will form part of the proposed mitigation scheme. It should be confirmed that such a permit can be obtained before the scheme can be considered feasible. The groundwater and surface water entering the ditch is likely to have come into contact with the imported waste material and will require an appropriate risk assessment as part of the Environmental permit or waste recovery application.

6.5 Alternative Schemes

As discussed in our previous review (Geosmart, April 2019), as part of the Environmental Impact Assessment there is a requirement to consider alternative options which could limit the environmental impact of the proposed scheme. This has not been done to a sufficient extent.

It is proposed to import additional material to complete the scheme, particularly in relation to Lake 1. An alternative solution which should be considered is to lower the water levels in Lakes 2 and 3 to a level in keeping with the original ground level. This would significantly reduce the potential impact of leakage from the ponds and the associated rise in groundwater levels that are impacting adjacent properties.

As part of the re-design of the lakes, material would be removed from the embankments to construct Lake 1, thereby reducing the rainfall run-off to the western perimeter ditch and the associated impact on the adjacent properties.

Alternative schemes could achieve the same end result of creating fishing lakes with a lower environmental impact on the environment.

7. Recommendations

Further work on the conceptual model and data collection is appropriate to define what is occurring before any decision on the application is made, given that the matter has gone on for several years and there is an alleged impact already which needs to be investigated.

A groundwater drain mitigation system might be possible to prevent groundwater flow beyond the western drain. However, there is also a risk of dewatering Hertsfield Pond which represents a far more challenging and delicate design, balancing the risks of both groundwater flooding and potential dewatering of Hertsfield Pond, which is key to deciding the feasibility of the proposed mitigation. A revised design would be needed to address this before planning permission should be granted.

Whilst the amount of work done may be typical of an application of this nature, in this case it has not addressed the impact that has been raised by the neighbours, so logically further investigation is needed to either confirm that the development has had unacceptable impact and should be removed, or that the development has not had such impact and should proceed.

The principle of planning conditions is to allow the development to proceed subject to undertaking certain work. In this case the development has already proceeded so the use of consent with conditions is not appropriate for the assessment of impact.

Conditions may still be appropriate for management of water safely at the site, but the issue of whether there has been an impact on the neighbours should be assessed and a conclusion reached before a decision on the development can be made. The only exception to this logically would be if a scheme was installed that would be guaranteed to remove the risks, which in this case would entail more work before feasibility can be confirmed.

We recommend that the following issues are addressed before you consider removing your objections to the Planning Application.

- The conceptual model of the groundwater system presented in the ES needs to be updated after suitable further investigation and monitoring, to recognise the potential impact on groundwater flooding at Hertsfield and support the design of mitigation measures.
- The feasibility of the proposed measures to mitigate groundwater flooding have not been demonstrated to a sufficient standard to be confident that further design would result in a satisfactory outcome. In particular, the source of flooding and water damage that you have identified should be investigated to confirm whether this has been caused by the Monk Lakes development.

- Advisors to MBC have suggested that the risks can be managed through the use of planning conditions. I do not agree that such an approach is relevant in this case because the development has already been built and impacts have been observed. In this situation it is vital that further assessment is undertaken before planning permission is granted.
- The significant uncertainties in the extent and behaviour of the groundwater system along the western margin should be reduced through monitoring to provide confidence in the proposed mitigation measures.
- Flood plain storage calculations should be provided for the impact of the embankments around Puma and Bridges Lakes for the more frequent flood events, when flood levels are below the embankment heights.
- Plans for the proposed development need to include the latest topographic survey and the updated mitigation measures for groundwater and surface water management.
- Approval of the final proposed surface water management plans and drawings should be provided by the lead local flood authority.
- Water quality assessment is required to cover the broad range of contaminants that could be associated with the historic and proposed deposition of waste materials on the site. An environmental permit may be necessary to support the feasibility of the proposals.
- Alternative options for the final scheme and completion of lake 1 should be considered by the applicant.
- The raised lakes should be registered under the Reservoirs act 1975, supported by a construction report and panel engineer to undertake regular inspection. Evidence has not been provided to indicate this is the case. Based on the potential leakage from the lakes, and difficulty inspecting the embankments due to vegetation growth, we consider that the reservoir cannot yet be assumed as safe for the purposes of the planning application.
- Assessment of the severe risk of a reservoir breach on adjacent properties is required, including support from the appointed reservoir engineer.


I trust the findings of our review are self-explanatory but please don't hesitate to contact me should you require further information.

Yours sincerely



Dr Paul Ellis

Enc



Appendix B: Geosmart Letter, April 2019, Hertsfield Barn: response to EIA statement for Monk Lakes, reference 70276R1.

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12 April 2019

David Padden
The Rear Barn
The Manor Farm
124 Manor Road North
Thames Ditton
Surrey
KT7 0BH

Ref: 70276R1

Dear David,

Re: Hertsfield Barn: response to EIA statement for Monk Lakes

Introduction

A review of the amended Environmental Impact Assessment Statement (EIA) for Monk Lakes, dated February 2019, has been undertaken by Dr Paul Ellis, Director of Geosmart Information Limited, environmental specialists in land, water and sustainable drainage. Dr Ellis has over 20 years' industry experience with particular expertise in the analysis of drainage, flooding, and interactions between surface water and groundwater systems, plus development of Geosmart's National Groundwater Flood Risk Map.

This review has focused on the impact of the development in relation to groundwater, surface water and flood risk. Dr Ellis (previously at ESI Ltd (ESI)) has been involved since 2014 on behalf of the client (David Padden) with several phases of investigation and impact assessment of the Monk Lakes development in relation to the client's property at Hertsfield Barn.

Particular attention has been given to Part F of the amended EIA 'Response 2 To Maidstone Borough Council Regarding Water Issues at Monk Lakes' provided by Hafren Water (Hafren) on behalf of Taytime in February 2019, which has not been previously reviewed. The latest response from Hafren follows on from issues raised by consultees in response to Hafren's previous report included as Part G of the amended EIA 'Response to Maidstone Borough Council regarding water issues at Monk Lakes' provided by Hafren Water in July 2017 and reviewed by ESI in September 2017. Hafren Water have focused their response on comments raised by Maidstone Borough Council (MBC) Kent County Council and the Environment Agency (EA) (Hafren, 2019, Appendix 2675/MBCR2/A1). We have reviewed the responses and additional

information provided in relation to our understanding of the site and linked this to the comments raised by MBC and EA where these are pertinent to Hertsfield Barn.

Background

Mr Padden has reported waterlogged ground and several incidences of flooding that have affected his and neighbouring properties. There is strong evidence to suggest that this flooding is a result of the adjacent Monk Lakes development. A review undertaken by ESI of the evidence for this has been presented previously (ESI, 2017, ESI, 2015 and ESI 2014). Mr Padden continues to report ongoing impacts on his property: a reported loss of trees in his orchard due to waterlogging; flooding of his pond and driveway; infiltration to his sewage treatment plant; and damp affecting his property. Photographs highlighting some of these impacts are presented in Appendix A.

Previous review by ESI (2015, 2017) of the potential environmental impact from the development identified the following key issues that should be understood and mitigated to prevent a negative environmental impact from the Monk Lakes development:

- Shallow Groundwater Pathway - a superficial aquifer extends beneath both Monk Lakes and the clients property, providing a pathway through which development activity at Monk Lakes could influence groundwater levels and water quality at Hertsfield Barn.
- Impacts relating to flooding and raised groundwater levels are reported by the client (and other neighbours), which they state were not experienced prior to the development.
- Evidence collected by both Mr Padden and Taytime Ltd suggests that the groundwater regime has been altered by the Monk Lakes development, which has caused a rise in groundwater levels at Hertsfield Barn.
- The potential impact of the development on Hertsfield Barn has not been considered appropriately within the Environmental Impact Assessment.
- The evidence base upon which the assessment has been undertaken is not sufficient, in spatial extent or frequency.
- The potential impact on water quality has not been fully assessed.
- The potential impacts of the development have not been fully recognised or addressed. The originally proposed mitigation measures have been altered and are not subject to detailed design or assessment of potential benefits or negative impacts. The mitigation measures would need to operate in perpetuity to ensure there is no recurrence of impact should the system fail.

We have reviewed the responses prepared by Hafren Water 'RESPONSE TO THE MBC LETTER OF 18th OCTOBER 2018 AND E-MAIL OF 25th JANUARY 2019' (Hafren Water, 2019, page 3), presented in the Environmental Statement (ES) on page 204 of the pdf document. We have grouped our comments on the responses into several main areas as summarised below and explained in more detail in the following sections.

- The relationship between the groundwater system, the western ditch and Hertsfield Pond including the influence of the Monk Lakes development beyond the western site boundary (MBC comments 3, 6, 9, 11)
- Changes in the groundwater regime and water balance post development (MBC comments 1, 2, 4a, 5, 7, 8)
- The proposed western ditch mitigation measures (MBC comments 4b, 10)
- Adequacy of data collation and review of flooding at Hertsfield Barn (MBC comment 12)

The relationship between the groundwater system, the western ditch and Hertsfield Pond including the influence of the Monk Lakes development beyond the western site boundary (MBC comments 3, 6, 9, 11)

A full understanding of the water environment is required to estimate the impact from the development on Hertsfield Barn. Any omissions or errors could result in an under estimate of the impact of the unauthorised development and reduce the effectiveness of the proposed mitigation measures.

Groundwater levels along the boundary with Monk Lakes appear to be higher than the natural pre-development conditions. Post-development groundwater levels monitored both within Monk Lakes, and on adjacent land, indicate a groundwater flow gradient in a north westerly direction, towards Hertsfield Barn.

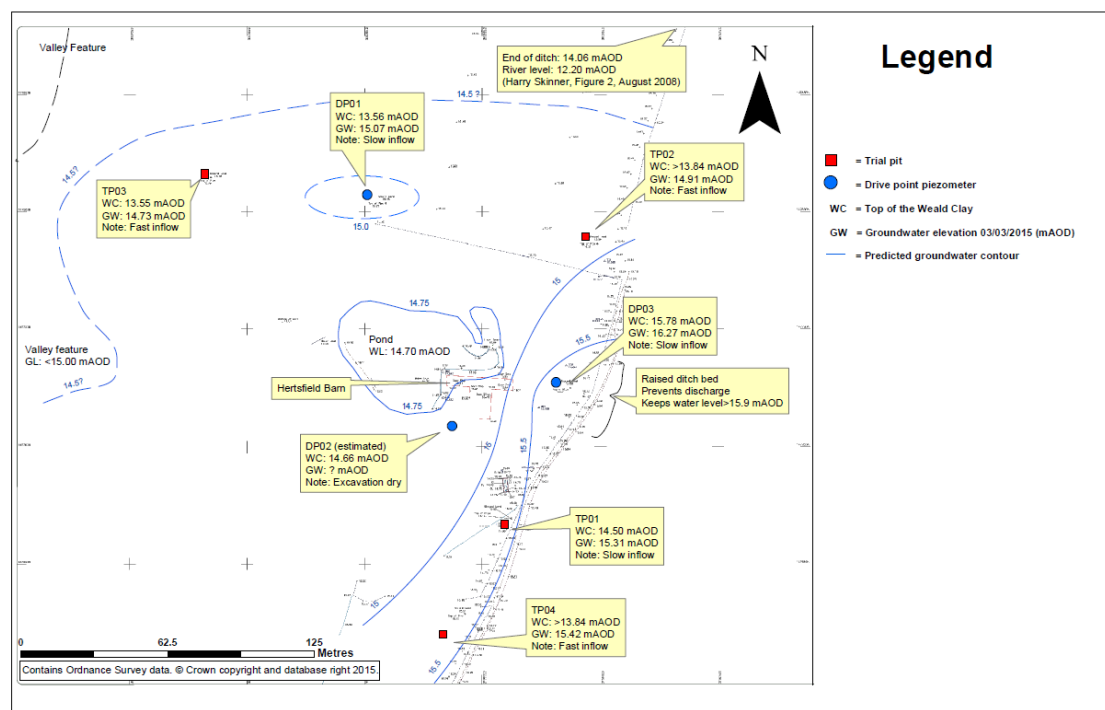
Ground levels around Hertsfield Barn are approximately 15 mAOD and generally below invert levels in the adjacent ditch, known as the 'western ditch'. The newly created steep banks surrounding the Monk Lakes development are considered to have created additional runoff and provided flow for the western ditch. The ditch often holds standing water, is unlined, and the additional runoff then infiltrates and has saturated the shallow groundwater system and resulted in a local rise in groundwater levels. The invert level of the ditch is often above ground levels further to the west. It was previously recommended that further investigation should be undertaken, including installing a data logger in the ditch and adjacent boreholes to establish the relationship between ditch water and groundwater levels. This recommendation has not been implemented.

The latest submission includes an updated cross section referred to in ES 6.15. The cross section has been amended with the elevation of Hertsfield Barn pond shown as 14.7m. The revised cross section is in response to the MBC comment 3:

'By setting the pond water level approximately 1.3m higher than a measured value the hydraulic gradient from the made ground west towards the pond is not revealed'.

The amended cross section is presented as Drawing 2675/MBCR2/03 (page 244 of the ES pdf). It confirms groundwater flow direction is likely to be towards Hertsfield Barn which is consistent with other shallow groundwater data (ESI, 2015). Unfortunately, the additional ESI data, which is provided below in Figure 1, is not shown on the amended cross section. Amended groundwater contours are presented in Drawing 2675/MBCR2/03 in Hafren Water 2019 (page 248 of the ES pdf) which confirm that flow is likely to be towards Hertsfield Barn. The contours do not include any estimates of groundwater levels outside of the Monk Lakes site, i.e. at Hertsfield Barn.

Figure 1 Estimated groundwater contours (from ESI,2015, Figure 8)



Groundwater contours should include the groundwater low around Hertsfield pond and make reference to the earlier trial pit and groundwater data presented in ESI 2015. As Taytime have not collected any data outside the Western Boundary then the information provided within the ESI report should be considered. If this information is disregarded, then the applicant should state the reasons for this and provide an alternative explanation for the high groundwater and flooding observed.

The groundwater level labelled on the revised contour plot for BH04 is incorrectly labelled as 15.66mAOD when in fact it should be 15.26mAOD, the level recorded on

26/01/19, the reference date used for all the other boreholes on the plot (Hafren 2019, Appendix A2, ES pdf page 270).

The recent groundwater level readings of 02/02/2019, presented in the ES pdf (page 242) report some of the highest levels on record for the site. Previous peaks in groundwater level may have been missed by the infrequent monitoring events. A recorded level of 15.67 mAOD in BH04, the closest to Hertsfield Barn, was above the floor level of Hertsfield Barn dwelling, where the lowest exterior wall base level is measured at 15.16 mAOD (ESI, 2015). The Hertsfield pond level is 14.70 mAOD and ground levels are as low as 15.03 mAOD in places. The elevated groundwater levels at the Monk Lakes development therefore clearly have the potential to cause groundwater flooding at Hertsfield Barn, as well as creating saturated soil conditions which may lead to increased risk of surface water flooding, and the loss of trees in the orchard reported by Mr Padden. The recent peak in groundwater levels also creates some doubt over the analyses of long term declining trends presented in Hafren, 2019, Table 2675/MBCR2/T1, page 8 (ES pdf page 209). It would also suggest that insufficient monitoring data has been obtained historically to accurately reflect any short term fluctuations.

ES 6.15 states *'It should be noted that the 2D cross sections do not provide a definitive guide to groundwater flow direction; the sections appear to indicate flow from the site at Hertsfield pond, whereas in reality this may well not be the case'*. Groundwater levels are higher than pond level and ground levels at Hertsfield Barn. Groundwater will flow from high to low elevations in the direction of Hertsfield Barn, through the aquifer system whether confined or unconfined. No evidence to support an alternative groundwater flow model has been presented and therefore the conclusion remains that flow is towards Hertsfield Barn until proven otherwise.

Changes in the groundwater regime and water balance post development (MBC comments 1, 2, 4a, 5, 7,8)

The Hafren Report 2019, page 32 (ES pdf page 233) states that

'the modification to the landform, hence local water environment, has altered the groundwater regime, insignificantly. Groundwater levels appear to have increased in some cases (BHs 1 and 8), but by decimetres only'.

This statement significantly understates the potential impact of the development on the water table and Hertsfield Barn.

The Hafren report confirms the following factors which will have had a significant impact on the post development groundwater conditions, such as removal of the majority of the drainage system:

'Removal of the surface drainage system. Prior to the development there was a drainage system comprising (buried) field drains and open ditches. The loss of this drainage provision

could potentially have produced higher groundwater levels by reducing the ability of water to egress from the area.' (Hafren, 2019, page 13, ES pdf page 214)

and creation of a new ditch along the western perimeter:

'There has been a significant change in its [the western ditch's] characteristics between the 'before' and 'after' situations, indeed the majority of the ditch did not exist in 2003.' (Hafren, 2019, page 15, ES page 216).

The scale of any change in groundwater levels is difficult to assess without baseline predevelopment data. However, even a variation of decimetres, as suggested by Hafren, can be very significant when considering groundwater flooding in relation to property floor levels.

Hafren confirm the placement of low permeability material will have reduced any pre-existing potential for direct (rainfall) recharge to the River Terrace deposits. The Hafren report confirms there is no data relating to pre-development groundwater levels within the River Terrace deposits and have concluded it cannot be determined whether levels have altered, but *'the apparent increase in groundwater levels, at some locations, may be due to the removal of a confining layer (potentially the Alluvium) allowing previously confined groundwater to rebound'* (ES pdf p210). Evidence to support this theory from borehole logs, showing the removal of the alluvium is not presented and we consider that the range of other factors presented above are also likely to have had a significant impact.

Hafren consider seepage from Lakes 2 and 3 as unlikely as they were lined with Weald Clay and compacted using a sheep's foot roller. However, there is no evidence presented to confirm the construction and no quality assured documentation recording this process. The report indicates that Lakes 1 & 2 are topped up by pumping from Lake 1, and anecdotal evidence from our client indicates pumping from the River Beult to the Monk Lakes site takes place on a regular basis throughout the year thereby implying leakage losses. As discussed previously, a leakage test from the ponds with adequate, high frequency monitoring, should be undertaken by an independent expert to confirm whether leakage is occurring from the lakes, as there is evidence, based on high water levels in BH1A to suggest this is the case.

It is accepted that much of the fill material on site is described as 'clay' in borehole logs which is of generally low permeability. However, the nature of imported material is such that it is often variable and may contain some permeable material. It is noted that groundwater levels are recorded within the fill material. We therefore do not accept that sufficient evidence is provided to demonstrate that groundwater could not flow through the fill material.

The assertion that groundwater levels in at least four of the monitoring boreholes are declining, should be revisited on the basis of the very high groundwater levels recorded on the 02/02/19. We note that the reduction in recharge to the site is likely to have occurred over a longer time frame (since 2003) than covered by the site monitoring,

and discussion of any potential trends in groundwater levels should consider this, i.e. a reduction in groundwater levels due to low permeability cover would probably already have occurred before the start of the 2014 monitoring period discussed. A significant control on groundwater levels will be the seasonal and interannual variation in rainfall, which has not been considered in relation to the water balance and trends in groundwater levels.

Hafren agree that works associated with the development have modified the landform and pre-existing water environment. They conclude that the total volume of groundwater within the site is considered likely to have been reduced due to the reduction in recharge, both direct and indirect. However, they have failed to consider the specific local variations along the western boundary adjacent to Hertsfield Barn where there is strong evidence to suggest an impact due to a rise in groundwater levels. The discussion of the changes in the water environment does not consider the focused recharge along the western ditch.

In response to Point 5 of the MBC letter, despite the earlier responses from Hafren that indicate changes to the groundwater regime have occurred, Hafren state *'The effects of the development on groundwater have been assessed. It is considered that if any do exist, they are small.'* We strongly disagree with this statement which does not agree with the evidence presented by our client on several previous occasions (ESI 2015, 2017) which demonstrates significant impacts occurring along the western boundary. This data is available but has not been considered in any significant detail within the Environmental Impact Assessment.

A suitable explanation is not presented to explain the source of recharge that is maintaining the high groundwater level in BH1A (in cross section 2675/MBCR2/03, ES pdf page 244) which is significantly higher than levels to the west, east, and north. The cross section does not extend to the south, however, the river terrace deposits do not occur much further south, instead giving way to the outcrop of the weald clay, plus there are perimeter ditches around the site and the large void area of Lake 1 which will intercept groundwater inflow from the south. The water balance, Hafren, 2019, page 17, (ES pdf p218) confirms this *'the rainfall catchment and groundwater catchment are delineated by the road to the south of the site, therefore 'interflow' and 'run-off' can be discounted from the balance as they do not contribute water to the site'.*

As stated elsewhere in the Hafren 2019 report it would be anticipated that the low permeability cover of imported material would reduce rainfall recharge and therefore groundwater levels, *'The total volume of groundwater within the site is considered likely to have been reduced due to the reduction in recharge'* (Hafren, 2019, page 10, ES pdf p211). The question is therefore: what is the source of the water that maintains the high level in BH1A, which is located in a significant thickness of permeable river terrace material and would be expected to drain fairly rapidly? This evidence suggests a source of recharge, potentially related to leakage from the lake.

Baseline Groundwater Levels

Without definitive baseline conditions from monitoring data, estimates must be made of what pre development conditions were prior to 2003.

The previous use of the land adjacent to Hertsfield Barn was primarily agricultural (see ES pdf page 783), with sufficient drainage to support arable crops and orchards. The drainage system is clearly observed in the Lidar data, Figure 2675/MBCR2/05, ES pdf page 246. We would therefore expect that groundwater levels were significantly below ground level over much of the area historically, otherwise the land would have been prone to waterlogging and not suitable for agriculture.

For example Hafren report 2019, page 7, (ES pdf page 208) states *'Prior to development the natural water regime was modified by man-made drainage provision; specifically the presence of field drains, field-boundary ditches and ponds. The installed systems would produce efficient drainage of areas overlying Weald Clay, in the south of the site, as well as reducing the volume of water available to recharge the River Terrace deposits. Conveyance of water to the River Beult would have been efficient.'*

Hafren have responded to comments made by Kent County Council in their letter of 21st September 2017: *"if groundwater levels appear to be close to or higher than the pre-development ground levels, it would be reasonable to conclude that the development has altered the hydrogeological regime'.*

Water levels are recorded within the imported made ground material at many of the observation boreholes indicating a likely change in the groundwater regime.

There is potential that some material, such as the topsoil, may have been removed prior to the deposition of the imported material. Hafren have undertaken an estimation of the pre-existing ground levels based on Lidar data and compared this to measured groundwater levels. As indicated in the Hafren Report 2019, page 32 (ES pdf page 233), the maximum post development groundwater levels in relation to the predevelopment ground levels are:

- In BH01 83cm above estimated pre-development ground level (GL);
- In BH02 within 8cm of GL;
- In BH04 within 15cm of GL;
- In BH1A within 52cm of GL;
- In BH2A within 87cm of GL; and
- BH3A within 40cm of GL.

If we assume that predevelopment groundwater levels were below predevelopment ground levels, as evidence of previous land use and drainage systems suggests, these

apparent shallow groundwater depths are considered sufficiently high to indicate a change in the groundwater regime as a result of the Monk Lakes development.

The new 2018 topographic survey (Hafren 2019, Appendix 2675/MBCR2/A4 and ES, pdf page 282) has raised some potential discrepancies in the surveyed borehole collar elevations and the original datums used to calculate groundwater levels in support of the ES impact assessment. Further assessment of BH04, located closest to Hertsfield Barn, using the new 2018 topographic survey data (Hafren 2019, Appendix 2675/MBCR2/A4 and ES, pdf page 282) indicates a ground level at the borehole of 17.89 mAOD and an apparent collar level of 18.16 mAOD. We note the datum level, presumably the borehole collar, used to derive the groundwater level hydrographs (Hafren, 2019, Appendix 2675/MBCR2/A2, ES pdf page 270) is 17.756 mAOD. This discrepancy needs further investigation as it could result in an underestimation of groundwater levels; for example, if the maximum groundwater level in BH04 was recalculated as 16.5 mAOD. The log for borehole BH4 (Hafren, 2017, Appendix 2375/WIA/A2, ES pdf page 485) suggests there is 2.3m of made ground over natural sandy clay deposits. Therefore, the minimum historic ground level could have been as low as 15.59 mAOD. The difference should be clarified to ensure the accuracy of data reported and the conclusions of the ES assessment.

Groundwater levels recorded in the made ground are potentially above the estimated pre-existing ground level, indicating a potential alteration in conditions post-development. As indicated in the Hafren Report (2019) the introduction of imported cover material which was of low permeability should have resulted in lower groundwater levels beneath the site. The increase in groundwater levels therefore indicates that a source of recharge to the groundwater system, such as leakage from the lakes or focused infiltration from the ditch, has occurred as a result of the development.

Leakage from Lakes - It is possible that leakage from the adjacent Monk Lakes is contributing to a rise in groundwater levels, as mentioned in the discussion of groundwater contours below. Paragraph 6.52 of the ES states:

'...it is noted that seepage from Lakes 2 and 3 is unlikely as they were lined with Weald Clay, and compacted using a sheepsfoot roller. Furthermore the imported material is consistently described as "clay" in the borehole logs'.

Detailed evidence has not been provided to confirm an adequately quality assured process was adhered to during the lining of the lakes, particularly given the potentially varied nature of the imported fill material. A limited amount of site investigation data is available to demonstrate the nature of the lining material. A rise in groundwater levels around the lakes could indicate a potential leak and an adequate water balance, supported by data of suitable resolution including a seepage test, should be provided if the potential for leakage is to be discounted.

Water Balance – in the MBC e-mail of 25th January 2019 (Hafren, 2019, page 16; ES pdf page 217) a water balance is requested along with the statement *'Calculating an average*

for the whole site is not detailed enough given the potential local effects'. The email also specifically references the requirement for an assessment of the additional runoff produced from the reservoir side slopes on the west. The water balance presented in Hafren, 2019, does not provide the required level of detail. It is a high-level assessment for the whole site, based on an old regional data set from the Ministry of Agriculture Food and Fisheries (MAFF).

A more accurate water balance should focus on discrete areas of the site to identify changes to the post development water balance. It would require detailed site specific information on rainfall, evapotranspiration, pumping volumes and changes in storage. We note that the post development water balance does not include any water pumped into the system, for example from the River Beult, and only includes water pumped out as a negative term. The findings of the water balance are that groundwater levels should be significantly reduced, however this finding does not appear to be consistent with the elevated groundwater levels observed along the western boundary. A water balance for the western section of the development is not presented, but would be likely to show a greater volume of rainfall recharge being concentrated along the western boundary of the site.

Insufficient evidence is presented to justify the conclusion that the development has had an insignificant impact at the western boundary and on neighbouring properties such as Hertsfield Barn. In fact, in our opinion there is strong evidence to suggest that a significant impact has occurred.

The proposed western ditch mitigation measures (MBC comments 4b, 10)

The Hafren Report 2019 (page 2, ES pdf page 203) states that *'the installation of an engineered drain is a fundamental aspect of future site work'* which we assume to mean the adequate operation and management of the site. The drain is based on the details of an engineered western ditch, previously prepared by PBA, which would manage both groundwater and surface water. *'The groundwater control which would be achieved by the proposed ditch, which incorporates the installation of a perforated pipe, would ensure that off-site effects of variations to groundwater level, would be mitigated.'*

A revised topographic survey dated December 2018 is presented in the ES VOLUME 2 – PART E, pdf page 182. It is understood this is different from the topographic survey used in the previous assessments, including the PBA design for the western drainage ditch and presumably the surface water run-off calculations and flood risk assessment. Confirmation is required to determine if the updated survey will significantly alter the findings of the earlier studies. Hafren Water (2019) have used the previous PBA MicroDrainage model for the run-off calculations but have not indicated if the model required updating with the revised topography.

The feasibility of the proposed mitigation measures

The Hafren 2019 report appears to maintain that off-site effects might not have occurred, despite the evidence to the contrary. ES paragraph 6.62 states

'The effects of the development on groundwater have been assessed. It is considered that if any do exist, they are small. Despite the small anticipated magnitude of impact upon groundwater distribution a robust scheme has been designed to mitigate against potential effects, particularly to the west of the development. Mitigation will be achieved via works on the western boundary ditch.'

Without a full appreciation of the potential off-site effects of the development it is difficult to see how these have been quantified adequately to assign a magnitude of impact for the EIA or how a suitably robust mitigation scheme can be developed. For example, when assessing the impact of other types of developments (e.g. a quarry or drainage infiltration system) on the water environment it is common practice to estimate the change in typical groundwater level at the receptor. This has not been undertaken for the Monk Lakes ES.

We note that off-site measurements have not been undertaken by Taytime to support the design of the proposed mitigation system. Instead it relies on the work undertaken by PBA in 2015, without the benefit of any of the additional information collected since (see ES Part K Drainage Strategy Report, Peter Brett Associates, July 2015) and ES Part L Groundwater Monitoring Report (Peter Brett Associates, July 2015).

The PBA design Drawing 29431/001/SK03 (ES pdf page 855) presents a water management strategy to both intercept surface run-off and reduce groundwater levels. The strategy provides typical details but does not include a comprehensive detailed modelling assessment to demonstrate suitability in principle and support full detailed design. It should therefore not be considered to adequately support the EIA as an effective mitigation measure.

Detailed analyses and modelling of the impact on groundwater level and inflow rates is not presented in support of the design. The strategy focusses on a single level of 14.70m AOD for Hertsfield Barn pond and does not present any hydrogeological calculations on how effective the groundwater interception trench will be and what mitigation it could achieve. In addition, it should be confirmed if the drain will operate effectively when water levels in the River Beuilt are high which would cause a backing up of water levels in the drain rendering it ineffective.

Further work including an assessment of the operation of the outfall, hydrogeological cross sections and modelling would be required to demonstrate the groundwater drain will intercept the key permeable zones and operate as proposed.

The PBA design has not been updated since 2015 on the basis of the more recent water level and topographic survey data, or the alterations to the design proposed by Hafren to accommodate flood attenuation measures, as discussed below.

Flood attenuation storage within the western ditch

The potential to cause and exacerbate flooding should be a key planning consideration. The Hafren report (2019, page 30) and ES pdf (page 231) indicates:

'discussions relating to the western ditch were held with Alex Brauninger (Senior Flood Risk Project Officer) at Kent County Council, via telephone on 18th January 2019. Hafren state the restriction of discharge to 2 l/s/ha would require a significant amount of attenuation storage, which, is agreed, would be difficult due to limited space within the rainfall catchment of the ditch.'

We note that the EIA should assess the impact of the development in relation to pre-development conditions, not the current site conditions. The development covers an extensive area, with ample room to install flood attenuation features for mitigation. The creation of steep gradients within the unauthorised development have led to the surface water flooding issues and in, our opinion, mitigation should be on the basis of the pre-development conditions. Allowances should not be made to accommodate this unauthorised development and reductions in the required standard of mitigation to accommodate the current site conditions are not acceptable.

Hafren 2019 (Page 30, ES pdf page 231) have revisited PBA's MicroDrainage calculations to include the 1 in 100-year plus 20% climate change event and a weir at the outfall of each 100 m (subcatchment) section of the ditch in an attempt to attenuate run-off. Given the potential impact of the Monk Lakes development on the adjacent vulnerable residential properties we consider that additional climate change increases should be incorporated within the assessment in line with the latest Environment Agency guidance. A maximum increase in rainfall due to climate change of up to 40% should be considered.

Hafren Water (2019, page 31, ES pdf page 232) have used the previous 2015 model from PBA to assess attenuation requirements for water stored in the western ditch using a series of weirs. This is a significant change to the design of the perimeter ditch which has not been updated. Details are presented within the main text of the maximum discharge rates but not of the required storage volumes to be held in the ditch. The storage volumes are fundamental to the design of the ditch and as such should be assessed to see if the proposed storage volumes are possible, and what changes in landform will be required to accommodate them. It is essential that additional water is not stored in unlined features which may allow infiltration to the shallow groundwater system and further exacerbate groundwater flooding off-site. Without an accurate detailed drawing of the proposed weir system, including topographic and accurate storage volumes it is not possible to determine the feasibility or effectiveness of the proposed system which has altered considerably from the initial 2015 PBA drainage strategy.

We have reviewed the MicroDrainage calculations presented in Hafren 2019, Appendix 2675/MBCR2/A7. The sections of the ditch adjacent to Hertsfield Barn appear to correspond with sections 1.003 and 1.004. Calculations for the 1 in 100 return period

plus climate change (ES pdf pages 372 and 377) indicate significant volumes will accumulate in these systems (307m³ and 182m³ respectively) and the occurrence of a flood risk is highlighted by the model. These are significant volumes to incorporate within the proposed 100m sections of ditch, which the PBA drainage strategy indicates to be 0.75m in depth, and 0.5m base width, 1.5m wide at the bank top. Ignoring any gradient, which will reduce the storage, it is estimated that storage in the current PBA 100m ditch sections would be 75 m³. This means a potential requirement for an increase of 4 times in ditch width to 6m, with associated changes to the steep slope supporting the reservoirs required to accommodate the additional storage. In addition, the MicroDrainage calculations utilise invert levels of 15.35 mAOD and 15.15mAOD which could potentially result in the stored water being significantly above ground levels at Herstfield Barn.

Hafren (2019) anticipate that the interceptor drain will mitigate any adverse effects upon the water environment. However, as stated above, a detailed design for the ditch has not been provided to incorporate the proposed changes in flood attenuation, including an increased allowance for climate change. Nor has sufficient investigation been done into the effectiveness of the proposed mitigation and the offsite implications of the proposed drainage strategy. In addition, as discussed in the later section on water quality an adequate risk assessment has not been undertaken, the discharge from the ditch may therefore be subject to the requirement for a review by the Environment Agency under the environmental permitting regime as the groundwater and surface water are likely to have been in contact with the imported waste material forming the made ground. Until it is determined that the appropriate permissions would be forthcoming (supported by a water quality risk assessment) then the proposed mitigation scheme should not be considered feasible.

The proposed mitigation strategy would need to operate in perpetuity in order to prevent a recurrence of impact on Hertsfield Barn, therefore adequate supporting information and a maintenance schedule is required to ensure the system does not fail. For example, if there is a breach in the lining of the ditch or deterioration in the groundwater drain then problems of high groundwater could return or even increase at Hertsfield Barn. The detailed drainage design should include a clear definition of the party responsible for the maintenance of the western perimeter surface ditch and the groundwater drain in perpetuity, plus adequate financial provision for whoever will take responsibility for the system.

Adequacy of data collation and review of flooding at Hertsfield Barn (MBC comment 12)

As set out in ES 1.52 data gathering and surveys provide the information required to assess potential impacts from the retention and completion of the lakes for recreational angling purposes. According to the ES, where available baseline information has been considered to be insufficient, site surveys to supplement the

baseline information have been carried out where appropriate. However, in our opinion the level of detail and quality of data provided is insufficient to adequately determine the impact of the development on the environment, in particular in relation to the following items:

- Monitoring of groundwater levels and potential impacts outside the site boundary, to support design of the proposed mitigation measures
- Sufficient data to assess the impact of the Monk Lakes development, including the water balance and potential leakage from Lakes 1,2,3, accurate pumping records from the River Beult, sufficiently frequent monitoring and a lake leakage test.
- The quality assurance audit trail for the lake/reservoir construction and lining, plus a Construction Environment Management Plan (CEMP) as requested by the Environment Agency
- Comprehensive water quality monitoring and leachate testing to assess the impact of waste materials of unknown origin on the surrounding water environment.

The dataset supporting the EIA is not sufficiently comprehensive to discount the risk posed to the client's property or to support the design of adequate mitigation measures. As previously recommended, additional temporal and spatial coverage is required to support an adequate assessment of the environmental risk associated with the unauthorised development.

Hafren suggest that the proposed mitigation measures will represent 'betterment' when compared to the 2003, baseline, conditions. However, as set out in previous discussions, to date the development is considered to have had a significant negative impact resulting in a rise in groundwater levels on the western boundary. Mr Padden continues to suffer from the impact of high groundwater levels as represented in the photographs provided by them in Appendix A. As recently as the beginning of February 2019 (4th, 6th & 8th) the pump from Hertsfield Pond required operation for 3 days in order to reduce levels and prevent flooding. Other neighbours also continue to be affected by water ingress to septic tanks and flooding of gardens.

Taytime have not undertaken any monitoring off site along the western boundary or made arrangements to do so with the various landowners.

The Hafren Report, 2019, page 3 (ES pdf page 204) indicates that access was denied to Taytime's surveyor in December 2018. Our clients have indicated that no formal request was made for access in advance. The surveyor indicated he was working on behalf of the council but had no identification to support his access request and so our client wished to await formal confirmation. The council have indicated that the surveyor was not working for them.

Water Quality

Previous work by Hafren (2017) states that the made ground present at Monk Lakes includes anthropogenic and waste material. Detailed sampling and leachate testing of the made ground has to date not been presented. A limited amount of sampling of surface and groundwater has been undertaken. All samples were analysed for a suite of parameters which included organics but excluded metals and polycyclic aromatic hydrocarbons. Given the nature of the made ground, the analytical suite should include a wider range of parameters. The information presented is insufficient to fully assess the risk of the waste deposition at Monk Lakes on the surrounding water environment.

A further round of water quality monitoring was undertaken in July 2017 and is presented in the Hafren report (2019) supplied within the ES. Samples were obtained from the same eleven monitoring locations as previous. These did not include any sampling off-site on Mr. Padden's property. Parameters recorded again included petroleum hydrocarbons and other water quality indicators (chemical oxygen demand COD, ammoniacal nitrogen, conductivity, and pH). The suite did not include a sufficient range of the potential contaminants, including metals, which could be associated with and derived from waste deposition.

Elevated COD was recorded in the western ditch (118mg/l), BH01 (168mg/l), BH01A (270mg/l), BH06 (270mg/l) compared with a mean concentration of 36mg/l in the other 7 locations. This would imply some connectivity between groundwater in the west of the Monk Lake site and the ditch. The COD recorded in the western ditch was higher than in the previous monitoring data. This could be related to variation in the base flow / loading of the ditch due to normal deviations.

Petroleum hydrocarbons were analysed in 5 of the 11 samples (BH06, Bridges Lake, Puma Lake, River Beult and the western ditch). A small amount of heavy end aliphatic hydrocarbons were noted in BH06 only. The water quality parameters selected still do not cover the broad range of contaminants which could be associated with the deposition of waste materials of unknown origin on site. Again, no monitoring of the off-site surface water or groundwater receptors has been undertaken.

Both shallow groundwater and the adjacent surface water (River Beult, Western Ditch, Hertsfield Barn Pond) should be considered as controlled water receptors. Any impact on groundwater quality as a result of the importation of waste will have potential water quality impacts on the water emerging on Mr Padden's property and potential risks associated with this. A more comprehensive sampling program is therefore recommended and should include sampling of groundwater on Mr Padden's property.

In accordance with the Environment Agency letter of 20th September 2017, a discharge permit may be required for the groundwater and surface water discharge to the western drain that will form part of the proposed mitigation scheme. It should be confirmed that such a permit can be obtained before the scheme can be considered feasible. The groundwater and surface water entering the ditch is likely to have come

into contact with the imported waste material and will require an appropriate risk assessment as part of the Environmental permit or waste recovery application.

Floodplain Compensation Scheme

Hafren Water, 2019, Appendix 2675/MBCR2/A3 provides a response to Environment Agency comments on the loss of floodplain storage due to the encroachment of the Lake 3 embankments. We note that the replacement storage, which is more than 300m from the river, should be assessed using a fluvial model to ensure the effects of Lake 3 further downstream are mitigated by the changes proposed upstream of the Lake 3 embankment. The additional storage should be 'live' storage allowing flow through the new area, rather than simply filling up and not contributing to the cross sectional area for flow. The best way to check this will be through the use of a fluvial model, which has not been undertaken.

The proposed minimum elevation (15.40 mAOD) of the flood storage area is below the existing ground level and there may be issues with the accumulation of surface water and groundwater, which would reduce the available storage. For example, in the cross section, Hafren Water, 2019, Figure 2675/MBCR2/03, groundwater levels in BH08 seem to extend above 15.40mAOD and the latest groundwater reading was 16.41 mAOD (Hafren 2019, Figure 2675/MBCR2/01). The storage area will also potentially require changes to the PBA 2015 drainage strategy in this area which includes the overflow from the Lily Ponds at 16.40 mAOD.

Alternative Schemes

As part of the Environmental Impact Assessment there is a requirement to consider alternative options which could limit the environmental impact of the proposed scheme. This has not been done to a sufficient extent, rather the strategy put forward is to stay close to the original scheme which we consider to have significant environmental impacts.

We note that there is a significant volume of natural clay material available on the site which could be used for the construction and lining of the lakes without the need to import waste material from off-site. The justification for the original design to create fishing lakes using imported waste material which forms the basis for the EIA is therefore questionable.

It is proposed to import additional material to complete the scheme, particularly in relation to Lake 1. An alternative solution which should be considered is to lower the water levels in Lakes 2 and 3 to a level in keeping with the original ground level. This would significantly reduce the potential impact of leakage from the ponds and the associated rise in groundwater levels that are impacting adjacent properties.

As part of the re-design of the lakes, material would be removed from the embankments, thereby reducing the rainfall run-off to the western perimeter ditch and the associated impact on the adjacent properties. The impact on floodplain storage from the encroachment of the Lake 3 embankment would also be mitigated.

Instead of the current proposal to import additional inert waste, material from the embankments could be used in the final construction of Lake 1 and water levels reduced to below ground level or as close as possible to the estimated pre-existing conditions. As part of the revised scheme, adequate lining of the lakes could be demonstrated through a quality-controlled process to eliminate the potential for leakage. In addition, the information collected from the recent boreholes (which were not available prior to the original lake/reservoir construction) can be used to support an appropriate design, verified by a reservoir engineer.

Lower lake levels and minimal leakage will also reduce pumping costs making the development more sustainable in the longer term and reducing the operational carbon footprint. Below ground level lakes may also remove the requirements for reservoir inspection and minimise any risk of a breach causing risk to residents and adjacent property.

Alternative schemes could achieve the same end result of creating fishing lakes with a lower environmental impact on flooding, water quality and sustainability.

Yours sincerely



Dr Paul Ellis
Enc

Appendix A – Photographs provided by the client David Padden from Hertsfield Barn (04/04/2019)

References:

ESI, October 2017. Technical note - Hertsfield Barn - Review of new technical data. Reference 62852L04Rev01.

ESI, 2015. Report on “The potential for groundwater flooding resulting from the unauthorised development at the neighbouring property known as Monk Lakes” - reference RL1-63346R2.

ESI, 2014. Hertsfield Barn - Groundwater Flood Risk Assessment. 62852R1, August 2014



Hafren Water, February 2019. Response 2 To Maidstone Borough Council Regarding Water Issues at Monk Lakes' provided on behalf of Taytime.

Hafren Water, July 2017. Response to Maidstone Borough Council regarding water issues at Monk Lakes provided on behalf of Taytime.

Appendix A – Photographs provided by the client David Padden from Hertsfield Barn (04/04/2019)

1. Holes filling with water from when the fence along our boundary with 3 Oast, was replaced 18/1/2016. Every hole they dug, from our entrance gate down to the pond, filled up with water.



2. Garden of our neighbours at 3 Oast, which is beside the fence that was replaced.
Photo taken May 2018.



3. Sodden ground in Hertsfield Orchard – May 2018.



4. Despite “vegetation” that they say will help with any groundwater issues – we certainly have “vegetation” in the ditches – never been cleared since the day they were badly dug – but doesn’t make a difference.



5. After rain, the water in the ditch sits – it doesn’t drain away immediately, it doesn’t run down the ditch channel - it sits in the ditch and then drains through the ground.



6. Klargester brickwork is constantly damp.



7. Numerous trees have died in the orchard now.



8. Water across our driveway. The area is waterlogged after rain, and runs across the drive into the garage, plus onto the garden at the front and side.



9. The pump in operation from the River Beult at Monk Lakes on 4th April 2019. There is an object which has a pipe going into the water and a pipe coming from Monk Lakes.



10. 12th February 2016 photograph from Alan Mathie, who is in the cottage next to Leigh Highwood and has lost 3 fruit trees. Shows the western ditch behind the fence.



Appendix C:

Summary of Freedom of Information Request to the Environment Agency by R.Lord, supplied 10/12/2020.

Summary of Environment Agency FOI documents supplied 10/12/2020

Number	Date	doc ref as supplied	Summary
	26/02/2020	FWD Mr Geoffrey Charles George Wilson - construction appointments Redacted	Email chain to 19/2/20 confirming instructions for Construction - section 8(1), commencing on 15/02/2018 at Monk Lake No.2 (grid reference TQ7672447598)
	22/01/2020	FW Property near Monk Lakes (1 Of 3) redacted	Mark Acford of EA- email forwarding attachments from local resident - to Geoff Wilson as the Construction Engineer.
	22/01/2020	FWD property near Monks lakes Redacted	Series of emails to Karen Rigg of EA forwarded to Mark Acford of the EA concerns complaints about the Lakes refers to Geosmart report, appears to be from David Padden.
	22/01/2020	FWD Balance document Monk Lakes Redacted	Internal EA emails - Karen Rigg forwarding document to Mark Acford
	11/03/2020	Biennial email acknowledgement 11-03-2020 (email)	Vanessa Wills (EA) to Mr Wilson Thank you for your email dated 19/02/2020. We have updated our records to reflect your current construction engineer appointments. Could you please confirm the name of the Reservoir that you have been in discussion with a member of the Reservoir Team, so that I can chase
	03/12/2019	2019.12/03 Geosmart Report_redacted	This is the letter from Dr Paul Ellis of ESI submitted on behalf of DP setting out concerns re addendum to the ES
	09/09/2019	120209-07	Letter from Laura Edwards EA to MBC in response to consultation. issues re biodiversity. Reservoirs Act <i>Depending on the volume of water to be stored above ground in the new lakes (>25,000m3) there may be a requirement to register them with the Environment Agency as the enforcement authority and also to inspect and report on their condition annually. The Act also has requirements around supervision during construction. The applicant must register anything which will become a statutory reservoirs and then apply the design and construction standards required under the Act.</i> Further information can be accessed on the Environment Agency's website: https://www.gov.uk/guidance/reservoirs-owner-and-operator-requirements
	05/09/2019	11_1948 Environment Agency 05.12_2019	EA Letter dated 5/12/2019 to MBC. Objection maintained. Expect to see previously agreed levels of water. Reduction in flood storage.
	30/08/2019	Drone photos of lake water levels	Document not headed for source (could be David Padden) photos between 30/8/19 to 13/12/2019 re pumping of water and changes in lake level.
	12/04/2019	2019.04.12 70276R1.1_Redacted	This is a letter from Dr Paul Ellis of Geosmart submitted on behalf of DP setting out objection to applicant's EIA material.
	26/06/2018	7(1) Preliminary Certificate 26-06-2018	Monk Lake Reservoir 2 Preliminary Certificate issued by Geoffrey Wilson (panel member) to be responsible for the construction of a new large raised reservoir known as Monk Lakes 2 to be filled up to 21.60m AOD subject to conditions. Condition 1. A copy of the BAM level survey 2014 to be provided to the engineer to check on the as constructed minimum crest. Condition 2 redacted. Condition 3. the supervising engineer to visit the site at least once a year before issue of the final certificate and to report changes to the construction engineer.
	20/02/2018	FWD Mr Geoffrey Charles George Wilson - acknowledge appointment Redacted	Sue Clarke (EA) to 'Emily' <i>We have now cancelled next Monday's site visit as Geoff Wilson is registered as construction engineer for Monk Lake 2. Are you able to let Mr Kinsey-Jones know, please, as I don't have an email address for him?</i>
	16/02/2018	Monk Lake 2	Email from Geoff Wilson to Sue Clarke at EA. I can advise that TerraConsult recently received a communication from Emily Harrison of Monks Farm confirming my appointment both as Construction Engineer and Supervising Engineer for Monk Lake 2. I will be away on business for the next week but will be addressing all matters pertaining to Monk Lake shortly after my return.
	07/02/2018	Biennial email acknowledgement 07--2-2018(email)	from Emily Davies of EA to Mr Wilson..... <i>Thank you for your email dated 06/02/2018. We have updated our records to reflect your current construction engineer appointments.</i>
	06/02/2018	Re Mr Geoffrey Wilson - construction appointment (reminder)	Email reply from Geoffrey Wilson to EA, copied previous 2017 email re appointment as there had been no change... <i>I can advise that the situation is as follows:</i> 1) Subsequent to our last communications on Monk Lakes, I finalised an agreement with TerraConsult, through whom I now undertake reservoir inspections. 2) A formal proposal for inspection was sent to the Owner of Monk Lakes on 04 October 2017. 3) The owner was to return a signed copy of the agreement to TerraConsult. There has been no response to date. <i>You will be aware from our previous communications that there had been problems in obtaining responses from the Owner in the past. The original verbal agreement for my appointment some two years ago was never confirmed, hence I assumed for a long time that another engineer had been appointed. The EA may perhaps need to consider making an appointment under Section 15(1).</i>
	02/02/2018	Certificate acknowledgment 02-07-2018 (email)	From Sue Bexter (EA) to 'Geoff' <i>Thank you for sending us a copy of the 7(1) Preliminary Certificate dated 26/06/2018 for the above reservoir. We have updated our records accordingly. We look forward to receiving a copy of the 7(3) Final Certificate in due course.</i>
	09/01/2018	Biennial email reminder 09-01-2018 (email)	Emily Davies (EA) to Mr Wilson Further to e-mail correspondence of 12/12/2017 it appears that we have still not been notified as to the status of your current appointments as a construction engineer. <i>I would be grateful if you could confirm that you are still appointed as construction engineer for the following reservoir: Construction - section 8(1), commencing on 07/08/2017 at Monk Lake 2 (grid reference TQ7780246836)</i>

	12/12/2017	Biennial email reminder 12-12-2017(email)	Alison at EA to Mr Wilson Further to e-mail correspondence of 17/08/2017 it appears that we have still not been notified as to the status of your current appointments as a construction engineer. I would be grateful if you could confirm that you are still appointed as construction engineer for the following reservoir: Construction - section 8(1), commencing on 07/08/2017 at Monk Lake 2 (grid reference TQ7780246836)
	12/12/2017	Mr Geoffrey Charles George Wilson-construction appointments (reminder)	email from Geoff Wilson to the EA - reply to above I can advise that the situation is as follows: 1) Subsequent to our last communications on Monk Lakes, I finalised an agreement with TerraConsult, through whom I now undertake reservoir inspections. 2) A formal proposal for inspection was sent to the Owner of Monk Lakes on 04 October 2017. 3) The owner was to return a signed copy of the agreement to TerraConsult. There has been no response to date. You will be aware from our previous communications that there had been problems in obtaining responses from the Owner in the past. <u>The original verbal agreement for my appointment some two years ago was never confirmed, hence I assumed for a long time that another engineer had been appointed.</u> <u>The EA may perhaps need to consider making an appointment under Section 15(1).</u>
	08/10/2017	2017.10.08 62852L04 Review of additional information_redacted	This is the letter from Dr Paul Ellis of ESI submitted on behalf of DP setting out concerns re the ES material.
	18/08/2017	Biennial email 17-08-2017(email)	From Alison at the EA to Mr Wilson I am writing to enquire as to the status of your current appointments as a construction engineer. I would be grateful if you could confirm that you are still appointed as construction engineer for the following reservoir: Construction - section 6(1), commencing on 09/04/2015 at Monk Lake 2 (aka Riverfield) (grid reference TQ7780246836) We would be grateful if you could inform us of any other additional construction engineer appointments
	18/08/2017	Re Monk Lake 2	Email from Geoffey Wilson to Sue Clarke at the EA I will endeavour to have my appointment formalised asap. As advised in my earlier email the timing of the contact from the undertaker was unfortunate, as it was just before I travelled overseas on business for approximately two months. Communications have been problematic but are now better, so will pursue the appointment. Previous email dated 4/8/2017.... Emily Harrison contacted me on Tuesday. I visited the fishing lakes complex yesterday and inspected Lake 2. I will now submit a fee proposal to the owner. Hopefully, we will then proceed to catch up on all outstanding certification required under the Act. I was very satisfied with what I saw and have no immediate concerns relating to reservoir safety. The perimeter embankment is substantial and includes a particularly wide embankment crest, normally only found on major dams. It all looks to be in satisfactory condition. Please note that it may take a few months to complete all documentation and certification. There are a few things that need to be either clarified or provided by the owner to facilitate proceedings. Also, timing is unfortunate in that Emily contacted me just 3 days before I travel overseas for 2 months.
	25/05/2017	RE Monk Lake 2 Redacted	Emily Davies EA to Geoff Wilson acknowledging details below.
	24/05/2017	within above document string	Email from Geoff Wilson to Emily Davies (EA) Here are my updated contact details. There is no longer a company name, since I left Amec Foster Wheeler: Address: 3, The Osier Field, Ball Lane Kennington, Ashford, Kent, TN25 4PL Email: geoffcg@hotmail.com H: 01233 641536 Re Monk Lake 2.txt[07/08/2020 12:12:30] M: 07718 636646 <u>I am still waiting to hear from Emily Harrison, but in the meantime have had some discussions with the original Construction Engineer Stewart Cale. Some time ago I contacted his successor, Nick Reilly (retired). There does seem to be a very troubled past (and present?). I would like to call you (or other EA person familiar with the history of Monk Lake) to discuss.</u>
	28/02/2017	Re Construction Engineer appointment	email from Emily to Geoff Wilson - Our records show that you are the appointed Construction Engineer for the following reservoir: Monk Lake 2 (aka Riverfield) If you could kindly confirm that our records are correct and complete and provide an update on progress with the reservoir, we would be very grateful
	11/11/2016	RE 111948 Monks Lakes Enforcment matter EA Resrvoir licence and other matters Redacted	long string of emails between Rebecca Lord (client's agent) , Richard Timms (MBC) concerning enforcement issues

	21/09/2016	Monk Lake 2 (aka Riverfield) Redacted	<p>Long email string starting 20/5/15 from Emily Davies EA to Emily Harrison.....<i>I have been looking back through our records on Monk Lake 2 and, probably because construction was proposed so many years ago, we do not seem to have a copy of the original Section21(1) Notice on file?</i> As I am sure that a number of the details that would have been contained within the original notice will now have changed anyway, I was wondering whether you might be able to provide us with an updated version for our records? I have copied your Construction Engineer into this email for information, as he may be able to assist you with the completion of the notice. Just in case you are unable to locate the original Section 21 Notice, I have also attached an extract from 'A Guide to the Reservoirs Act 1975' detailing the information that should be contained within the notice.</p> <p>Reply from Geoff Wilson 10/09/2015 ...<i>I acknowledge receipt of your email. I can confirm that no Section 21 Notice has been issued by me. I will need to follow up with the owner before I am able to advise any further.</i> Further reply from Geoff Wilson on 21/09/2015... <i>I will discuss with Emily early next week and then provide you with an update. I hope that it will be possible for the necessary certification to be completed by December/early January.</i></p> <p>EA Response : <i>Thank you for your email and update, we look forward to receiving a section 21 notice giving details of the reservoir. As there appears to be no preliminary certificate please can you confirm that the reservoir is not being used to store water?</i></p>
	08/09/2015	120209 Monk Lakes 2015 09 08	<p>letter from Mitra Ghadi EA to Richard Tims MBC in response to consultation on application 11/1948. We have reviewed the addendum submitted and we object to the application as we find that the addendum to the Environment Statement (ES) and previous documentation submitted in 2011 and 2012 do not adequately assess the risks to the natural environment and specifically the SSSI.</p> <p><i>Drainage: No information on drainage calculations has been submitted</i> and there is no evidence on how the drainage scheme will or will not impact the fluvial flood plain. <i>We also note that the groundwater monitoring report has found there to be groundwater flooding however no information on baseline flow has been submitted and the report has not demonstrated impact on fluvial, surface water and groundwater flows and whether there is any increased offsite risk.</i> While any proposed mitigation needs to be to the satisfaction of the LPA, we strongly recommend that we meet with colleagues in Maidstone Borough Council and Kent County Council (as the Lead Local Flood Authority) to discuss all aspects of flooding and drainage implications prior to any decision being made.</p> <p><i>Reservoirs: No new reports have been submitted to our Reservoirs team and no certificate has been submitted to show that the lakes can properly be filled with water under the supervision of the Construction Engineer who we were notified in April 2015 as Mr Geoffrey Wilson. Our reservoirs team will be getting in touch with the site operators</i></p>
	08/09/2015	Letter from EM to MBC objecting to planning appl 08/09/2015	Same as above
	24/04/2015	107526-5 ENF8320 Update FINAL	<p>Letter from Richard Penn of the EA to Richard Vause of PINS.</p> <p><i>We would like to clarify briefly our revised Statement of Case dated 2 April 2015. We hope that this will assist the Inspector when considering the appropriate period of time that will be required by the appellant to remove the waste from the location and decommission the lakes and is thus only intended to address the ground (g) appeal. All imported waste material to be removed from the site must be pre-sampled, analysed and classified before removal in order to ensure it is taken to the correct disposal or recovery site and accompanied by the correct paperwork. Consideration will also need to be given to the correct disposal of organic sediments accreted at the bottom of the lakes.</i></p> <p><i>Any plans to treat waste or to "recover" it at the location will require a formal permission from us which will depend entirely on the nature and proposed reuse of the material.</i></p> <p><i>With respect to the decommissioning and draining of lakes, the decommissioning must be carried out in a manner which complies with the requirements of the Reservoirs Act and at a rate and with a strategy calculated not to worsen the risk of flooding. Any movement of fish must comply with the Salmon and Freshwater Fisheries Act.</i></p>
	09/04/2015	Re Monk Lake 2 Reservoir redacted	<p>Email from Emily Harrison to Emily Davies (EA)</p> <p><i>Sorry for the delay. Just to confirm that Geoff Wilson is confirmed as our Panel Engineer. He is planning on visiting the site in the next fortnight and will update me if there is anything that's required to do immediately.</i></p>
	02/04/2015	Monks Lake EA letter 107526-4 ENF8320	Letter from Richard Penn (EA) to the planning Inspectorate concerning the rescheduled hearing and that now only on Ground (g) also about quantity of waste on site and ramifications of removal.
	30/03/2015	580862 Final letter before enforcement notice 300315	<p>Emily Davies (Reservoir Safety) EA letter to Taytime Ltd</p> <p><i>We have been informed by colleagues in our Addington office that Taytime Limited may be the new owners of Monk Lake 2, which is a registered large raised reservoir under the Reservoirs Act 1975. Please note that the Act requires reservoir owners and operators to inform us of any changes to the public register, including changes of ownership. We would be grateful if you could confirm the correct name and address of the owners of Monk Lake 2.</i></p> <p><i>We are also writing today to request notification of the appointed Construction Engineer for Monk Lake 2. Section 6(1) of the Act states that 'no large raised reservoir shall be constructed unless a qualified civil engineer is employed to design and supervise the construction'. Further to email communications between my colleague Alastair Stevenson and Ms Emily Harrison back in January, we understood that an appointment was being made. However, we have not yet received notification of this appointment.</i></p>
	20/03/2015	Re Monk Lakes Questions	Repeat of email below

	20/03/2015	Re Monk Lake Questions	<p>Email string, reply to request from Richard Timms MBC, by Ghada Mitra(EA) about the technical side of removal of the quatum of waste from the site note the follwing comments.....</p> <p>3. Waste quality <i>We have the following advice under this section:</i></p> <p>There were concerns with the quality of some of the waste that had been deposited on the site which resulted in the issue of warning letters to the previous operator and hauliers.</p> <p>The site has been filled by several different companies so the current operator has not seen / does not have an awareness of the nature of most of the waste that has been deposited on site. Operators are only required to retain Duty of Care documentation, which would indicate the source of the waste that has been deposited on site, for 2 years. Even if Duty of Care notes were available without associated representative analysis this would be insufficient to determine the suitability of the waste for onward movement.</p> <p>We were not required nor do we have a record of where the waste that has been deposited on site originated from.</p> <p>It think it very unlikely that we will have identified all the waste that failed to meet the requirements of the previously more relaxed regime let alone the more stringent authorisations with which operators are now required to comply. Therefore onsite waste analysis will need to be carried out to determine the quality, which informs where it could be disposed of and may have a bearing on cost and final destinations.</p>
	26/01/2015	118710-2 Monk Lakes scoping ccXXXXXXREDACTED	<p>Letter from Ghada Mitri EA to Richard Timms MBC re consultation docment 6/1/15. We have reviewed the information submitted and would like to reiterate our previous response detailed in our letter ref KT/2014/118710/01-L01, dated 15 August 2014 (below), and have the additional comments to make. We would expect any submitted drainage scheme to show that:</p> <ul style="list-style-type: none"> • there is no increase in risk as a result of obstruction of flow or loss of storage; • surface water is managed so as to be disposed of without an increase in risk to neighbouring properties; and • the possibility and consequence of cascade failure depending on panel engineer is considered. • the sub-surface flow (previously called Groundwater flow) is assessed and mitigated as per our previous letter, to protect neighbouring residents • all drainage from the site into controlled waters (the River Beult SSSI) are of acceptable quality that will not have negative impact on riverine ecology <p>We believe that when a planning application is submitted there will be some details we need to work through after which, we may carry out another audit similar to that of Mott MacDonald 2008 (depending on resources).</p> <p>Reservoirs: We note that a panel engineer was appointed at the time of the 2012 FRA, but there is none now. We strongly recommend that this is done as soon as possible to ensure that all risk to neighbouring properties is minimised. We expect the site to be compliant with the Reservoirs Act 1974. We understand that the site owners are looking to appoint a new panel engineer soon.</p>
	26/01/2015	letter from EM to Maidstone BC commenting on scoping doc 26-01-2015 redacted	same as letter above
	11/12/2014	575963 Monks Lake construction engineer app chase	<p>letter from Alastair Stevenson (Reservoir Safety) EA to Emily Harrison of Monks Lakes Ltd. We have been informed that you are resubmitting planning for this site and are about to instruct a new construction engineer, we have been informed as of the 24th of November 2014 that Nick Reilly is no longer the construction engineer for this reservoir. Please advise as a matter of urgency of whom will now be appointed to this position .</p>
	24/11/2014	Monk Lakes Near maidstone Kent	<p>from Nick Reilly (?) to Roger Lewis (?)</p> <p>We spoke some time ago about Monk Lakes. I write to tell you that as far as I am aware the project seems to be dormant at the moment and I have written to the owners, Mr and Mrs Guy Harrison, to advise them that I am withdrawing from the project with immediate effect. So I request that you delete my name from your list as Construction Engineer. I understand that Peter Brett Associates are now associated with the project and that Mr Paul Hill at their Ashford office may be able to give you more information.</p>
	15/08/2014	118710 response to scoping 15Aug14 ccXXXX REDACTED	<p>letter from Ghada Mitri ES to Peter Hockney MBC re environmental scoping for the Groundwater issue. As Monk Lakes falls within the scope of the Reservoirs Act, we expect that the site appoints a construction engineer from the All Reservoirs Panel (see https://www.gov.uk/government/publications/contact-details-of-engineers-on-the-all-reservoirs-panel) to design and supervise the construction and any alterations. The lakes must not be used to store water unless the construction engineer has certified that it is safe to do so. Our Reservoirs Team must be notified when the appointment is made. We look forward to being consulted on the Reservoir Act Compliance Report.</p>
	06/08/2014	RE RW for information Monk Lake 2 (Riverfield) reservoir Redacted	<p>Email String between EA and Emily (Harrison?) note email of 06/08/2014 from Emily to Alastair Stevenson states... <u>I am waiting for the exact name of the engineer but the company will be Peter Brett Associates. My contact there, Paul Hill is away on holiday for 2 weeks and he is going to confirm who will be appointed at that point. Sorry not to be more helpful in the meantime. We have not disinstucted Nick Reilly yet (who is currently our Panel Engineer) we just intend to because Peter Brett are carrying out some investigations for our pending re-determination (of planning application MA/11//1948)</u></p>

	06/08/2014	RE Monk Lakes	<p>Nick Reilly to Richard Knight (EA)</p> <p>I have heard nothing for well over a year from the Harrisons re Monk Lakes and was beginning to suspect that their plans had been abandoned. As you know I assisted them to formulate their planning application with the aim (on their part) that I would act as Construction Engineer under the Act. I have never been formally appointed to this role and my intention was that I would not accept it unless they regularised their approach to be more professional in design, testing and supervision etc. I do not think that this was ever likely but have delayed "resigning" pending formal advice from the Harrisons of the intentions and proposals.</p> <p>I have been approached by Roger Lewis who is seeking to ascertain the status of the project and in particular who is the Construction Engineer. As you will appreciate the Harrisons are technically in breach on a number of counts but particularly in relation to nr 2 reservoir which exists but has not been registered or certified although it was inspected by Stewart Cale in November 2007. At my last involvement it had not been filled and was probably not capable of being filled so provided this is still the case there is only a compliance problem and not a risk problem. I undertook to advise you if I ceased to be Construction Engineer. I am approaching retirement (I come off the panel 31 May 2016) so do not intend to continue with this project but would like to know what is going on before I formally notify the Harrisons.</p>
	21/05/2014	107526- 2 ENF8320 21 May 14	<p>Letter from Ghada Mitri EA to the Enforcement Team Manager Richard Vause at PINS. Previous comments still apply, updated information re the NPPF and updated modelled flood outlines. Reference to Reservoirs Act, Waste Management - suggests waste was deposited on site under the waste exemption regime. It is our position that the status of the imported waste depends on the conditions of the exemption and the validity of the planning permission in place at the time.</p> <p>We were consulted in December 2013 on the discharge of condition 24 (groundwater controls) and 19 (drainage facilities) for MA/11/1948. We recommended in our responses to the Local Planning Authority that additional information on drainage and groundwater flow should be provided by the applicant to enable us to provide technical advice. No such information has been provided at the time of this update.</p>
	12/12/2013	117434 01 LO2 12 Dec 13	<p>Letter from Ghada Mitri EA to Peter Hockney MBC re application to discharge condition for 11/1948. Based on the details submitted to date, and in addition to our previous response (ref: KT/2013/117434/01-LO1), we would not recommend discharge of the conditions until further clarifications are provided by the applicant. We note that the FRA accompanying the application, approved us as part of previous planning consultations, contains calculations and details in relation to reservoir safety matters.....We would also seek clarification on whether the diversion ditch has been sized to accommodate the emergency spillway discharge from Lake 3. Please note that we have some photos of the ditch exceeding capacity under an event which was considerably less than the 100yr</p>
	23/03/2013	116232 forwarded to 3rd party redacted	<p>Email from Ghada Mitri EA to Richard Timms MBC re application MA/12/2101 re the onsite managers cabin. It is stated the reservoir will be under the supervision of a Reservoir Panel Engineer. This means it will be subject to regular inspection to ensure reservoir safety but there is a small residual risk of the proposed portakabin being affected if a breach in Lake 1 were to occur.</p> <p>We understand consent for the adjacent reservoirs is due to be considered at Appeal if not determined beforehand. If the findings deem the reservoirs should not be built, we have no objection to the siting of the portakabin as proposed. If the reservoirs are considered lawful, the local authority should be aware the site of the portakabin may not be affected by inundation following reservoir failure as shown in Figure 3, but could be affected if the breach</p>
	23/03/2012	23 March 114334	<p>23/03/2012 letter from Jennifer Wilson of the EA - to Peter Hockney MBC re application 11/1948. Based on information to date we remove our objection. Applicant will have to obtain a bespoke permit to cover the operation of the site. As outlined in a letter to you dated 21/12/2011 the will need to demonstrate they are a fit and proper person. Need to be technically competent and ensure adequate financial provision to address any incidents. Requests made for information on the Flood Risk aspects of the application and ES. Issues raised re fisheries and biodiversity. issues re water resources and filling of the lake- abstraction from the river not permitted - concerns over how the site will operate.</p>
	23/03/2012	114334 02-LO1 23 March 2012	<p>letter from EA to Peter Hockney MBC from Jennifer Wilson - draft of the above letter.</p>
	09/03/2012	11414 01 LO1 09 March 12 REDACTED	<p>letter from Jennifer Wilson EA to applicant's agent Parker Dann. Following submission of additional material EA objection Withdrawn.</p> <p>We also wish to reiterate other matters raised within our letter to MBC dated 21 December 2012 (Reference KT/2011/113792/01) relating to the Reservoir Act, surface water drainage, foul drainage and the Environmental Impact Assessment. These also need to be taken into consideration .</p> <p>In conclusion, we hope we have made it clear that in addition to any planning consent that may be granted, the applicant will be required to obtain an environmental permit and reservoir approval from us prior to any waste activity taking place on site. We have already made them aware that due to the current water levels within the River Beult, future abstraction from the river is unlikely to be permitted.</p> <p>Please also be aware that whilst we are no longer objecting to this planning application, it does not mean or guarantee that, other permissions will be forthcoming</p>

	21/12/2011	11372 01 - LO1 21 Dec 11	<p>Letter from Michaela Kennard EA to MBC in response to a consultation. Objection raised as unlikely an environmental permit would be issued and the ES doesn't adequately assess the risks on the natural environment. As you will be aware, we have been involved in discussions regarding this site for a number of years, and have previously expressed our concern regarding any additional importation of fill material.</p> <p>In July 2010 we welcomed the applicant's stated commitment to complete the works without importing any more fill material from off-site; and we advised that we would be requesting that this be made a condition of any subsequent planning permission. We are therefore extremely disappointed that the applicant is now proposing to import an additional 51,000 m3 of fill material.</p> <p>Also ref to Reservoirs Act: One area of possible contention between the Reservoirs Act and Town & Country Planning requirements is in respect of landscaping. <u>It is often a requirement of planning to provide tree screening to make a proposal visually acceptable within the landscape. However, the Reservoirs Act often requires water retaining embankments to be relatively tree free to ensure stability and assist inspection</u></p>
	26/10/2010	017464 02-LO2 26 Oct 10 redacted	<p>letter from Barrie Neave of the EA to Development Control at MBC concerning erection of a detached shed and change of use from agriculture to nature conservation at Riverland. Attached to this heading there is a letter concerning Riverfield and 'other matter's dated 25/10/2010. Refers to meeting with residents on the 8/10/2010 and viewing of the site from Hertsfield Lane side. Refers to the latest consultation for 3 lakes and EA meetings with site owners on 8/2/2010 who are seeking regularise the site. Reference to the Reservoir Consulting Engineer. Note that no further meeting despite requests. Reference to Reservoirs Act - need for supervising and inspecting engineers.</p> <p>Reference to Waste Management The Riverfield site was subject to a Paragraph 19a waste exemption originally granted in February 2004 under Paragraph 3 of the Waste Management Licensing Regulations 1994. This original exemption was in respect of an estimated 1.5 million tonnes of material. In general terms this allows the recovery of waste for 'relevant work' in accordance with any requirement in or under the Town and Country Planning Act 1990. In this case the exemption was registered in relation to the creation of a 'recreational facility'. The exemption was renewed in March 2007 for a further 1 million tonnes of material.</p> <p>The exemption is concerned with the nature of the material being used, the quantity of material, and the purpose for which it is being used rather than the specific location within the exempt site. We would expect the location of material to be compliant with planning requirements.</p> <p>Goes on to explain changes in the regulations and then concludes So, as you can see, the regulations have tightened up for this sort of activity to ensure that a 'Riverfield' should not happen again. In fact, I believe Riverfield was used as an example to DEFRA of the failings of the old exemptions.</p> <p>Perversely, this will have implications for Riverfield if it is necessary to remove all or part of the imported material in that there are fewer sites that will be able to accept the removed material.</p>
	25/10/2010	107526 01-LO2 26Oct10 REDACTED	The same letter as above Barrie Neaves of the EA to Juliet Stringer Appeals officer at MBC
	25/10/2010	107526 LO2 26 Ocy 10 REDACTED	The same letter as above Barrie Neaves of the EA to Juliet Stringer Appeals officer at MBC
	03/09/2010	Monk Lakes- Marden Kent- appointment of construction engineer	<p>From Mike Heading of Scott Wilson to Emily at Reservoirs EA.....</p> <p>I have had discussions with Mr Guy Harrison, Owner of Monk Lakes regarding the role of Construction Engineer. This to advise that I am willing to take up the appointment as Construction Engineer for the Monk Lakes project and have arranged a site meeting with Mr Harrison on Tuesday 14th September. The meeting will allow me to become familiar with the site and to discuss formalisation of my appointment. As you may be aware Scott Wilson has been involved with this project over the last few years and therefore we look to maintain continuity of involvement.</p>
	02/08/2010	Monk Lake 2 Redacted	<p>Email from Reservoirs (EA) to Ms Harrison.</p> <p>We have today received an email from Mr Stewart Cale to advise that he has resigned as the Construction Engineer for Monk lake 2. As I am sure that you are aware, it is a requirement under Section 6 of the Reservoirs Act 1975 that, where a new large raised reservoir is constructed, a Construction Engineer is appointed to design and supervise its construction. For this reason, we would be grateful if you could inform us of the engineer appointed to take over Mr Cale's duties within 28 days of this message.</p> <p>A list of Panel Engineers can be found on our website at http://www.environmentagency.gov.uk/business/sectors/64253.aspx.</p>
	02/08/2008	Re CE Monk Lakes redacted	<p>Email string including this from Stewart Cale of Scott Wilson</p> <p>As advised to you by telephone, I hereby confirm that I have resigned my position as Construction Engineer under Section 6 of the Reservoirs Act in respect of Monk Lakes, Staplehurst, Kent. I shall be pleased if you will amend your records accordingly.</p>
	13/07/2010	111210 13July 10	<p>Barry Neaves EA letter to Peter Hockney MBC re consultation for design engineering by Scott Wilson for 3 lakes. Advised Reservoirs Act compliance required due to size. We note that on page 3 of the report it states: 'The material that has been imported to site has been necessary from an engineering point of view in order to follow the original 2003 planning consent..' We would contend that, from an engineering point of view, it would not be necessary to import fill material to create lakes in this location but we accept that it has been necessary to import fill to comply with the 2003 planning permission. That said, we welcome the commitment to complete the works without importing any more fill material from off-site. Indeed, we would ask that this be a condition. The overflow system and surface water drainage proposals will be an important consideration for the appointed Supervising Engineer and Inspecting Engineer who will need to be satisfied with the safety aspects.</p>

	26/05/2009	107526 01-LO1 26 May 09	Pieter De Villeirs of EA letter to MBC appeal officer re enforcement appeal - 6 pages includes EA Statement of Case written by <i>Barrie Neaves</i> has a degree in Civil Engineering (B Eng Hons), is a Chartered Civil Engineer and a Member of the Institution of Civil Engineers (CEng MICE). He has worked for the Environment Agency and its predecessor organisations since 1979 and his responsibilities include giving advice on such matters as flooding, in accordance with the policies of the Agency, when consulted by planning authorities upon local plans and planning applications .
	21/05/2008	Re Monk Lakes Redacted	Email from Emily Harrison to Matthew Roberts (EA) Also, for your records: Stewart Cale is helping us with some revised plans and we have agreed to a longterm contract with him to assess the banks regularly.
	28/04/2008	FW Revised Monks Lake drawing redacted	Emails from Roberts Matthew (EA) to Stewart Cale. others copied in. I have received the revised plans for Monks Lakes from the new owners for the exemption re-registration. I will need to collate & forward comments to Maidstone planning asap. Please could you have a look at them - I will need any comments ideally by the end of today (weds at very latest) Ryan/Kate - the map does not incl info we have requested concerning use of waste. Has the letter outlining what we need been sent to the new owners? Could one of you forward me an electronic copy please and I'll email it to them today
	17/04/2008	NEW DESIGN 17-04-08-02	Montana plan -dated april 2008
	25/03/2008	Monk lake 2 - Riverfield Fish Farm Redacted	Email from Matthew Roberts (EA) to Stewart CaleI've just received confirmation (emails attached) that the new owner of Riverfield Fish Farm would like to retain your services as Construction Engineer for Monk Lake 2. Copy not attached
	19/03/2008	Re Monk Lake 2 Riverfield Fish Farm redacted	Email from Emily Harrison to Matthew Roberts (EA) Just to confirm, we are going to use the original Engineer, Stewart Cale of Scott Wilson.
	17/03/2008	RE Riverfield - change of ownership redacted	Email between Matthew Roberts EA and Stewart Cale of Scott Wilson re change in ownership - Stewart Cale had no contact details
	13/03/2008	FW Riverfield change of ownership redacted	Robert Matthews (EA) to Stewart Cale (Scott Wilson) - Please see the email below, which confirms that ownership of Riverfield fishery has been transferred from Simon Hughes to Guy Harrison (Director of Monk Lakes). Has the new owner retained you as Construction Engineer for the Monk Lake 2? copying in on an earlier email, extract: In case you were not already aware, Simon Hughes has sold the fishery at Riverfield, see attached letter. (He has retained the fish farm). The new owners (who will now be responsible for compliance with planning permission, the para 19a exemption, Reservoir Act, abstraction licence etc details) contact details are: Guy Harrison (Director of Monk Lakes): 0780 10 10 4 10 Emily Harrison (Company SecrePlease see the email below, which confirms that ownership of Riverfield fishery has been transferred from Simon Hughes to Guy Harrison (Director of Monk Lakes). Has the new owner retained you as Construction Engineer for the Monk Lake 2? Gary of Monk Lakes) 07748 983 676 Morgan Jones (Site Manager of Monk Lakes) 07985 228 233 Correspondance address is: Emily Harrison, Monk Lakes, Staplehurst Road, Marden, Kent, TN12 9BS.
	06/12/2007	388741 Ack ConcE Appt and Rpt (06-12-07) Redacted	Acknowledgement Email from EA to Stewart Cale of Scott Wilson.
	05/12/2007	388741 Email from ConcE (05-12-2007)	Email from Scott Wilson to Mark Acford (EA) with attachedConstruction Engineers report (see below)
	00/11/2007	388740 ConcE Rpt (05-12-07)_redacted	Scott Wilson report on inspection of Lake 2 under the reservoirs act. Instructd by Simon Hughes. Construction Engineer = Stewart Cale date of inspection 07/11/2007. The existing embankments for Lake 2 were formed from earthfill excavated from the fishing lakes known as Monk Lakes which are situated to the east of the new lakes. The existing lakes are generally excavated into natural ground and do not, therefore, come within the ambit of the Reservoirs Act. The embankment which will eventually form Lake 2 is approximately rectangular in shape with the main axis orientated north-west/south-east. The embankment is virtually complete, except on the south-west side where there are two vehicle access points through what will be the embankment. The crest also will be raised by about 0.5 m. The embankments have been constructed to a current crest elevation of +21.50 m AOD and a crest width of between 15 m and 20 m between the south and north corners (anticlockwise). It is proposed to raise the embankment crest to +22 m AOD in due course. This work will reduce the eventual crest width to about 13 m-18 m..... the works are ongoing... next visit when lakes are nearing completion about mid 2008.
	02/10/2007	374522 email from Area re appointed CE	internal EA email - Simon Hughes phone call - he has instructed an engineer (from Ashford) who will visit the site on 09/10/2007
	20/09/2007	371646 Post meeting letter	letter from Mark Acford (EA Enforcment Offcier) to Simon Hughes. The pool is raised above natural ground level on all sides and when completed would be capable of retaining more than 25,000 cu m of escapable water. We discussed your intention to ensure the capacity is reduced to less than 25,000 cu m by constructing shallows, islands and reed beds before closing the breaches in the retaining embankment. You indicated your intention to appoint a construction engineer to review the method of construction and subsequently to confirm the capacity of the finished pool to ensure that it does not qualify for registration under the Reservoirs Act. I would be grateful if you would inform me when this appointment has been made.
	19/09/2007	376161 J Gosden notes of site visit 2007-09-19_redacted	detailed observations of the site visit, final note: The owner stated his intention to engage a Panel engineer to oversee the construction of the new reservoir.

	13/09/2007	369265 Email to John Gosden (13-09-07)	email from Matthew Roberts (EA) to John Gosden of Jacobs - email string relating to site visit arrangements
	04/09/2007	367070 Riverfield assessment visit	letter from Mark Acford (EA Enforcement Officer) to Simon Hughes. <i>As discussed in our telephone conversation of 4 September, we understand you are in the process of constructing a pool at Riverfield Farm. Early indications suggest the pool may be capable of retaining more than 25,000m³ (approximately 5 million Gallons) of water above natural ground level. This is the threshold volume for regulation under the Reservoirs Act 1975. You explained that your intention is to ensure that the completed pool is not of sufficient capacity to fall under the remit of the Act. It is however part of our role to assess large bodies of water and determine if they are subject to the above legislation.</i> We would like to visit Riverfield Farm on the 18 September at 13:00 in the company of an independent reservoir 'Panel Engineer' Mr John Gosden of Jacobs Babbie. Please let me know by Monday 10 September if this time is not convenient.
	23/08/2007	364813 Task Instruction and (23-08-07)364815 Email to Graham re task instruction (23-08-07)	Email dated 23/8/07 from Matthew Roberts (EA) to Graham Yarwood of Jacobs re the attached undated document from Matthew Roberts (EA) to Jacobs re Riverfield Fish Farm 1) Visit site accompanied by Environment Agency staff. 2) Check details of survey carried out by Verity Kirstein. 3) Carry out an independent assessment to determine whether the lake being constructed constitutes, or could constitute, a 'large raised reservoir'. 4) Check whether any of the other lakes on the site constitute 'large raised reservoirs'. 5) Produce a written, expert's report, in accordance with Criminal Procedure Rule 33, of the independent assessments carried out in 3) and 4), above.
	07/08/2007	362339 letter re capacity (07-08-07) redacted	Letter from Simon Hughes of Riverfield Fish Farm to Mr Roberts of the EA (Reservoir Safety) confirms that ' <i>at this time we do not know what the final capacity will be..... We confirm we will ensure that our construction is in accordance with the above act and when we appoint a qualified civil engineer from the Defra database we will supply you with his name and address..... we have no plans to fill the lake this year..</i>
	24/07/2007	355772 Appt ConcE (24-07-07_)	Matthew Roberts EA (Reservoir Safety) to then land owner Simon Hughes. <i>A member of staff from the Environment Agency's Kent Office visited your premises on 28 June 2007, and carried out an assessment of the fishing lake that you are currently constructing. This assessment indicated that your fishing lake could be capable of holding at least 100,000 cubic metres of water above natural ground level. On this basis, your fishing lake may constitute a 'large raised reservoir' within the meaning of the Reservoirs Act 1975 (the Act). If your fishing lake does constitute a 'large raised reservoir', it must be constructed in accordance with Section 6(1) of the Act. Section 6(1) of the Act requires that a qualified civil engineer (a 'Construction Engineer') be appointed to design and supervise the construction. This 'Construction Engineer' must be listed on the Defra database of qualified civil engineers, details of which can be found at: http://www2.defra.gov.uk/db/panel/default.asp</i>

Appendix D



Recent photograph showing flooding from along Western Margin, Hertsfield Cottages

Appendix E

Hertsfield Barn
Staplehurst Road
Marden
Kent
TN12 9BW



24th January 2025

www.bewengineering.co.uk

wayne@bewengineering.co.uk

07590 561 158

Dear Mr Padden,

ONGOING DAMP AT HERSFIELD BARN

On 1st March 2021, I wrote a letter after examining the provided evidence to present my professional opinion. The main points of the letter were as follows:

“The damp is clearly progressing based on previous reports and appears to have begun since the construction of the reservoir. Indeed, not just the damp in the building but the land all around the property has become waterlogged, even during warmer months.

The damp is currently soaking through the porous stonework and will be saturating the oak frame where it is in contact with the stone. If the situation continues and the cause of the damp is not removed, then there will be wet rot of the structural oak frame in the future.

If the cause can be removed and the stone and timbers dry out, then the timbers should be treated to prevent dry rot in the future.”

Since this letter, additional evidence has been provided indicating that the problem persists to this day. Photos are attached. As previously advised, this issue could potentially cause long-term ramifications for the oak frame if not properly addressed.

Yours sincerely,

Wayne Bew GMICE PgCert Structural Engineering
Bew Engineering Limited
Managing Director

Bew Engineering Ltd.
The Holt,
Harlequin Lane,
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East Sussex,
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Redhill Aerodrome
Kings Mill Lane
Redhill, Surrey
RH1 5JY



Damp within the property



Water tracking across the driveway towards the house



Garden flooded even in dry spells

