

Your Ref: 22/03883/F
Our Ref: CRM.1027.052. HY.L.001

Date: 06 October 2023
Email: paul.hardwick@enzygo.com

Cherwell District Council
Planning and Development Services
Bodicote House White Post Road
Bodicote,
Banbury OX15 4AA

Dear Sir/Madam,

RE: Development of 96 dwellings (50% affordable housing), extension to Bicester Road Cemetery with associated access (from Bicester Road), open space, landscaping and infrastructure: Land north of 66 and adjacent, Water Eaton Lane Gosford

We are writing in response to the Environment Agency letter Ref WA/2023/130393/01-L01 of 15 September 2023 and specifically to address its Reason for Objection 2. The EA comments forming Objection 2 are presented in sequential **paragraphs** from the letter indented in *italics* and our response follows each comment.

We assume (from its cross-referencing) that the EA has seen and read the Tier1/Tier 2 Groundwater Risk Assessment report ref. CRM.1027.052 GE.R.002A T1/T2 GRA prepared by Enzygo and submitted on 8th June 2023.

Para 1 *We object to the planning application, as submitted, because the risks to groundwater from the development are unacceptable. The applicant has not supplied adequate information to demonstrate that the risks posed to groundwater can be satisfactorily managed. We recommend that planning permission should be refused on this basis in line with paragraph 174 of the National Planning Policy Framework.*

We assume that the key NPPF sub section is NPPF paragraph 174(e) which states:

Planning policies and decisions should contribute to and enhance the natural and local environment by:

(e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans.

Para 2 *As submitted, the proposal is contrary to Local Plan policy ESD 8.*

We assume the local plan reference is to Policy ESD 8 of the Cherwell Local Plan 2011-2031 Adopted July 2015 which states:

Policy ESD 8: Water Resources The Council will seek to maintain water quality, ensure adequate water resources and promote sustainability in water use. Water quality will be maintained and enhanced by avoiding adverse effects of development on the water environment. Development proposals which would adversely affect the water quality of surface or underground water bodies, including rivers, canals, lakes and reservoirs, as a result of directly attributable factors, will not be permitted. Development will only be permitted where adequate water resources exist, or can be provided without detriment to existing uses. Where appropriate, phasing of development will be used to enable the relevant water infrastructure to be put in place in advance of development commencing.

The EA response does not explain why the proposal would be contrary to ESD8 and we assume that it is the EA's view that the cemetery extension would adversely affect the water quality of surface or 'underground water bodies'. Its argument appears to hinge on the definition of either 'groundwater' or 'underground water bodies'. Nor does it explain why in its Para 1 it considers the risks to groundwater in an unproductive low permeability mudstone aquifer would be unacceptable.

Para 3 The details presented in the submitted reports raises concerns that the development presents a risk to water quality of both ground and surface water. We do not accept the conclusions presented in the groundwater risk assessment and are concerned the development presents a risk of pollution due to the shallow groundwater present at the site.

Enzygo's definition of groundwater is the legal definition as stated in HM Government guidance¹:

'All water which is below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil.'

Water in the soil zone, saturated or otherwise is in our view soil water not groundwater as you cannot have an aquifer in soil. The saturated zone of unconsolidated superficial deposits or bedrock is groundwater -these are aquifers, defined as¹

'A subsurface layer or layers of rock or other geological strata of sufficient porosity and permeability to allow either a significant flow of groundwater or the abstraction of significant quantities of groundwater.'

The T1/T2 groundwater risk assessment carried out by Enzygo Ref CRM.1027.152.GE.R.002A and submitted 8 June 2023 reviewed the assessments carried out for the adjacent site and again notes that:

[section 4.11] The Environment Agency as a statutory consultee concluded that 'water moves through Oxford Clay at extremely slow rates and inhibits the flow of contaminants related to burials making this a suitable site for this use'. It raised no objection to the Bicester Road Cemetery development when that application was submitted.

The permeability tests reported in section 4.15 clearly demonstrate that although on land north of the proposed cemetery extension, the bedrock permeability (assuming the trial pits were at excavator depth

¹ [Protect groundwater and prevent groundwater pollution - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/672227/Protect_groundwater_and_prevent_groundwater_pollution_-_GOV.UK_(www.gov.uk).pdf)

typically 2.5mbgl to 2.8mbgl) and so in what we describe as either the 'weathered zone' of the Oxford Clay (the mudstone bedrock) or as the mapped 'alluvium'. In either case the test results indicate the bedrock permeability and alluvium permeability is extremely slow (to paraphrase the EA in para 4.11 above) and that whilst the ground may appear to be seasonally saturated (necessitating the installation of land drains on the existing cemetery) this is near surface soil zone water level variation from rainfall infiltration confined by the underlying mudstone not mudstone groundwater aquifer level variation, being confined to the soil zone with little interaction with immobile groundwater in the mudstone other than chemical/biological diffusion through mudstone pore waters at extremely low rates.

In our view the groundwater in the Oxford Clay is immobile compared to that in the soil, and that soil water on the ground surface and in the soil zone not groundwater is the mobile component that drains via surface drainage networks on the adjacent site. We accept that development presents some risk of shallow groundwater pollution, but the hydraulic conductivity evidence from trial pit soakaway testing shows that groundwater in the weathered zone is moving very slowly and our T1/T2 qualitative risk assessment demonstrated that the proposed cemetery development posed a low risk to groundwater quality which in any event is not useable for any purpose, and the GRA assessed it as posing no risk to surface waters i.e. the Cherwell.

Para 4 The risk assessment has discounted any risks to groundwater in this location because of the unproductive designation of the aquifer. We disagree with the comments in section 6.6 of the groundwater risk assessment. The limited groundwater elevation data for the wider site shows that groundwater will be very shallow (as little as 0.8 m bgl); graves would therefore be placed in saturated soils, and directly into groundwater.

Section 6.6 stated

6.6 Assessing the risk of cemeteries to surface water courses is not part of the groundwater risk assessment process. There is a potential risk of near surface site runoff in the soils and weathered zone picking up contamination from grave plots particularly where near surface groundwater crossing the plot floods the excavation over time and then enables grave contaminants to migrate upward (primarily by diffusion) through the water column to then diffuse into the overlying soil and any passing runoff. Provided the proposed site drainage lowers perched near surface groundwater sufficiently to ensure minimal infiltration runoff from soils following rainfall, and the grave excavation subsoil backfill is sufficiently low permeability to prevent upward contaminant migration. Then the pollution pathway is minimised, and grave contaminants will migrate downward or laterally away from each plot.

We would accept that the first sentence is not strictly correct where groundwater potentially interacts with surface water. Soil moisture or soil water is distinct from groundwater. Soil water occupies the space between soil particles and is at its maximum when the air in the soil is mostly replaced by water. As the soil drains, the saturated spaces between the particles are replaced by air, and residual water is retained as thin films on and between the soil particles held by capillary attraction. The water is free to move upward by capillary action or downward by gravity, it is taken up by plant roots or evaporates at the soil surface or recharges groundwater².

² [Soil moisture and groundwater \(Chapter 9\) - Measuring the Natural Environment \(cambridge.org\)](#)

So, in our view the surface soil water and groundwater in the mudstone are separate, such that any grave pollutants will be in the mudstone porewater and will migrate laterally very slowly when the grave is capped. Clays typically have a high water content (20-40%) due to high porosity but small pores and pore throats which is why suitably compacted clays will create low permeability materials that are used for example for landfill containments to prevent or minimise leachate migration. Para 4 fundamentally misunderstands the difference between soil water and groundwater (and mudstone pore water).

Para 5 The Bicester Road Cemetery adjacent to the south, is reported to have had issues with drainage, and land drains across the site were needed. It is not evident how the quality of this intercepted water there has been impacted by the graves, and the potential offsite migration of contaminants along these pathways. (We have not reviewed any groundwater elevation data or quality data from the existing cemetery site that may be of relevance to a risk assessment for the extension, and it is understood that there are 5no. boreholes on the existing site (see section 4.6)). It is feasible that this cemetery extension will also have such issues regarding surface water/land drainage, and there is a real risk therefore that contaminants from graves in the groundwater will migrate into surface water/land drainage features.

We have no comment on para 5 other than that land drains are permissible more than 10m away from a burial plot, suggesting that near surface runoff in the soil zone following rainfall would be acceptable. As UK Government guidance indicates that existing low environmental risk cemeteries 'may need some form of intervention to control groundwater levels'^{3,4}. In our view the proposed cemetery extension is of low environmental risk and so could be exempt from permitting⁵ if the following mitigations were put in place:

1. To pre-install land drains say 500mm deep as applied on the adjacent cemetery site to rapidly remove surface water and near surface runoff and thereby reduce any interaction of soil water with potentially contaminated pore water in the mudstone?
2. To condition the proposed development to ensure that any burial will not be within 10m of any field drain or dry ditch and the southern boundary wet ditch as applies for the existing cemetery. any watercourse.
3. If the only issue is potential surface water pollution, the land drainage runoff could be samples from an online attenuation/storage area and tested for chemical and biological parameters of concern.
4. In extremis sealed caskets could be used to provide a further layer of protection to pollutant migration.

Para 6 We note that the drainage from this proposed cemetery extension is planned to connect to the drainage of the proposed residential development. We accept that the groundwater in the clay itself is not likely to be used for drinking water purposes, however, we consider there to be source pathway and receptors present. The groundwater risk assessment has itself mentioned these aspects in section 6.9.

³ [\[Withdrawn\] Cemeteries and burials: prevent groundwater pollution - GOV.UK \(www.gov.uk\)](https://www.gov.uk/guidance/withdrawn-cemeteries-and-burials-prevent-groundwater-pollution)

⁴ [Cemeteries and burials: groundwater risk assessments - GOV.UK \(www.gov.uk\)](https://www.gov.uk/guidance/cemeteries-and-burials-groundwater-risk-assessments)

⁵ [Low environmental risk cemeteries: exemption conditions - GOV.UK \(www.gov.uk\)](https://www.gov.uk/guidance/low-environmental-risk-cemeteries-exemption-conditions)

There is no section 6.9 in the GRA report, but we have no issue with the comment.

Para 7 Our approach to groundwater protection is set out in ‘The Environment Agency’s approach to groundwater protection’. In implementing the position statements in this guidance we will oppose development proposals that may pollute groundwater. Groundwater is particularly sensitive in this location because it is very shallow and will mix with surface waters in a proposed residential setting.

Para 8 Overcoming our objection In accordance with our approach to groundwater protection we will maintain our objection until we receive a satisfactory risk assessment that demonstrates that the risks to groundwater posed by this development can be satisfactorily managed. We will need to review a more thorough assessment of the groundwater dynamics at this site, with groundwater monitoring and detailed drainage design. This will need to assess the risks of migration of contaminants and look at feasible mitigation measures if any are possible.

Further ground investigations could also be undertaken as part of a T2 assessment to assess the nature of the ground conditions on the site (rather than the surrounding land as we assessed). However, we note from the Ground investigations carried out in 2011 for Kidlington Parish Council by CDS to the immediate south that of 6 trial pits excavated across the site none of them evidenced any evidence of groundwater ingress when excavated at the end of spring with limited dewatering only likely in wetter weather due to surface water ingress where graves are temporarily left open prior to use.

In our view the drainage problems at the existing site are due to poor near surface soils drainage not perched groundwater and this is confirmed in correspondence from CDS’ Civil/Drainage Engineer dated 8 February 2023 who indicates the drainage scheme was designed provide surface water drainage in the grave areas to depths of no more than 0.7m. *As such it would not prevent groundwater contamination from burials but the site was assessed to not pose a risk to groundwater as groundwater levels were not high enough, as such no dewatering drainage was specified (copy available on request).*

Conclusion and Recommendations

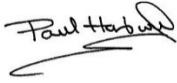
In our view the proposed cemetery extension is of low environmental risk and so could be exempt from permitting ⁶ if the following mitigations were put in place:

1. To pre-install land drains say 700mm deep as applied on the adjacent cemetery site to rapidly drain surface water and near surface runoff and thereby reduce any interaction of soil water with potentially contaminated pore water in the mudstone?
2. To condition the proposed development to ensure that any burial will not be within 10m of any field drain or dry ditch and the southern boundary wet ditch as applies for the existing cemetery. any watercourse.
3. If the only issue is potential surface water pollution (the groundwater aquifer being defined as ‘unproductive’), the land drainage runoff from the existing operational site could be sampled and tested for chemical and biological parameters of concern. where chemical biological results indicate there is a risk to surface water, sealed caskets could be used for burials in the proposed extension to provide a further layer of protection to pollutant migration.

⁶ [Low environmental risk cemeteries: exemption conditions - GOV.UK \(www.gov.uk\)](https://www.gov.uk/guidance/low-environmental-risk-cemeteries-exemption-conditions)

If this approach is not enough for the EA to remove its objection we would recommend additional trial pitting within the proposed extension footprint to determine depth to bedrock and confirm (as we expect) that there is no groundwater table at grave depth in the unconsolidated weathered mudstones in which graves would be constructed.

Yours sincerely,



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For Enzygo Ltd

