TECHNICAL NOTE

JBA Project Code	2023s1304
Contract	Thames Farm Planning Application
Client	Thames Farm Action Group
Date	10 June 2025
Author	Benjamin Brière De L'Isle
Reviewer / Sign-off	Paul Eccleston
Subject	Review of additional Information submitted 2025-05-09 under Planning P24/S2642/FUL

1 Introduction

A Planning Application (P24/S2642/FUL) was made to South Oxfordshire District Council (SODC) by Taylor Wimpey West London (TWWL) for engineering operations associated with ground stabilisation works (as amended by plans and information received 9 January 2025) to support the development of land at Thames Farm, Shiplake (RG9 3PH).

Another planning application (P24/S2651/DIS) relating to the drainage, the associated roads and landscape management and planning application (P24/S2652/S73) relating to the proposed development layout were also submitted to SODC.

The proposed development has a long history of failed planning applications due to the hydrogeological sensitivity of the site, i.e. located adjacent to the Harpsden Water Treatment Works, a set of public abstraction boreholes. The abstraction boreholes abstract unconfined groundwater from the local Chalk which is prone to dissolution features and would require ground stabilisation for some of the proposed planned infrastructure. The proposed drainage strategy has also been subject to numerous iterations as potential combined effects of the proposed development were poorly described in relation to the significant environmental and social damage to the public water supply.

Thames Farm Action Group requested JBA (email dated 21/05/2025) to review the technical documents submitted as part of the above planning applications.

2 Documents reviewed

JBA reviewed documents submitted recently, May 2025, by TWWL and its consultants to address the Environment Agency and Thames Water concerns, amongst many other stakeholders, around the proposed development which is now subject of a wider Environmental Impact Assessment.

The additional information submitted 2025-05-09 is based on numerous previous amendments of the Planning applications which were also the subject of reviews and comments by JBA and others. No satisfactory comments and amendments have been made to the Planning Applications above so that elements of the works supporting this DQRA are not necessarily considered satisfactory or agreed with. Notably, the Flood Risk Assessment and Drainage Strategy v7 documents is not accessible, the pdf file appears corrupt, and only the Flood risk Assessment and drainage Strategy v6 has been reviewed and is considered by this Technical Note,

albeit both versions on the planning portal appear current with the version 6 not superseded.

The documents reviewed by this Technical Note include:

- Cover Letter, Stantec, Ref 332610422 dated 9/5/25
- Shiplake Water Quality Assessment and DQRA Technical Note, H Fraser Consulting, Document reference 30438TN3 Rev1 Shiplake DQRA Final dated 8/5/25.
- Appendix B to Shiplake Water Quality Assessment and DQRA Technical Note - Appendix B - 30438 Results v1-3 Sensitivity, Appendix B - 30438Shiplakev1-3PulseSource09122024-171237, Appendix B - 30438Shiplakev1-309122024-171839.

The Cover Letter by Stantec (9/5/25) states:

"It is our understanding that whilst the letter from the EA specifically refers to the engineering works planning application (Ref: P24/S2642/FUL) in their response, having read and considered the contents of the letter, we are of the view that the objection specifically relates to the S73 submission to amend the reserved matters approval (Ref: P24/S2652/S73) and the discharge of condition relating to the drainage strategy (Ref:P24/S2651/DIS)."

It is our view that ground stabilisation, site layout and drainage should be considered together to properly evaluate risks to the water supply as one would affect the other.

3 Hydrogeological Impacts Considerations

The sections below provide a technical review of the Detailed Quantitative Risk Assessment (May 2025). The objectives stated by the DQRA is to "*assess potential risks to water quality arising from infiltration of surface water drainage at a site in Shiplake, Oxfordshire*".

3.1 Comments on Conceptual Site Model, modelled parameters and proposed development

The Conceptual Site Model for the proposed development presented in paragraph 52 consists of the succession of:

1. SuDS system – including macro pervious paving, bioretention basins and swales
2. Infiltration blanket layer – 2.8m thick
3. Unsaturated zone – 14.5m of unstructured Chalk
4. Dilution with groundwater below the site
5. Saturated zone flow to Water Supply – horizontal flow through fractured Chalk

The receptor that should be considered to assess potential risks to water quality should be primarily the water in the aquifer at the base of the unsaturated zone to comply with the requirement of The Groundwater (England and Wales) Regulations

2009 and subsequently assess the potential risks for the water at the public water supply.

Based on the results presented in the DQRA Technical Note, concentrations of pollutants are exceeding Environmental Quality Standards (EQS) or Drinking Water Standards (DWS) when entering the Principal Aquifer and the results of the DQRA should conclude the currently proposed development could potentially cause pollution.

Although the rainfall used to provide a source term to the model is within the same order of magnitude to the volume of water presented in Table 2 - 100 year (+40% climate change factor) storm event - contained in earlier Hydrogeological Impact Assessment (H Fraser Consulting, August 2024), the rainfall volume used initially diluting the source of contamination is greater than the 15min rainfall event so that, for example, greater dilution is considered when calculating background hydrocarbon concentrations. The DQRA provides no evaluation of worst-case conditions that could results from a pollution event.

3.2 Comment of literature search

The literature review reported is limited to the following references:

- SuDS manual Woods Ballard, B, Wilson, S, Udale-Clarke, H, Illman, S, Scott, T, Ashley, R, Kellagher, R. The SuDS Manual (C753F), CIRIA, 964p, ISBN 978-0-86017-759-3, December 2015
- Susdrain (https://www.susdrain.org/delivering-suds/using-suds)
- Kellagher et el., 2006. SuDS – Increased Liability for the Water Industry – Phase 2 UK Water Industry Research (UKWIR)
- Sniffer: Jefferies C, Napier P,m Fogg P, Nicholson F. Source control of pollution in sustainable drainage (UEUW01), Final report, February 2008.
- United States Environmental Protection Agency (US EPA). Preliminary Data Summary of Urban Storm Water Best Management Practices, EPA-821-R-99-012 August 1999
- Nnadi et al., 2019, "An Evaluation Of Stormwater Treatment Efficiency Of Sustainable Drainage Systems (SuDS)". In book: Stormwater: Sources, Monitoring and Management (pp.31-76). Edition: 1st; Publisher: Nova Publishers Inc., New York

It is notable that two key documentations have been missed off the reference list and which are widely accepted as Best Practice Guidance in the UK. The first was DMRB LA113 (Road drainage and the water environment). This document describes the requirements for assessment and management of the impacts that road projects can have on the water environment and should have been consulted during this literature review and parameters for water quality of road run-off considered.

The second key document missed was CIRIA C609 – Sustainable drainage systems: hydraulic, structural and water quality advice. The document discusses the critical issues that must be considered when designing, constructing and maintaining SuDs schemes to effectively manage rainwater

runoff from development sites. It includes information relevant to SuDs techniques, including a discussion about the design and performance of each.

In addition, in paragraph 25, the background concentrations for potential pollutants in residential runoff have been taken from the US EPA 1983 Nationwide Urban Runoff Program report. These concentrations are likely to be applicable to the USA rather than UK background concentrations. Also, they are over 40 years old so are likely to have been superseded by newer investigations. Therefore, more up-to-date guidance from a UK-based study (for example DMRB and CIRIA mentioned above) should have been used instead to quantify water quality concentrations for the site.

Paragraph 26 mentions that benzene and toluene (originating from petrol) have been considered both in the long-term background average and as a single pollution event. The report states that the long-term background has assumed that a steady leak of 0.01 l/day occurs from 10 cars across the site and that the contaminant mass would take 1-10 days to travel through the site surface water system, but the basis for these assumptions is not stated. A small explanation on this would be beneficial to understand their rationale.

3.3 Review on use of RAM3 software

As mentioned above, the background concentrations used within the software are taken from a USEPA report from 1983. It is likely that these concentrations are out of date and not applicable to UK conditions. Therefore, more suitable concentrations should be considered.

Similarly, the data sources used for some of the specific modelling parameters (e.g. soil-water partition coefficient) are over 30 years old. More recent publications should have been used as part of the literature review to derive these values to ensure appropriate site-specific values are used.

No source has been provided for the water filled porosity, bulk density of unsaturated zone. It is assumed that these have come from a recent ground investigation but confirmation of where these values have come from is needed to confirm their validity. The other figures for attenuation within the infiltration layer and unsaturated zone seem appropriate.

The Environment Agency (Remedial Targets Worksheet v3.1: User Manual, dated October 2006) indicates that when using equations solutions, assumptions of the equations used should be considered and "Where an aquifer is strongly heterogeneous, consideration should be given to the appropriateness of any of the solutions". There is little reference in the DQRA to evaluate the adequacy of the software equations to the site-specific geological setting.

3.4 Sensitivity analysis comment and assumptions in Conceptual Site Model

The sensitivity analysis adjusted the following parameters: porosity of structured chalk, hydraulic conductivity of the chalk, retardation and half-life. Each parameter was only adjusted once. It would be useful to see each parameter increased and decreased by an order of magnitude to analyse the impact of each parameter on the model either way.

No sensitivity analysis on the partition coefficient have been undertaken. This is a key parameter reducing contaminants concentration in the infiltration blanket and unsaturated zone. Based on the weak literature review, only one value has been used, and a range of partition coefficients is more appropriate.

Until the results of a sensitivity analysis for all key parameters are evaluated with key parameters influence established, the assessment is not providing sufficient confidence that its results are representative of the range of conditions pertaining to the proposed development. In a regulatory context, this fails the precautionary principle.

For example, the result of the model (paragraph 67) indicates it would take 2 years for the peak contaminants to reach the water supply; this appears to be counter-intuitive considering fast flow in the fractured Chalk and the distance to the water supply following infiltration into the drainage blanket. Similarly, the statement paragraph 67 that "The concentrations from the pulse source remain high until they reach the groundwater table, …" proves attenuation by the proposed development is not satisfactory when it is failing (paragraph 69 states "It is noted that in these calculations it is assumed there is no attenuation in the SuDS system".

The applicant's risk assessment is not realistic, fails to model the proposed development characteristics and therefore cannot demonstrate an absence of risk to a critical infrastructure, the water supply, or the Chalk Principal aquifer.

4 Conclusion

The literature sources characterising water quality are out of date and non-UK specific limiting their suitability to establish a robust Source term, a critical element in the Source- Pathway – Receptor approach taken to characterise the risk to the water supply.

The RAM3 software used does include all of the relevant input parameters for the DQRA, it is comparable to Environment Agency RTM model and uses the same equations solutions to solve transport of contaminants. However, neither of them is fit for purpose for this specific site with rapid flow through Chalk fractures.

Assumptions made to develop the Conceptual Site Model and assignment of parameters in the model should account for rapid flow through Chalk fractures.

The sensitivity analysis of some the model parameters is insufficiently representative of the site-specific conditions and provide insufficient confidence in the model results. Further tests should have been conducted on each parameter to increase the size of the dataset to cover the full range of sensitivities.

The applicant has produced a risk assessment that is not realistic and that fails to demonstrate absence of risk to a critical infrastructure, the water supply. In fact, the model results presented in the DQRA indicate the current drainage design would results in the pollution of the Chalk Principal Aquifer. Furthermore, the DQRA provides limited reassurance that the potential contamination of the Chalk Principal Aquifer could then also lead to contamination entering the public water supply. Considering these deficiencies and the precautionary principle requirement for groundwater protection policy, it is recommended that the planning authority refuse these planning applications.