

To: PINS/LPA

From: SLR

Company: Mactaggart and Mickel Strategic
Land LTD (Mac Mic)

SLR Consulting Limited

cc:

Date: 11 July 2025

Project No. 432.010035.00001

RE: Flood Risk Information Reference and Summary v04

1.0 Introduction

The purpose of the technical note is to:

- Highlight the relevant flood risk information;
- Provide key modelling updates; and
- Summarise the conclusions of the flood risk analysis.

1.1 Submitted Items

Below is a list of the relevant information in relation to flood risk for the site as a whole. The documents and data noted before are current and there is no reliance of previous documents or iterations.

Item	Version	Type / format	Purpose
Flood Risk Assessment and Drainage Impact Assessment	250707 432.010035.00001_MacTaggart and Mickel Hurst_FRADS_P05	PDF	To define the risk of flooding to support the application. The document was updated based on the review (email dated: 27/06/25) from the Environment Agency and updated information related to the culvert at Lodge Road.
Appendix J of the hydraulic modelling report (Appendix C	Hurst – Fluvial Flood Map Comparison	PDF	To provide a clear comparison between the EA published Fluvial Maps

Item	Version	Type / format	Purpose
of the Flood Risk Assessment)			and Mac Mic's site specific Fluvial Modelling This has been provided as a "Planning Friendly" document to show the minimal flood risk to the site.
Appendix J of the hydraulic modelling report (Appendix C of the Flood Risk Assessment)	Hurst – Surface Water Flood Map Comparison	PDF	To provide a clear comparison between the EA published Surface Water Maps and Mac Mic's site specific Surface Water modelling This has been provided as a "Planning Friendly" document to show the minimal flood risk to the site.
Hydraulic modelling report (Appendix C of the FRA report)	432.010035.00001_R02_FRMR_v03	PDF – included as part of the FRA and DIA report above	Technical assessment to quantify flood impacts. This uses site specific information, and topographic survey, to provide a better representation of the watercourse topography, and structures



Item	Version	Type / format	Purpose
			within the watercourse. To refine the representation of flood risk. This information supports the FRA and was updated to reflect the Environment Agency review comments and updated information related to the culvert at Lodge Road
Topographic survey information	Lodge Road Hurst A4 Sections-PF-SURV-107258-001.pdf to Lodge Road Hurst A4 Sections-PF-SURV-107258-008.pdf	PDF and DWG	Data used to define the topography, and structure information in the hydraulic model
EA Main River Trace Map	LS6063-T	PDF and DWG	Radar trace of the EA Main River to show the route of the Main River.
Hydraulic modelling data	020	Various geographic information system (GIS files, .csv, text files and gridded data to construct and present the modelling outputs. Viewing this data	Updated hydraulic modelling files for Environment Agency to review(inputs and outputs). The updates are based on the Environment Agency review comments.



Item	Version	Type / format	Purpose
		will require GIS software.	This information has been provided to the EA for review on 9 th July and receipt of submission from the EA was received on the 10 th July. and The model requires modelling software to read, so therefore we prepared user friendly plans as noted above.

1.2 Summary of Documents

Flood Risk Assessment and Drainage Impact Assessment and Drawing Ref Hurst – Fluvial Flood Map Comparison and Hurst – Surface Water Flood Map Comparison

The Flood Risk Assessment and Drainage Impact Assessment (Ref: 250707 432.010035.00001_MacTaggart and Mickel Hurst_FRADS_P05) is a core document that outlines site-specific flood risks, modelling data, and a conceptual drainage strategy designed to address surface water flood risk. It provides an overview of all potential sources of flooding at the site, all assessed as low risk:

- Flooding from Rivers and Seas: Low
- Flooding from Surface Water: Low
- Flooding From Infrastructure: Low
- Flooding from Reservoirs: Low
- Flooding from Canals: Low
- Flooding from Groundwater: Low

The overall flood risk to the site is considered **low**; however, to manage potential future flooding, appropriate mitigation measure have been recommended.

Modelling and Mapping



At the request of the Environment Agency, an extensive site-specific flood modelling exercise was carried out. The model produced comparative flood maps for both surface water and fluvial flooding, which allows the Environment Agency (EA) flood maps to be superseded

- Drawing Reference – Hurst Surface Water Flood Map Comparison

The surface water mapping comparison reveals areas of shallow ponding (<100mm) contained by natural site topography, with deeper areas (up to 170mm) occurring along the watercourse and in the eastern and northwestern portions of the site. While both EA and site-specific modelling identify similar ponding areas, the site-specific maps show a slightly smaller footprint, particularly north of the site near the spine road.

According to Wokingham Council's Local Plan sequential test methodology, sites with ≤10% surface water risk are considered suitable for mitigation via drainage design. The combined assessment of EA and site-specific mapping indicates only 5% of the site is at risk, and an appropriate drainage strategy has been developed accordingly.

The FRA looks at the site in its entirety therefore whilst there are small areas of defined high-risk areas of surface water, the judgement is that the flood risk to the site as a whole is **low** due to the depth of flooding simulated on the as well as the mitigation through the drainage strategy.

Therefore, based on the updated extensive site-specific surface water modelling, flood risk is **LOW**.

- Drawing Reference – Hurst Fluvial Water Flood Map Comparison

The fluvial flood mapping shows that flood risk primarily affects land immediately north of Nursery Close (outside the site boundary), with minimal to no impact within the site itself. The reduced extent of flooding in the site-specific model is due to detailed culvert modelling, informed by a targeted topographical survey.

Importantly, the site layout avoids Flood Zone 3 entirely, with only a minor encroachment of site infrastructure within Flood Zone 2. Any associated water levels remain contained within this designation.. It should be noted that the depth of flooding for the encroachment onto site infrastructure, for the 0.1% AEP event (Flood Zone 2), is less than 0.1m and does not affect the site layout or development.

Therefore, based on the updated extensive site-specific fluvial modelling, flood risk is **LOW**.

Drainage Strategy

The conceptual drainage strategy models a system that restricts surface water discharge to 3.16 l/s/ha (calculated via the HR Wallingford tool). This discharge rate informs the sizing of ponds, attenuation basins, and swales across the site.

- The northernmost development plot will be served by an on-plot gravity sewer incorporating attenuation features (both above and below ground, including permeable paving). Flow will discharge to a swale, with final attenuation rates to be determined during detailed design.
- The swale will serve the main internal road and ultimately discharge via manhole and pipe network to the southern drainage system, before emptying into the on-site watercourse on the western boundary.
- Development south of the main access road will drain into a swale system connected to one detention basin and one attenuation pond.

Hydraulic modelling confirms that the proposed drainage network will prevent out-of-network flooding for events up to and including 1 in 100 years, plus 40% climate change allowance.



The strategy demonstrates that an effective and resilient scheme can be delivered for the lifetime of the development.

Hydrology report (Appendix D of the FRA report)

The Hydrology report sets out the detailed calculations required by the EA modelling reviewers when assessing the model as part of the modelling review process.

In light of the comments provided by the EA, the hydraulic modelling reporting and FEH Calculation Record have been revised where relevant to address the concerns raised. Updates include the following:

- The catchment extent has been reviewed and delineated based on Environment Agency (EA) 1m resolution LiDAR data and a flow tracing algorithm within a GIS package, the EA 'Most Probable Overland Flow Pathway's dataset, Ordnance Survey (OS) mapping and aerial imagery.
- URBEXT2000 has been recalculated following revisions to the FEH catchment boundary.
- Fluvial flood estimates have been derived based on the FEH Statistical method, using the small catchment procedures and compared against flood estimates derived by catchment application of the ReFH2 rainfall-runoff method.
- The adopted hydrographs are estimated within the ReFH2 software based on the assessed critical storm duration, taken as that duration which resulted in the largest peak flow.
- The final fluvial flood estimates are based on the more precautionary i.e. larger estimates produced by the ReFH2 rainfall-runoff methodology.
- Design net rainfall has been derived within the ReFH2 software and based on the EA standards set out in Risk of Surface Water Flooding (RoSWF) Appendix A – Modelling standards.
- Total net rainfall estimates are derived for the 1, 3, 6 and 12-hour storm. The catchment aerial reduction factor is set as 1.0 and a summer seasonal rainfall profile (50%) adopted with the Seasonal Correction Factor set as 1.0. This aligns with the minimum requirements outlined in the EA standards.
- Rainfall losses are applied directly within the ReFH2 software at a variable temporal rate which, for the catchment scale, is reported as an acceptable approach within the Environment Agency Flood Estimation Guidelines.
- Climate change allowances for the Loddon and tributaries Management Catchment basin region as provided by the Environment Agency are adopted based on the upper allowance for the 2070s epoch.
- A +35% uplift in peak rainfall intensity allowances is applied to the 3.3% AEP rainfall event and +40% for the 1% AEP rainfall event. This is applied directly within the ReFH2 software.
- For the fluvial flood estimates, a climate change uplift of +46% is applied to the 3.3% 1% and 0.1% AEP events derived by either the ReFH2 or FEH Statistical methods. With respect to the ReFH2 fluvial flows, the allowance is applied outwith the software i.e., applied directly to the respective AEP estimate.
- The FEH Calculation Record has been fully revised to address issues with clarity and to provide justification for the adopted approach. Specifically:



- The revised reporting now explicitly states that the fluvial and rainfall modelling scenarios are undertaken independent of one another and hence there is no 'double counting' of modelled flows.
- The quoted risk of indicative flooding, as based on the Environment Agency Flood maps for Planning, has been reviewed against the NaFRA2 mapping and is updated, where relevant.
- The historic flood information has been reviewed, and a more complete assessment of its suitability is included in the revised reporting. In summary, it would appear that the surface water extent shown is likely exacerbated by high ground water levels following prolonged rainfall over the preceding months. As such it does not represent a 'good' event to adopt to validate model results. This is discussed in more detail in the revised reporting.
- The application point of fluvial flows is discussed in terms of its appropriateness and the location shown within an appropriate Figure. A comparison of the modelled outflows against the flow estimates has been undertaken and this is now reported.

Hydrological assumptions, limitations and uncertainty in the results have been revised in light of the Environment Agency comments. The final adopted results are clearly documented, and justification is provided in the hydrology report (appendix D) of the FRA.

The hydrological analysis is considered to be robust and appropriate for use with the site specific hydraulic modelling and has been submitted to the EA for their further review on 9th July 2025.

Hydraulic modelling report (Appendix C of the FRA report)

Following an Environment Agency review of the hydraulic model the following updates to the hydraulic model were completed.

- Update of the climate change allowance applied in the hydraulic model, updated to 46% (previously 40% requested by Environment Agency for fluvial flows).
- An adjustment of the hydraulic model inflow location.
- Addition of newly acquired CCTV survey information of the culvert under Lodge Road; this was provided 7th July 2025. This data was used to refine the downstream boundary of the hydraulic model. This information is the best available information on the culvert location. The Environment Agency were again consulted, and they have no further information on this structure.
- Minor adjustment of model roughness values.
- Reinforcement of the modelled top of bank points, based on topographic survey, to refine this representation.
- Extensive sensitivity testing on the key hydraulic model parameters including – flow, roughness, downstream boundary and culvert blockage.
- Updated reporting to provide additional information on modelling approach, technical assumptions and to respond to the EA review. The additional information included topographic surveys and site photographs.
- A review of the EA's Historical Flood Map dataset identified two recorded flood outlines within the proposed site boundary: 'Recorded_Flood_outlines.6979' (dated December 2002) and 'Recorded_Flood_outlines.6980' (dated January 2003). The EA commentary associated with both outlines states the flooding "looks more like waterlogging than fluvial in nature". As such, these events have been excluded from use for calibration or verification in this assessment, as they are not considered



representative of either fluvial or pluvial flooding – being instead classified by the EA as another flood source.

- Given the limitations of the Historical Flood Map and the EA acknowledgement of no detailed flood modelling previously undertaken within the site area a comparison between the site-specific modelling and EA flood mapping was undertaken and documented in the FRA.

The hydraulic modelling is considered to be robust and appropriate for use with the site specific hydraulic modelling and has been submitted to the EA for their further review on 9th July 2025.

Topographic survey information

Level survey for use in the design.

EA Main River Trace Map

A radar tracing survey used to understand the route and approximate cover of the culvert.

Hydraulic modelling data

Hydraulic modelling data output from the hydraulic model

1.3 Conclusion

This note provides a high-level summary of the site-specific Flood Risk Assessment (FRA) and directs readers to the full technical documentation for comprehensive review.

The FRA concludes that the site is at Low risk of flooding from all sources. The hydraulic model underpinning this assessment has been reviewed and subsequently reissued to the Environment Agency (EA) for comment.

All technical data and detailed analysis are available in the full FRA report and its associated appendices.

