

Water Resource Associates

A network of consultants in hydrology, water resources and environmental issues

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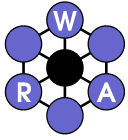
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Furtho Pit, Cosgrove, Northamptonshire: Review of Application Documents Relating to Hydrology and Flood Risk.

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Version 4: Amended Final Report.

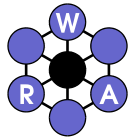




Executive Summary

This report provides further expert advice on document submitted as part of the Furtho Pit Application. The key findings are as follows:

1. The FRA submitted by Link Engineering in June 2025 was only slightly modified from the earlier version submitted in November 2024.
2. This included new versions of the EA flood maps, some different values for estimates of greenfield flows which were not explained and reference to the use of cellular storage tanks.
3. The limitations from the earlier versions are still present, namely background information on the topography, geology, soils and hydrology is missing, information on historical flooding is limited, and the estimates of greenfield surface runoff are from an outdated and inaccurate method.
4. The flood response plan from July 2025 was also only slightly modified from the earlier version submitted in November 2024.
5. The new version of the flood response plan is missing a key map in Annex B showing emergency evacuation routes.
6. Limitations from the earlier flood response plan are still present such as missing details on actions for staff to take during an emergency displayed as posters, safe vehicle movements during flooding, and information on access routes in the area around the site.
7. No new reports have been submitted relation to the canal embankment and proposed flood storage area.
8. The only document is a letter from JBA to West Northamptonshire Council to confirm and agree with the Canal and River Trust that canal embankment does not fall under the conditions of the 1975 Reservoir Act, but that the proposed new storage area does fall under the act.
9. A number of further precautionary points relating to the construction of the flood storage area and embankment have been listed.



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Background

Water Resource Associates LLP (WRA) was engaged by the Furtho Development Objection Group (FDOG) with financial support from Cosgrove Parish Council in September 2025 to undertake work to review documents submitted as part of the planning application for a commercial development at Furtho Pit, Cosgrove, Northamptonshire. This current study is a follow-up to earlier assessments by WRA in 2023 and March 2025. It forms a review of new documents which have been submitted by the applicant in relation to hydrology and flood risk.

Documents Reviewed

The review covers the following new application documents/files which were provided by FDOG:

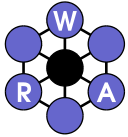
1. Frontier Park Old Stratford Flood Risk Assessment by Link Engineering dated June 2025 (49-page document plus appendices): *LP265 FP-LE-GEN-XX-RP-CE-FRA01-P4 - Flood Risk Assessment V8.pdf*
2. Canal and River Trust Response dated May 2025 (4-page letter): *Response CRTR-PLAN-2025-43610(1).pdf*
3. JBA Consulting Response to Canal and River Trust Dated June 25 (3-page letter) *250728 10512 Response to CRT(1).pdf*

In addition other documents and drawings from the earlier review were requested for comment including the drawings for planning flood evacuations routes, storm exceedance flow paths, culvert general arrangement, and typical culvert headwall details dated November 2024, and the dam breach technical note and dam breach scenarios (September 2024), slope stability technical note (October 2024) and planning and flood risk report (December 2024).

Review of the Flood Risk Assessment

The Flood Risk Assessment (FRA) is generally the most important document for the review as it summarises all aspects of flood risk at the site and needs to be approved by the Environment Agency (EA) and Local Planning Authority (LPA). Previous work by WRA has undertaken review of the earlier versions of the FRA from Link Engineering in June and September 2023, and March 2025. The latest version is therefore compared with the previous version in this document.

The June 2025 version included the following components:



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Pages 1 - 5: title and contents

Pages 6 - 39: document text

Pages 40 - 49: appendices.

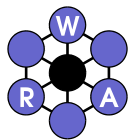
The current June version is very similar to the November 2024 version with only some minor changes:

- EA flood risk maps have been updated to show the latest versions (Figures 1 and 9). Note that the flood outlines have not been changed, just the style of the webpages and the map shading. The surface water flood risk maps from the EA now also include maps showing the impact of climate change to 2050 and 2080.
- Section 1.9 on planning policy has been updated referring to the latest guidance from 2022.
- Table 2 in the SuDS assessment is different as it includes the proposed used of cellular storage tanks.
- Tables 3 to 6 have slightly different discharge rates for different areas in some of the scenarios, but the combined totals from the whole development remain the same.
- Section 5.1.1 now includes contact details for the occupier of the development site.
- Appendix D contains an additional drawing “Maintenance and Access Route”.

The changes to the FRA are minor and many of the aspects which WRA has raised in previous reviews have still not been addressed. The text describing these omissions is repeated again in this review, as it is important to demonstrate that neither the consultants working on behalf of the developer nor the statutory authorities (The EA, LLFA and LPA) have considered these limitations.

The review of the June 2025 FRA identified that details on the background environmental information were missing, such as the presentation of topography, geology and soils, information on catchment hydrology, details of historical flooding and current flood risk maps. Nothing had been added to the June 2025 FRA to improve these limitations. The concern therefore remains that the inability of the consultants to properly demonstrate the existing conditions at the site in relation to the environment, hydrology and flood risk does not promote confidence in the measures they have proposed for the development.

The predicted greenfield flows given in the June 2025 FRA were the same in total as with the values given in previous FRAs, but the values were different for some of the scenarios as shown in Table 1 below. Although these differences are just in tenths of litres per second, over the duration of a 6-hour storm, a 0.5 l/s difference in discharge would equate to a difference in volume of 10.8 m³, which is a significant volume for attenuation storage. Reasons for the differences are not given in the FRA and the only version of Appendix D available on the West Northamptonshire Council had drawings dated from 2022 and MicroDrainage software output dated 2021. This has not been changed from the earlier FRAs and does not give any information on why these values



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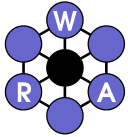
have changed. It also shows the greenfield flow estimates are still based on the same outdated and inaccurate IH124 method and the drainage storm sewer design is based on Flood Studies Report rainfall data from 1975. Both of these aspects need to be revised. The text from the earlier WRA review criticising the data and methods used is repeated below.

Table 1. Proposed discharge from areas of the developed site taken from the FRA V 7 and V8

Scenario	Proposed discharge (l/s)	
	November 2024 FRA V7	June 2025 FRA V8
Northern Pond 2-year	9.2	9.5
Southern Pond 2-year	18.0	18.1
Unit 5 Outfall 2-year	2.2	1.7
Unit 5 Outfall 30-year CC	2.2	2.1
Unit 5 Outfall 100-year CC	2.5	2.3
Access Road 2-year	3.0	2.5
Access Road 30-year CC	4.2	3.9
Access Road 100-year CC	4.8	4.3

Attention should be drawn to the fact that the consultants, Link Engineering, are still using this method and that the EA and LPA have not objected. This shows an overall broader lack of understanding of hydrological modelling in the context of flood risk at the site. The IH 124 method which has been used is the results of data and techniques applied in the 1970s and is just a simple equation which is not commensurate with flood estimation in the 21st century. It can only calculate a peak flow rather than a hydrograph (i.e. the change of flow over time) so the volume of flow from the greenfield site cannot be properly estimated. It also has no parameter to account for the slope of the land, it is based on annual average rainfall rather than an extreme storm, it uses five soil classes from a national scale, and the estimates are scaled up to an extreme scenario based on how river flows are also scaled in the selected part of the country, using data from the 1970s.

The IH 124 method was the focus of a review of surface runoff estimates at the plot scale by the EA in 2012 and was found to be highly inaccurate compared to measured data and therefore not able to provide a meaningful representation of a site's flood risk. The results of the review led to the development of the ReFH2 software by Wallingford Hydo Solutions (WHS, 2019) to use at the plot scale and a revision of the SuDS guidelines in 2015 (Woods-Ballard et al) which recommends the ReFH2 method. Furthermore, the latest documentation from March 2024 (EA/DEFRA/NRW/Welsh Government) states that the ReFH2 method should be the preferred approach to flood estimation in small plots. This method should therefore be used in the Furtho Pit FRA.



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It is of concern that the EA are insistent to request that revised hydraulic modelling should be undertaken to demonstrate the potential breaching of a flood storage area using the latest hydrodynamic modelling software by their term consultants (see the later sections of this review), whereas in contrast they choose to ignore the continued application of a greenfield flow estimate based on data and methods from the 1970s. Therefore, there is inconsistency in their review of the applicant's submissions - how can they allow an outdated and inaccurate method for one aspect of flood management while demanding the latest highly detailed method for another? Given the increased understanding in hydrological modelling over the decades, the use of more capable software and data from GIS, and the impact of climate change over the past 40 years it is imperative that the latest methods are used. Where else in the field of professional services would a method from the 1970s be used in preference to the latest 21st century method?

Another aspect of the surface water management which has not been considered and is now widely requested by LPAs and is also recommended in the SuDS guidelines is that an additional 10% impermeable urban area should be used in the surface water management to account for urban creep over the lifetime of the development (e.g. additional buildings and roads etc).

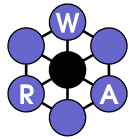
Overall, it is still the case that the FRA should be rejected by the EA and LP until a revised surface water management section is provided using the latest methods for greenfield and developed site flow estimation and incorporating the 10% urban creep factors.

Review of the Flood Response Plan

The flood response plan also by Link Engineering was listed as an appendix in the latest FRA but a freestanding version of the document dated July 2025 was provided by the FDOG for review. The document had very few changes from the earlier version dated February 2022 which was covered in the WRA review from March 2025. The only changes were that the maps on pages 5, 6 and 7 were updated to use the latest predicted flood extents and hazard index. The July 2025 version also had omitted the map from Annex B showing the emergency access and flood evacuations routes. This version needs to be corrected to include the Annex B map as this is a vital component of the flood response plan.

As with the FRA, all the other criticisms of the Flood Response Plan from the earlier WRA review remain and have been included in the text below:

Overall, the Flood Response Plan is a very brief document highlighting what the management of the new facility would need to do in the event of a flood from the Dogsmouth Brook. Significant details are missing and the response plan provides an instruction to what needs to be done to provide flood warning rather than being a useable plan in itself.



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The plan recommends that various measures are undertaken including installing a telemetered flood warning station on the site to gather information about the stream and provide a reliable measure of flood risk. The plan should however go into more detail to actually list the warning levels for the stream based on the modelling work which has already been undertaken and have a set of procedures which staff at the site will need to follow which is specific to the proposed development. The only information on flood warning and actions to take is presented in the standard EA warning procedures table and many of these are not relevant for the activities which are likely to be performed in the commercial development. The warning plan should include aspects such as movement of vehicles to safe areas and alternative working arrangements.

Likewise, as the site will be occupied by staff and potentially at all times, warning posters should be made which can be displayed at key locations around the buildings such as in stairwells, staff kitchens and communal areas, by the main entrance doors. It is desirable to have an example of such a warning poster in a Flood Response Plan.

The Plan has not covered the hazard from flooding over the wider area. As it is a commercial site, staff would travel from their place of residence to and from the site, and it is likely that the day-to-day activities at the site would involve delivery and shipment of goods. The staff should be made aware of this as the flooding over the wider area could restrict movement to and from the site, as the map in Figure 1 shows with flood zone 3 covering the A5 areas of Stony Stratford to the south-east and also Watling Street to the north-west. The fact that the large extent of flooding from the River Ouse to the south-east will also have consequences on the operation of the site seems not to have been fully considered in the development proposals.

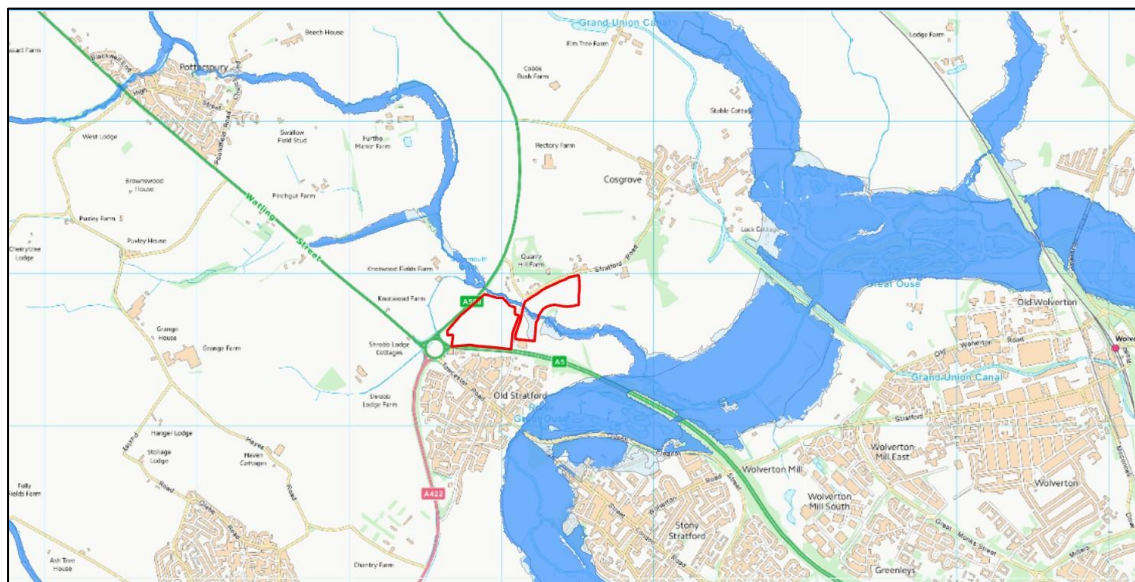
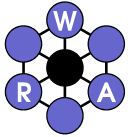


Figure 1. EA medium and high-risk flood zones shown in blue for the wider area around the development site (outlined in red).



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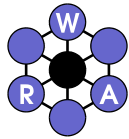
The Flood Response Plan has shown the predicted flood extents and the associated hazard classification for the 100-year plus climate change and the 30-year post-development flood scenarios. It would be beneficial to include lower return period flood extents and hazard classification to identify areas which would be more frequently flooded, such as the 2-year flood. The 100-year and 30-year events, although more severe in magnitude, may give the future owners or managers of the site a false sense of security in that a flood which would occur on average just once in 30 or 100 years has low chance of being experienced in any one year. Although the 2-year flood may not impact the building on the site itself, knowledge of the locations and in particular transport routes which are frequently flooded would be of benefit.

The description of the evacuation routes and access for emergency vehicles is also very brief and does not consider the flooding over the wider area and impacts of increased traffic due to road closures during flooding. The blue arrows in the flood evacuation routes figure (which has also been provided as a separate drawing file) do not extend outside of the site and it is not clear what the end of the arrows represent. If these are emergency areas for people to gather, then more information should be given to people so can then be safely evacuated from the site.

In conclusion, the Flood Response Plan is poor and is missing key information specific to the type of activities likely to be undertaken at the site. The Plan still does not adequately address the flood risk over the wider area and as such presents an inaccurate assessment of the flood risk. Therefore it should be rejected by the EA and LPA.

Further Correspondence and Questions Relating to the Canal Embankment and the Proposed Flood Storage Area

No new reports have been issued relating to the hydraulic modelling of the proposed flood storage area and the addendum report from November 2024. The only document is a letter from JBA to West Northamptonshire Council to confirm and agree with the Canal and River Trust that current situation, “the Stratford Arm of the Grand Union Canal embankment does not fall under the requirements of the Reservoirs Act 1975”. JBA then proceed to state that the proposed flood storage area does come under the conditions of the 1975 Reservoir Act; “The proposed new flood storage dam will fall under the requirements of the Reservoir Act as it will impound a body of water above natural ground level and it will have a control structure.” The letter is the agreed opinion of Mr Jeremy Benn, a member of the Reservoir Supervising Engineer Panel and Mr Christopher Scott a member of the All-Reservoirs Panel of Engineers.



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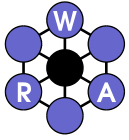
We have identified the following points in relation to the flood storage area:

1. The flood storage area is a flood storage embankment by nature of its design (impounds water above natural ground level with an engineered flow restriction) irrespective of the canal embankment.
2. A 'large raised reservoir' is not to be constructed without following the wording as set out in Section 6 of the reservoirs act. The first thing that will be required is the appointment of a Construction Engineer. It should be stressed that no design should be considered final and certainly no construction work should start until a Construction Engineer has been appointed. An AR Panel Engineer is qualified to act as a Construction Engineer under the remit of the Act.
3. The CE will guide the design and construction of the reservoir so that it meets the necessary standards. For example, it will be necessary to determine the Flood Category as per Floods and Reservoir Safety [4th Ed] and this will inform the sizing of the main high-level overflow, as well as its overall design. It is not acceptable to let the embankment overtop in more significant flooding.
4. The culvert capacity through the embankment should be increased. If the flow is restricted this will cause additional heights of water to be retained upstream, and this in turn will raise the hydraulic loading on the canal embankment itself. These embankments can be notorious for their current condition. If, for whatever reason, the canal were to collapse and in any way that this can be drawn back to the modifications made or the change of land use and loading imparted by the design, then the flood storage reservoir owner might carry a civil liability associated with it.
5. Materials used to construct the dam such as the clay core and concrete would need to be brought into the site rather than using locally available materials.
6. The ownership of the reservoir should be identified and the party taking on the structure should understand what liabilities they will be inheriting. Anyone planning to own the reservoir once the scheme is complete will become an Undertaker under the remit of the Act, and therefore carry the duties associated with this role. Failure to comply with the Reservoirs Act is a criminal matter, not a civil one. This is strongly regulated, and issues at reservoirs can become excessively costly to remedy. There are many cases of angling clubs buying a reservoir and then being bankrupted after the next statutory inspection. The developer should not assume that just because they are building a flood embankment that the Environment Agency would adopt it.

References

DEFRA/EA/NRW/Welsh Government (2024). Estimating flood peaks and hydrographs for small catchments. R3 – Summary of reassessment of FEH methods and recommendations. FCERM Research and Development Programme. Research Report March 2024 SC090031/R1.

Institute of Hydrology (1999) The Flood Estimation Handbook (5 Volumes), Wallingford, Oxfordshire.



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Wallingford Hydro Solutions (2019). The Revitalised Flood Hydrograph Modelling Tool
Version 3.0 2019. Wallingford, Oxfordshire.

Woods-Ballard, B., Wilson, S., Udale-Clark, H., Illman, S., Scott, T., Ashley, R., and Kellagher, R. (2015). The SuDS Manual. CIRIA Publication C753, London.