

Mr David Mardon
Hyder Consulting Ltd
David.madon@hyderconsulting.com

Our ref: WX/2009/111183/06
Your ref: BFR/003 & UA003287

Mr Brian Ransom
BFR Design Ltd
Brian.ransom@bfr-design.co.uk

Date: 22 March 2012

Dear David/Brian

NORTH YATE FLOOD RISK MODELLING AND SURFACE WATER DRAINAGE STRATEGY.

We have completed our review of your various flood risk technical submissions with respect to the above major Core Strategy Area of Search. Overall, we are now in a position to inform you that we are satisfied with the scope and detail of the assessment, and your proposed flood mitigation strategy to inform an outline planning application. We are pleased that the proposed flood mitigation strategy has shown that a flood risk reduction will be achieved through this major development as required by PPS25 and South Gloucestershire's Level 2 SFRA.

In principle, we support your proposed flood risk betterment approach by reducing the peak flow of the "Combined Site Stream flood flows" by regulating the upstream catchment flow to a restricted Greenfield rate (5l/s/ha) and the Ladden Brook floodplain conveyance route to this site. In addition, we support the restricted discharge rate (5l/s/ha) to the development area to prevent an increase in flood risk downstream.

To avoid an objection in the planning process the above is subject to you:

1. Compiling a detailed FRA for the proposed development.
2. Articulating whom the competent authority/body will be maintaining the entire infrastructure, as proposed.
3. Clarification with respect to Table 3 in Hyders Technical note dated 1st December 2011. This summarises pipe diameter sensitivity and the change in total volume of the flood storage facility. We would advise that a 250mm pipe be applied instead of the current 300mm to maximise the total storage potential of the asset.
4. Confirmation that further modelling work will be provided before reserved matters or development commencing on the ground.

For audit trail purposes, I have listed the documents we have reviewed to date:

1. BFR Technical Note "Proposed Development at North Yate Surface Water Drainage Strategy" Dated August 2011.
2. BFR Drainage letters dated 29th September 2011 and 5th December 2011
3. BFR WINDES storage model outputs dated 21 November 2011
4. BFR Surface water attenuation general arrangement plan (Drwg no. E003-10 Rev.03)
5. Hyder Technical Note – Design and Performance of Pond P4C dated 1st December 2011 and further explanation in Hyder Flood Risk modelling letter dated 17 February 2012.

6. Hyder Tanhouse Tributary Note dated 07 December 2011 and 17 February 2012.
7. Hyder North Yate "Impact of Pond P4C on 100CC Event Flows Leaving the Site" Flow hydrographs March 2012.

More specific comments on the flood risk modelling and surface water drainage strategy are set out below:

Flood Risk Modelling

Ladden Brook

We have already approved the baseline model of the Ladden Brook and this has been incorporated into our flood map and the Councils SFRA. At our request the representation of Pond P4C within the model has satisfactorily demonstrated that it is a feasible option and that sufficient storage (11,562m³) and land has been provided to contain the Ladden Brook floodplain and attenuating the upstream catchment flows to 5l/s/ha. This work was important, as it has proven that the Ladden Brook floodplain conveyance route will not flood the development or the surface water attenuation features.

Whilst we are satisfied with the outline results of Pond P4C we would expect the detailed design process to optimise the operation of this feature further to maximise its upstream storage function. As this work is essential infrastructure for the delivery of the development this work would need to be submitted for approval prior to any reserved matter application or any development commencing on the ground.

We are pleased that you have taken on board our advice that P4C is a floodplain storage facility and not allocated for surface water drainage attenuation from the development.

Tanhouse Tributary

The previous issues highlighted in the previous review have now been resolved to our satisfaction. At this outline stage, the outputs of the model have provided a sufficient level of detail on a likely possible flood extent to inform the master planning process and the drainage infrastructure. However, we would expect a more detailed modelling exercise to be undertaken to provide a more accurate floodplain of this watercourse through the site to inform the future master planning and detailed design of the drainage scheme. This must be submitted for approval before any reserved matter applications or development commences on the ground.

We note that you have used a fixed percentage runoff value of 25% for permeable areas when the SPRHOST value for the catchment is 42%. This will need to be reappraised at detailed design to ensure that the hydrology and storage provision is accurate.

Surface Water Drainage Strategy

Overall, we support the 5l/s/ha being applied to the total development area (70ha) for all storms up to the 1in 100 year rainfall event including climate change. This equates to a total outflow of 350l/s and total drainage attenuated volume of 23689m³. This approach is a significant betterment instead of allowing a discharge that increases on a sliding scale as the storm intensity increases. From undertaking a similar storage calculation exercise, we were gaining similar values to your detailed results, which is encouraging.

Thank you for providing the latest surface water drainage plan, WINDES results and a table summarising the impermeable area, runoff rate and required storage volume for each development plot. This information has been useful in clarifying what the total impermeable area is for the total development area and on an individual plot basis. We have no objections with your approach for using impermeability factors for determining a more accurate impermeable area for each development type within the denoted plots.

We would expect a detailed drainage model to be created to demonstrate that the surface water attenuation system does operate as outlined by the current strategy. This must be submitted for

The Environment Agency

Rivers House, East Quay, Bridgwater, Somerset TA6 4YS
Tel: 08708 506506 Fax: 01278 452985 DX 135476 Bridgwater 3
Email: enquiries@environment-agency.gov.uk
www.environment-agency.gov.uk

approval before any reserved matter applications are submitted or development commencing on the ground.

Minor surface water comments that require clarification in the final FRA:

Scrape 2

Plot 4 is split into three parcels on the plan but it's only mentioned twice in the table? But we note that there is a 4A. The plan needs to be updated to show plot 4A.

Scrape 10

It needs to include the attenuated discharge from Peg Hill into this scrape. We recognise that it will already be attenuated discharge but you need to be factoring in the input of water from this site.

Scrape 11

Disagree with the impermeable area quoted in the Summary Table. Should be 8.6ha rather than 7.1ha.

Pond 1

Disagree with the impermeable area quoted in the Summary Table. Should be 9.91ha rather than 9.70ha.

Adoption of Flood Risk Infrastructure

As we have discussed in the past adoption of all flood risk infrastructure must be articulated in the final FRA to avoid an objection. We would be disappointed if a maintenance company were to be considered for this role. Instead, we would advise that you discuss this matter with SGC to determine if they would be prepared to adopt the strategic attenuation features, shown on your latest drainage masterplan and the flood storage area called Pond P4C, as they could form part of the public open space areas of the development. This would have to be subject to their technical approval and appropriate commuted sums. We would ask that you keep us involved in these discussions.

Ways forward:

As you know this is a significant development so we would expect the final FRA to be robust in supporting any future planning application. It's important that you compile all the technical notes together so that there is one concise/accurate FRA, which includes the latest flood risk modelling and surface water drainage strategy. Please ensure you also consider our comments included in this letter.

Whilst we are at a stage to invite you to compile the final FRA for our comment I would urge you to first liaise with South Gloucestershire Council on the technical details of your FRA. It's critical that you gain SGC approval of your scheme and to determine as the SAB if they would consider adoption.

As stated above further approvals of the flood risk infrastructure will be required before reserved matter applications or development commencing on the ground. At detailed design, it's important that you agree with us how you will be linking your drainage and watercourse models together. We would expect a combined model that includes all development inflows for the surface water attenuation areas and P4C. I'm sure there are many modelling approaches available but it's critical that you demonstrate through your modelling that the infrastructure operates as designed to ensure safe development up to the 1 in 100 year with climate change but also achieves a flood risk reduction downstream.

For your information, South Gloucestershire Council will be undertaking a further catchment assessment of the new development proposals in their area.

I would hope that leading to the submission stage there would be no further changes made to the hydraulic models or to the envisaged drainage strategy. However, if further changes were to

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occur please ensure you make us aware before submitting the final FRA so we can discuss these with you.

I trust the above is self-explanatory but if you wish to discuss any of the above further please contact me on the number below.

Yours sincerely

A handwritten signature in black ink, appearing to read 'N. Smith', is centered on the page. The signature is written in a cursive style with a large initial 'N'.

Nigel Smith
Development and Flood Risk Engineer
(nigel.smith@environment-agency.gov.uk)
DD: 01278 484807

Cc. Pam Walton (South Gloucestershire Council – Forward Planning)
Nigel Hale (South Gloucestershire Council – Drainage Engineer)