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Sent: Thursday, July 27, 2023 4:35 PM

To: Scott Fenner <Scott.Fenner@bellway.co.uk>; 'Gemma Good' <gemma.good@jackson-rowe.com>

Cc: 'Sandy Barnes' <sandy.barnes@jackson-rowe.com>; 'Daryl Roberts' <Daryl.Roberts@miller.co.uk>

Subject: M434B: DC/23/94483 - Boorley Gardens Phases 3B, 3C & 3D - Email 1 of 2

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Afternoon,

I refer to the responses from Network Rail and the LLFA – we will respond to each in separate emails. Email #1 responses below;

NETWORK RAIL

Extract #1 from email dated 19/06/23

Unfortunately the consultant has not responded fully to the concerns set out in my email dated 8th February 2023 and has not provided the requested details of the pond construction. The developer will readily have access to full construction details and the pond at their disposal and as such we believe this information can be supplied easily.

On 17/05/2023 we responded to the summarised comment 'A berm is required at Basin D to provide the required storage volumes. A detailed design of Basin D is required with the top water levels indicated on a cross-section to demonstrate that water will not be stored above the level of the railway crest' by adding sections of Basin D on to Drawing No. M434/57 Revision B and stating that; "Details of Basin D have now been produced as requested. It can be seen that water will not be stored above the level of the railway crest."

Network Rail's email dated 08/02/23 did not mention construction details, it requested 'that the detailed design of Basin D is included in the submission with the top water levels indicated on a cross-section to demonstrate that water will not be stored above the level of the railway crest.' This information was shown on the provided drawing.

The drawing has now been amended to include a construction detail for the basin, as requested - please find attached Drawing No. M434/57, now at Revision D.

Extract #2 from email dated 19/06/23

We have undertaken a brief review of the submitted calculations and note that the requested sub-hourly storm durations have now been submitted. However, their models have used FSR data as opposed to the much more recent FEH methods. CIWEM Urban Design Group report entitled 'Rainfall Modelling Guide' confirms that FEH13 rainfall can be used for the 15 and 30 minute storms, and best practice requires designers to use the worst case conditions in their design. Given the risk of this site flooding NR Assets we believe the designer should be fully considering the worst case flood risk and as such we expect to see the results of the FEH 15minute and 30 minute storms considered in the design.

Our 17/05/2023 response to the summary 'The submitted calculations have not included sub-hourly storms for the 1 in 30 year, and all 1 in 100 year simulations.' was "Noted. Additional hydraulic calculations for Catchments C & D are attached." The attached *M380-Catchment C&D PDF*

Output.pdf and *M380-Catchment C&D FSR 15 & 30 PDF Output.pdf* were provided. Please also find attached *M380-Catchment C&D FEH 15 & 30 PDF Output.pdf*, as requested, and an explanation on why FSR data was initially used (below).

FSR data was used for sub hourly storm durations because the FEH dataset is not widely applicable to sub hourly storm durations. The rainfall data collected to inform the FEH dataset is obtained from storm durations greater than an hour, and is based on return periods > 2 years, therefore using FEH data for sub hourly storm is an extrapolation of rainfall data which should be avoided when there is sub hourly rainfall data contained in the FSR dataset. MicroDrainage does not allow you to run 1-year FEH data rainfall events and therefore you are required to run the FSR rainfall for the 1 year return period.

Infodrainage (previously MicroDrainage) also states that “FEH concentrated on rainfall event durations of one hour and above. Although it states it can be relied on for durations as short as 30 minutes it may require further research for use below this duration. The FSR report analysed sub-hourly rainfall and therefore may be more appropriate for shorter storm durations such as required for the Modified Rational Method.” Link to their

website: [https://help.innovyze.com/space/infodrainage2021v3/16810488/FSR+Rainfall#:~:text=The%20Flood%20Studies%20Report%20\(FSR,record%20for%20generating%20the%20methodology](https://help.innovyze.com/space/infodrainage2021v3/16810488/FSR+Rainfall#:~:text=The%20Flood%20Studies%20Report%20(FSR,record%20for%20generating%20the%20methodology)

Autodesk have also stated similar findings [here](#) , which are summarised in the table below. In their article they actually found FSR data to be more conservative than the FEH for 2-year 60min event based on a catchment in Oxford. Please also note the sub hourly (short) storm durations subside quickly and any nominal flooding that may appear on a drainage network will ultimately find its way towards the downstream element and continue its path until it reaches the attenuation features. Due to the SuDS scheme proposed the critical duration for the majority of the network is > 30mins.

How the two methods compare

We've created this handy chart to show you how the methods compare:

	FSR	FEH99	FEH13
Published	1975	1999	2013
Based on	Rainfall gauge data	Catchment and rainfall data based (more gauges than FSR)	Both catchment- and point-based data
Duration	Sub-hourly and hourly+	Hourly+	Hourly+
Data	Older rainfall data	More recent rainfall data	Expanded on original dataset with more data
Simulates	1-year return	1-year return	Min. 2-year return
Applicable for	UK and Ireland	UK only	UK only
Cost	Free in InfoDrainage	Charge for CD-ROM (discontinued)	Charge per dataset download

A quick comparison of FSR vs two versions of FEH

Based on the above we did not consider that using FEH data for the sub hourly storm durations was required as it is an extrapolation of the rainfall dataset. Please also note that the FEH data was used for storm durations greater than an hour.

Extract #3 from email dated 19/06/23

We note some flooded volumes in excess of 20m³ are occurring close to the location of the pond and no flood routing diagram has been provided. As the pond is likely to overtop onto the railway it is imperative that the flood routing and any additional volumes entering the pond are considered fully. Until adequate information is submitted we OBJECT to the discharge of planning condition 11 as it has not been demonstrated that the surface water runoff generated by the site will be managed in accordance with the planning condition. We are concerned that our Assets are at increased risk as a result of this development and we are happy to meet with the Applicant to discuss our concerns.

Network Rail's email dated 08/02/23 did not mention a flood routing diagram, so the attached Drawing No. M380/128 Revision D was not provided to clear the requirement.

I trust this allows the planning conditions to be discharged, but if additional information is required please let me know.

Regards

Dave

Dave Brock
Technical Director



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