



7. Flood Risk and Drainage

DEVELOPMENT OF BRISTOL AIRPORT TO ACCOMMODATE 12 MILLION PASSENGERS PER ANNUM (REF 18/P/5118/OUT)

Response to North Somerset Council Flood Risk Management Team Comments

The North Somerset Council (NSC) Flood Risk Management Team responded to planning application reference 18/P/5118/OUT for the development of Bristol Airport to accommodate 12 million passengers per annum (mppa) on 28th January 2019. These comments have been summarised as follows;

- *Factors of safety for the design of infiltration structures to be as stated above and based on current best practice guidance including the CIRIA SuDS Manual C753. If the applicant disagrees with this best practice guidance or any of the recommended infiltration drainage design factors of safety, then evidence to justify a lower factor of safety should be submitted in support of this application.*
- *Network calculations for full planning application sections of surface water infrastructure, with a matching plan showing corresponding pipe numbers.*
- *Exceedance flow routing plan for the site that identifies overland flow paths during an exceedance event and that confirms flood risk will not be increased elsewhere.*

This document is Bristol Airport Limited's (BAL) response to the comments summarised above. Each point is discussed in turn below.

Factors of Safety

The submitted calculations have assumed a factor of safety throughout of 2. Previous calculations for the approved 10mppa application (produced by Arup) used a factor of 1.5.

NSC's response refers to the CIRIA 'SuDS Manual' C753 which sets out a range of safety factors based on the total area drained for each soakaway and the consequences of failure, (Table 25.2, C753). It should be noted that C753 is a guidance document only and that the safety factors are not a mandatory requirement. The factors of safety quoted in C753 are provided as a 'one size fits all' and do not reflect differences between single site infrastructure developments where all drainage elements are owned and managed by the operator, and developments such as housing estates where there are multiple owners and responsibilities for drainage infrastructure. Additionally, within developments such as housing estates, space for managing drainage exceedance safely is limited; in contrast, within Bristol Airport's operational boundary there are extensive areas of car parking and grassland available to do so.

An overall flood exceedance plan has now been prepared to indicate where any excess flows can be routed and the resulting volumes can be stored. This information is shown on Hydrock drawing nos. BAE-HYD-XX-XX-DR-D-2017-P01 and BAE-HYD-XX-XX-DR-D-2018-P01 which are submitted alongside this Note.

Factors of safety are introduced in order to counter the potential for the siltation of the soakaway feature and variations of the infiltration co-efficient. Document C753 notes that these factors are

not based on actual observations of performance loss and therefore are a 'general' guidance to cover all designs from vegetated basins on a residential/industrial estate, through to the types of systems proposed for the proposed development (which is located on a major infrastructure site). On this basis, generic factors of safety values are overly cautious, as they are intended to cover all infiltration features ranging between infiltration basins to high-void fill/geo-cellular systems. It would be expected that the latter has substantially lower risk of deterioration since they are underground systems solely for infiltration; no dressing with soils, growth of vegetation etc are needed as required for a landscaped infiltration basins.

The detailed design proposals will include pre-treatment measures such as silt traps and interceptors. Unlike some sites/developments, the airside of the airport will produce limited silt since the vegetated margins are subject to minimal disturbance and the concrete aprons are subject to regular sweeping. The substantial roof areas will produce relatively clean water. Whilst there will be potential silt production on the car parking areas, runoff will pass through interceptors/silt traps thus substantially reducing the risk of deterioration of infiltration.

Regular planned maintenance will ensure that any build up of silt will be removed. Furthermore, new installations will be designed to reduce the likelihood of silt build up due to the design of the purpose-built soakaway installation. In this instance, all soakaways will be inspected on a regular basis by the on-site Bristol Airport engineering team and any findings (such as deterioration of the inlet pipe) will be noted and, where required, acted upon. This type of installation will be taken forward, where applicable, as part of the proposed development.

As noted in section 3.1.23 of the Drainage Strategy report, additional site testing will be carried out at the specific soakaway locations prior to construction and the designs updated as necessary. Under previous applications including the expansion of Bristol Airport to 10 mppa (reference 09/P/1020/OT2) these matters have normally been addressed at the detailed design stage in discharging conditions attached to the relevant consent.

The Drainage Strategy seeks to demonstrate that any exceedance flows from soakaways will be contained within the overall airport site and will not affect third party land. In the 100 year plus climate change event, depths of any ponding should not exceed 300mm. The consequences of any exceedance flows from a soakaway unit are therefore based on an engineering judgement to be made by BAL and taking into account the effect on its operations or the safety of the public and staff within the airport site.

For the reasons set out above, and from the provision of the exceedance flow plan demonstrating how any potential flood flows can be directed and stored, an overall factor of safety of 2 is judged to be appropriate in these circumstances.

Network Calculations

The NSC comment states that the application is for a full planning permission. The application is in outline with the exception of the extensions to the Terminal Building, i.e. West Terminal Extension, South Terminal Extension/New Arrivals VCC. All other elements are either an outline application only or are have already been covered by the previous 10mppa application.

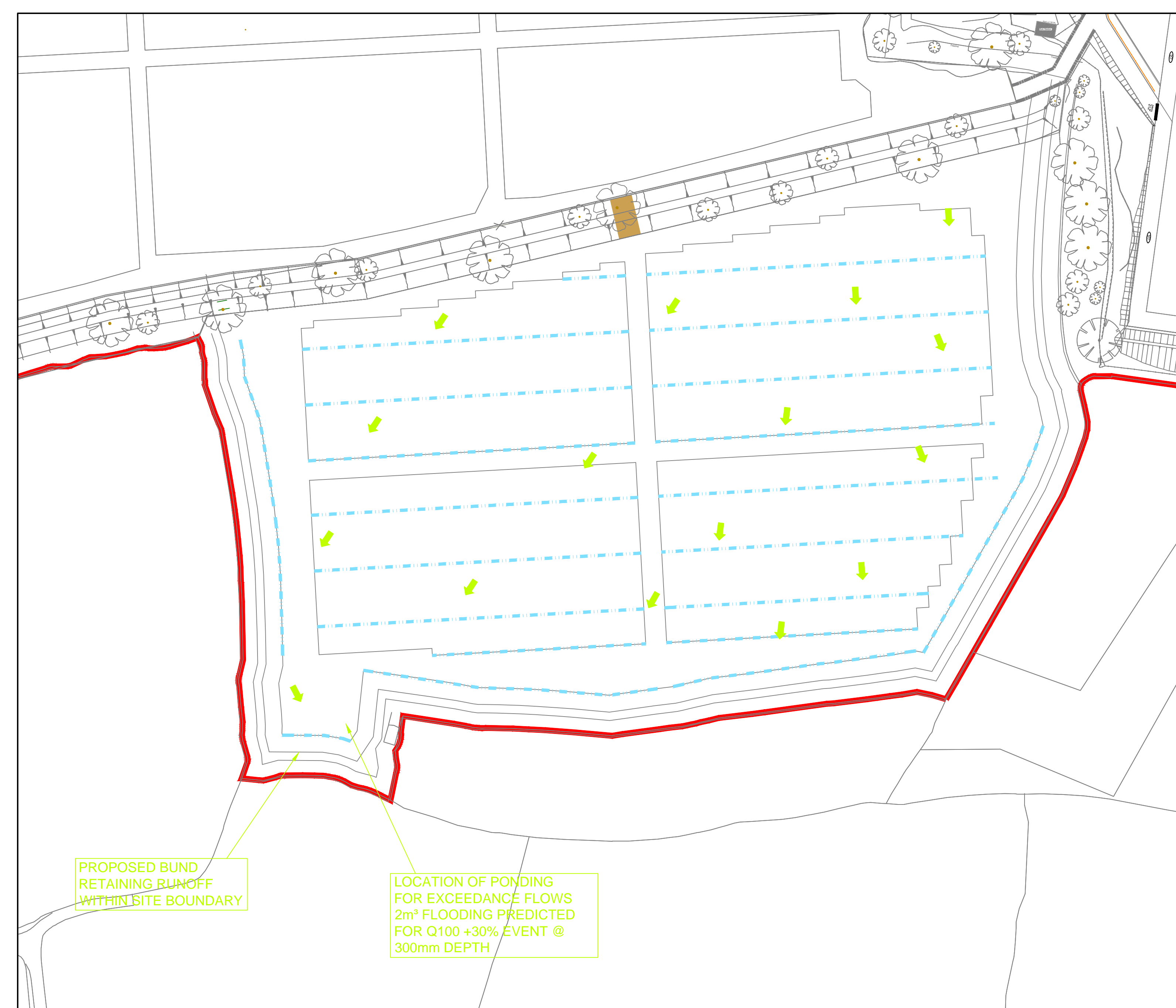
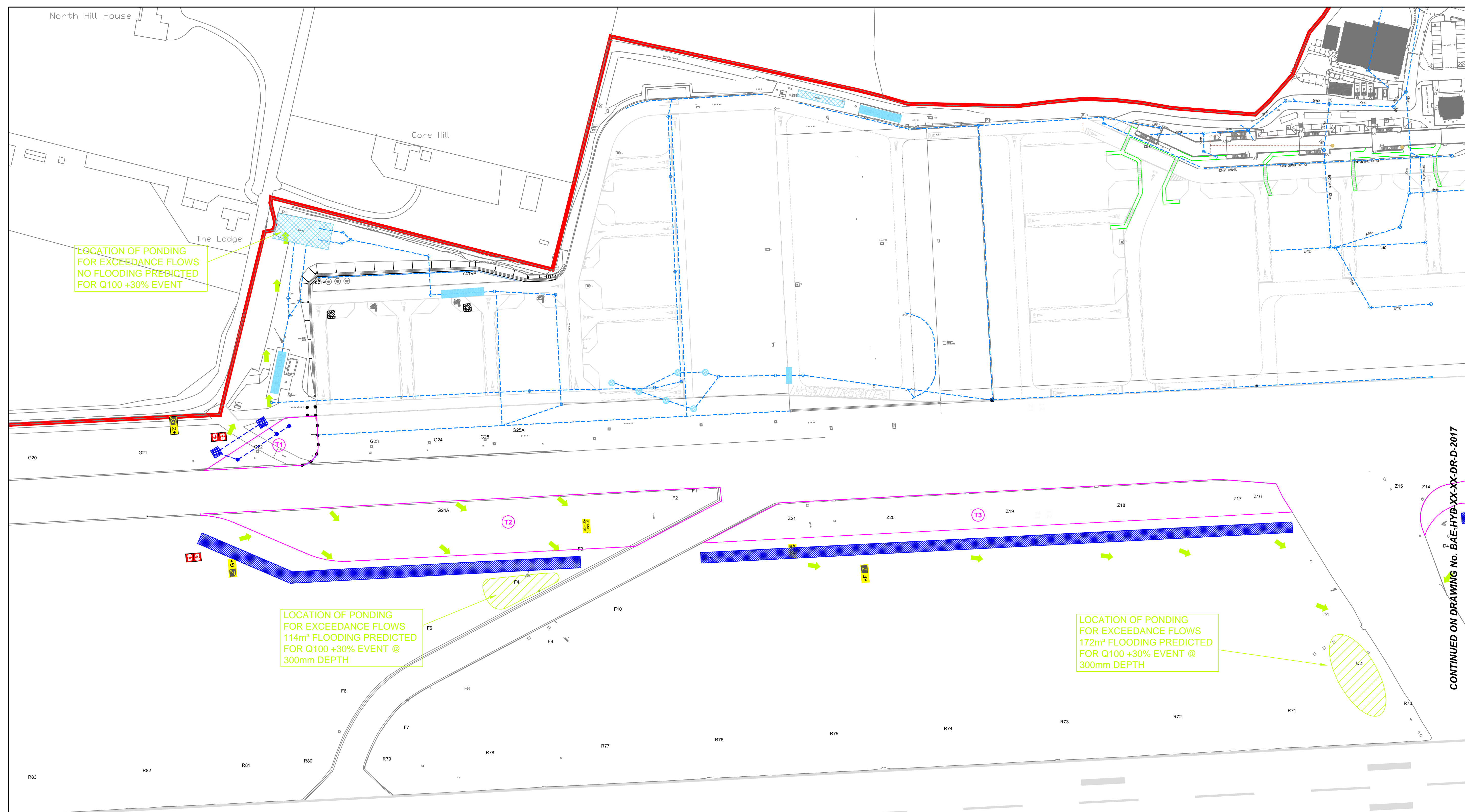
As the overall drainage system comprises numerous discrete networks with historical amendments to the drainage layout, it will only be possible to compile an approximate network analysis for those

proposed soakaways that are subject to a full planning application, as described above. As a result, BAL would consider such requirements at the detailed design stage (via condition as necessary).

Exceedance Flow Routing Plan

An indicative exceedance flow routing plan has been prepared to accompany the Drainage Strategy, showing the likely paths of overland flows and where these will be contained to prevent off-site flows, based upon the current topography of the site. This information is shown on Hydrock drawing nos. BAE-HYD-XX-XX-DR-D-2017-P01 and BAE-HYD-XX-XX-DR-D-2018-P01 which are submitted alongside this Note.

A detailed Exceedance Flow Routing Plan can be completed as part of individual component of the scheme at the design stage. Furthermore, BAL would not object for this to be conditioned if required.



KEY

- Existing surface water drain
- Existing petrol interceptor
- Existing tank soakaway
- Existing manhole soakaway
- Proposed surface water drain
- Proposed petrol interceptor
- Proposed cellular soakaway unit
- Direction of exceedance flows
- Potential ponding areas for exceedance flows

REVISIONS	
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P01	27/03/19	First Issue.	RHJ		
Rev	Date	Description	By	Ckd	App

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CLIENT
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PROJECT
BRISTOL AIRPORT
12mppa EXPANSION SCHEME

TITLE

POST-DEVELOPMENT SURFACE WATER
EXCEEDANCE FLOW ROUTES
(SHEET 2 of 2)

HYDROCK PROJECT NO. C-09194-C	SCALE @ A0 1:1,000	
STATUS DESCRIPTION FOR APPROVAL		STATUS S2
DRAWING NO. (PROJECT CODE ORIGINATOR:ZONE-LEVEL-TYPE-ROLE-NUMBER) BAE-HYD-XX-XX-DR-D-2018		REVISION P01