

# Drainage Note



Project Name: Redundant Blue Bird Factory - LPA Ref: 19/00592/FUL  
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During committee on the 1<sup>st</sup> of November the topic of surface water flooding was, rightly, and understandably, raised by members in relation to the Blue Bird Factory Site. A lot of time and resource has been employed on this topic to fully understand the current situation and climate change implications which has enabled us to design the proposed development to mitigate the flooding impact on the site and the surrounding environment and ensure that no proposed development is at risk of flooding in the future.

It was also noted by members that there were no details contained within the committee report regarding the proposed adoptable drainage network so this note will also seek to cover that off as a summary.

## 1.0 Drainage

To aid members understanding this note is broken down into 3 sections:

### Surface Water Flooding

- Existing overland flows which exist and occur naturally based on the surrounding environment.
- Flows are to be mitigated, controlled, and directed to their existing water course flow route.

### Storm Water Drainage

- Water which is generated because of impermeable areas of development. (i.e. roofs, drives, roads etc.)
- This water is directed through sewers, stored, and restricted before connecting into the existing outfall for the factory site into an existing ditch course. These onsite sewers and outfall are adoptable by Severn Trent Water.

### Foul Water Drainage

- Wastewater which is generated from properties which is not clean. (i.e. from sinks, showers, toilets etc.)
- Flows are to be directed through sewers and connected into an existing sewer network. These sewers are adoptable by Severn Trent Water.

## **2.0 Surface Water Flooding**

As members are aware, and discussed in detail at committee, the current environment and flow routes cause flooding along Bromsgrove Road and across the Blue Bird Factory Site. What we have sought to achieve in developing our designs and mitigation strategy is the control and management of this water to reduce the impact on the listed buildings and reduce the impact offsite as well.

It has been an important part of our design process that the safety and longevity of all properties, existing and proposed, is paramount and that dry, safe access and egress is available to all properties at all times, during any flood event.

The modelling of surface water flood events on a development is done and considered in 3 scenarios:

- "1 in 30-year storm event" – 3% probability of occurring in a given year.
- "1 in 100-year storm event" – 1% probability of occurring in a given year.
- "1 in 100-year storm event + 40% climate change – The volume of water modelled for a 1 in 100-year storm event increased by 40% to allow for climate change.

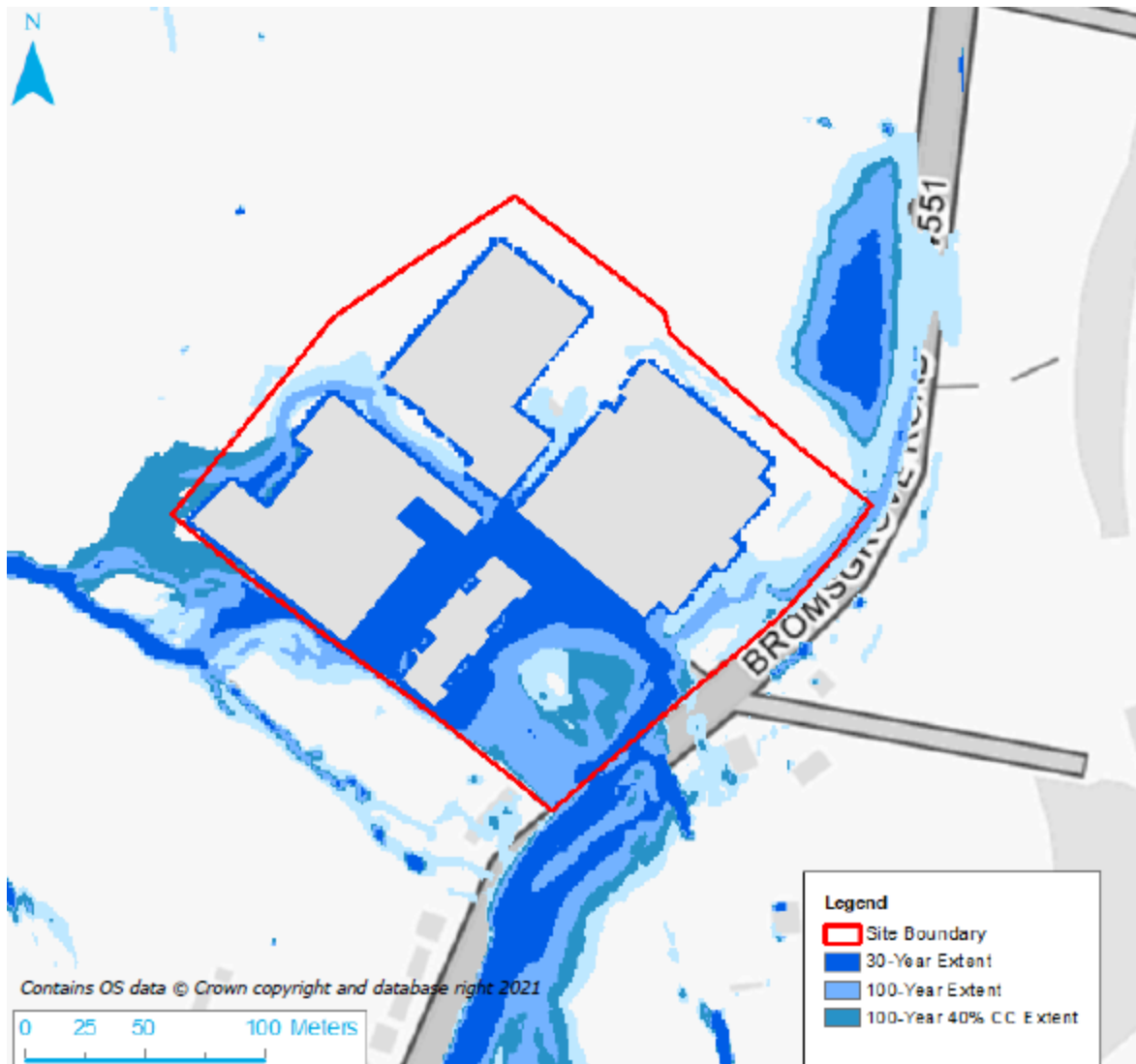
All our designs have been modelled to 1 in 100-year storm event + 40% climate change.

## **3.0 Existing conditions**

The image below shows the existing factory buildings, Administration Building and Welfare Building and the extent of flood water which occurs in each of the 3 scenarios described previously.

Water flows into the site from Bromsgrove Road and leaves the site in the North-West corner.

You will note that the Administration Building and Welfare Building are both surrounded by water in all events.



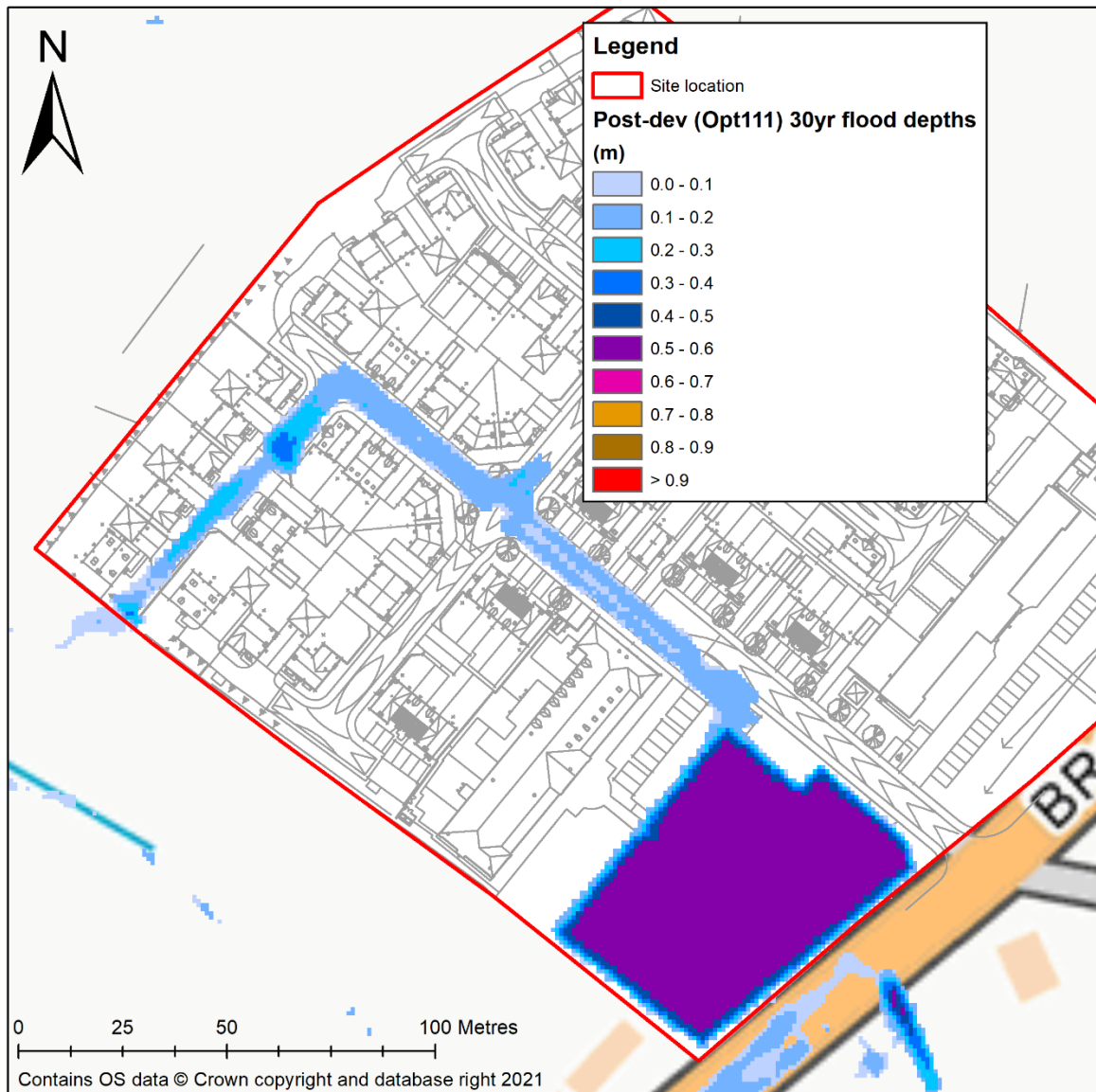
If the site remains undeveloped then the future safety and existence of these buildings cannot be guaranteed. As this report goes on to explain, the development proposals mitigate against the risk of damage to the listed buildings as well as achieving a reduction in offsite flood risk, providing significant a betterment to current conditions.

#### **4.0 Proposed conditions**

##### ***1 in 30-year event - (3% probability of occurrence in a year)***

The below image shows the modelled 1 in 30-year storm event.

You will see that in this situation all storm water flows are contained within the attenuation feature at the front of the site with any additional volume directed and contained within the highway corridor flowing to the North-West corner of the site reflecting the current situation. It is also worth noting that the area and depth of flooding leaving the site is reduced in comparison to the current situation today.



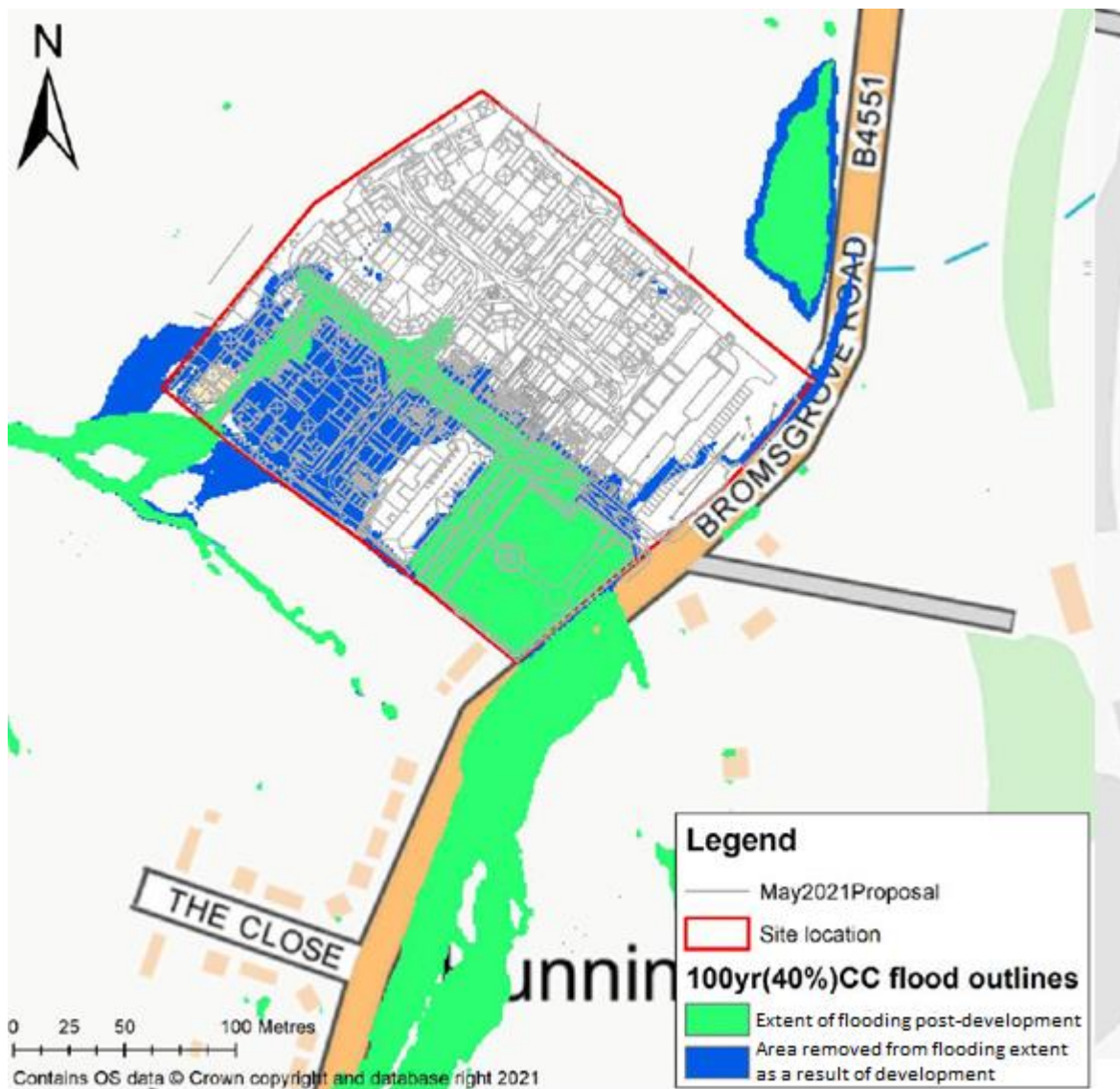
### ***1 in 100-year event + 40% climate change***

The below image shows the modelled 1 in 100-year storm event + 40% additional volume for climate change.

The below image shows the comparison between the extent of flooding in a 1 in 100-year + 40% climate change event before and after the development's mitigation strategy.

Prior to the site's development the area of blue and green would flood. The blue is the area which has been removed from the flood extent by the development's mitigation strategy

You will note that the green area, shown in this extreme event + climate change allowance, is contained to the attenuation feature at the front of the site and the highway and does not flow into any buildings or properties.



## 5.0 Property safety, access and egress

All new dwellings have been raised at least 600mm above the maximum modelled flood level for 1:100 year +4 40% (shown in the previous diagram), ensuring that even during the worst-case event proposed dwellings will remain dry and safe.

The Welfare Building has been demonstrated to be elevated 70mm above that maximum flooding level, however it does not achieve the full 600mm freeboard additionally desired. Due to the building's status as a listed building, the finished floor levels cannot be altered, therefore it has been proposed to provide 'flood barriers' that can be easily inserted within the southern doorway frames to further mitigate any residual risk.

Dry access and egress routes have been designed for all properties to ensure that any resident can gain access to or exit from the site during the flash flooding event. These routes will be outlined on the proposed highway network, shared pathways within the scheme and a proposed elevated boardwalk adjacent to the balancing pond.

A Flood Response Plan will also be provided to educate residents in how to prepare for a flooding event and actions to take during. It will be a condition of the sale of properties, in perpetuity, that all new occupiers are provided a copy of the Flood Response Plan. It

should once again be noted that all dwellings have been classified as safe for their lifetime, as required by the exception test.

## 6.0 Telemetry system

During discussions with the LLFA it was agreed that, whilst the properties will not flood, it would be useful to provide forewarning of the possibility that the onsite highways will become waterlogged during a storm event.

The timings for the worst-case scenario (i.e. 1 in 100 year storm event, with 40% climate change allowance) are outlined as follows –

- Commencement of 'flash' storm event –  
0 minutes
- Filling of the onsite attenuation basin (located to the frontage of the Welfare Building) –  
0-45 minutes
- Triggering of the telemetry system within the attenuation basin –  
35 minutes
- Flooding of the roads begins, as per designed flooding model –  
45-105 minutes
- Flooding begins to ease within the roads –  
105 minutes
- Flooding dissipates from the roads –  
150 minutes

From the above timescales, it can be noted that the telemetry system will issue a warning once flood waters enter the site, giving residents adequate time to prepare as necessary, however this will only occur 35 minutes into the overall storm event, meaning that the heavy rainfall can be observed prior to the telemetry system providing its warning.

It has been proven that all onsite allocated parking is outside of the flood extents deemed as a hazard. Deep flood waters have been contained within the attenuation basin.

It should be noted that the above durations are for a worst-case scenario / high amplitude flood event. The occupants of the site will benefit from longer lead times for lower amplitude flood events, which have a higher probability of occurrence.

As mentioned above during all modelled flooding events, there will, always, be a safe and dry pedestrian access and egress route throughout the site. The alternative is for residents to remain in their properties, which will remain dry, for the 150-minute window. The LLFA have agreed that the mitigation measures proposed will provide for a both dry properties, and for dry access/egress routes, and will provide a safe environment.

## 7.0 Storm Drainage

This onsite storm drainage system will allow for the surface water flows captured by the development, inclusive of roof area and proposed driveways and highways (hardstanding). The onsite storm drainage system is completely separate to the proposed foul drainage system and surface water flood mitigation.

The surface water drainage network will utilise the existing factory outfall but will comply with current policy restrictions providing betterment to the current situation. This will result in further reduced flood risk offsite.

To achieve this restricted rate the surface water will be stored in underground storage crates and over-sized pipework throughout the site. It is worth noting the storage volume for this water has been calculated with an additional 40% volume which could occur as a result of climate change.

Both the LLFA and Severn Trent Water (STW) have been consulted on the proposed drainage strategy, they have raised no objections. STW will adopt the proposed drainage network.

## **8.0 Foul Drainage**

The onsite drainage system will accommodate the foul water flows generated by the development. This includes all wastewater produced by the proposed dwellings and refurbished apartments. The onsite foul system is completely separate to the onsite surface water system.

The outfall for the foul water is into an existing Severn Trent Water operated sewer within Bromsgrove Road.

Both the LLFA and Severn Trent Water (STW) have been consulted on the proposed foul water drainage strategy, they have raised no objections. STW have completed a capacity assessment and have confirmed that their sewer network can receive the site's foul water.