SITE:	Land to the south of Lower Bullingham west of the Rotherwas Industrial Estate north of the Rotherwas Hereford HR2 6JW
TYPE:	Outline
DESCRIPTION:	The first phase of an urban extension (known as the Southern Urban Expansion in the Herefordshire Local Plan Core Strategy) comprising up to 540 homes (Use Class C3); employment land (Use Class B and E)
APPLICATION NO:	242558
GRID REFERENCE:	OS 352026 - 237392
APPLICANT:	Bloor Homes
AGENT:	Ridge and Partners

Site Location

Figure 1: Environment Agency Flood Map for Planning (Rivers and Sea), 2024

Flood Risk

Fluvial Flood Risk

In accordance with Environment Agency standing advice, the planning application has been supported by a Flood Risk Assessment.

Site Access

Access and egress from the site can be restricted during flood events, noting the following flood mechanisms that are identified in the FRA :-

- Watery Lane and Holme Lacy Road flood from the Wye. Also in some cases the entrance to Rotherwas Estate is blocked due to surface water flooding at the railway bridge.
- The B4399 can flood from the Norton Brook, making the road impassable.
- Lower Bullingham Lane becomes inaccessible due to water held behind a raised section of roadway.
- The Withy Brook can flood Green Crize resulting in deep water at the railway bridge.

The FRA makes reference to a safe route, to the south along Green Crize. However, this route does not lead to an urbanised area with a place of safe refuge. We await commentary from Emergency Planning regarding the implications of siting this large scale development in a location where access can be compromised. The development is likely to place an additional burden on the emergency services. There may be scope to improve access to the site.

The applicant has presented proposals for the on-site vehicular and pedestrian access routes to remain dry for the 100 year event and taking the effects of climate change into account.

Green Crize Railway Bridge

The modelling plots do not all show floodwater on Lower Bullingham Lane. However the Withy Brook breaks it's banks upstream of the Green Crize railway bridge at least annually.

Ordinary Watercourses and River Wye 5 year peak flood depths

Ordinary Watercourses and River Wye Impact Analysis 5 year

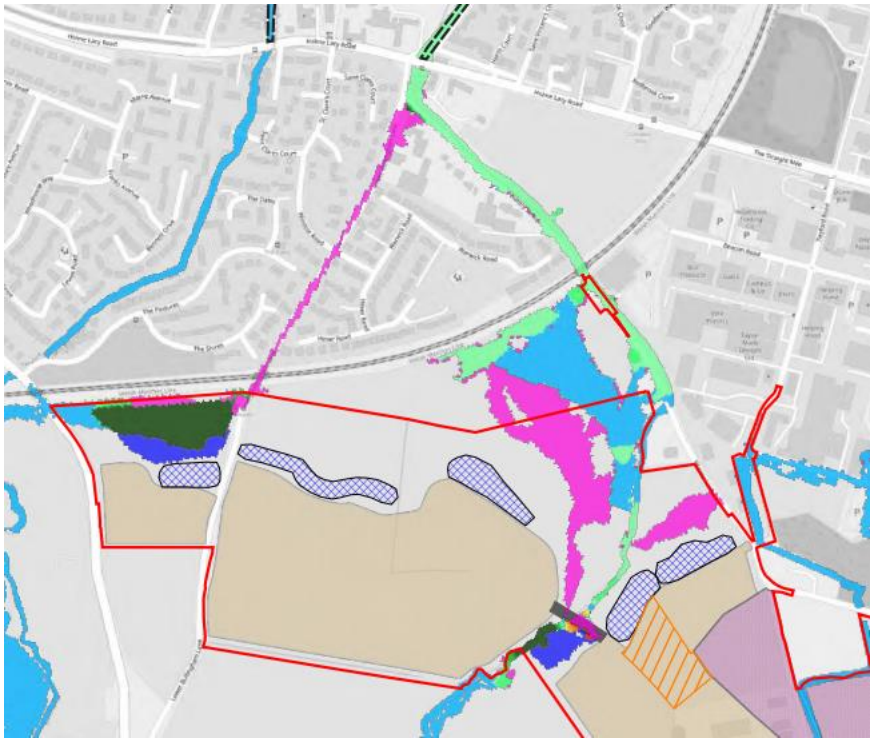
The flooding at Green Crize railway bridge occurs because the road is lower than farmland. This road access will always be at risk of closure.

The Withy Brook bursts its banks at an existing farm access culvert. The land is owned by Bloor Homes. The applicant needs to present a long term solution that will address this risk and provide assurance that the fluvial flow will not spill across the field to the road. This needs to be addressed as part of the Outline planning application and implemented without delay. This should be regarded as effective riparian management, not a contribution to flooding deficiencies.

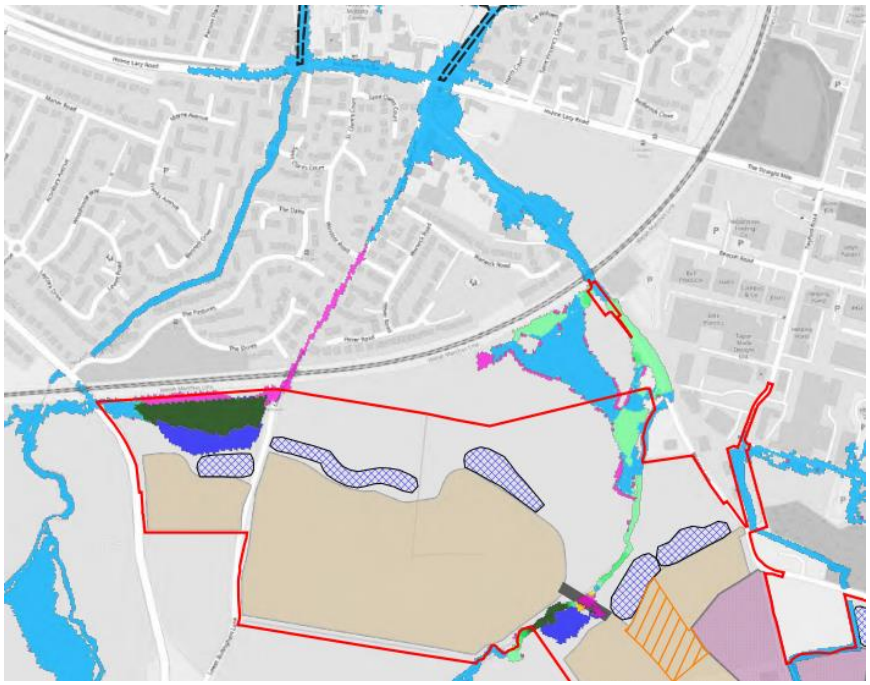
The flooding of Green Crize can also occur due to the high soffit level of the railway culvert which limits flow capacity in higher return events.

Lower Bullingham Lane

Floodwater on Lower Bullingham Lane becomes trapped due to the presence of raised ground at the Windsor Road junction. This leaves the road closed following each episode. In some cases, cars are are caught in the flood water. It is possible that the road levels drop very slightly, before rising at Windsor Road.



Ordinary Watercourses Impact Analysis - 50 year



Ordinary Watercourses and River Wye Impact Analysis - 30 year

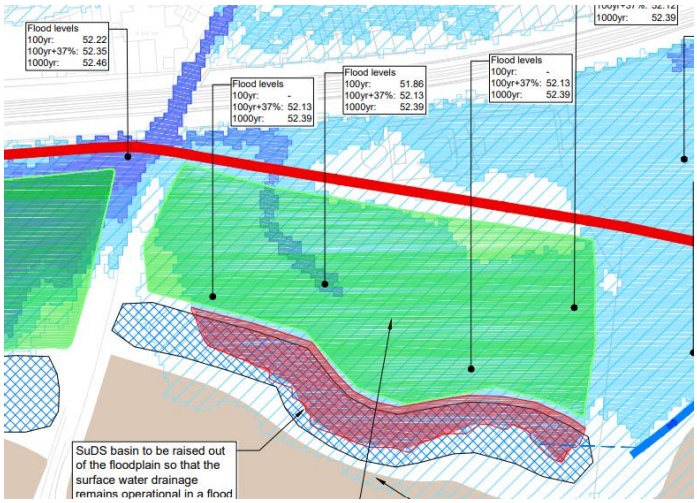
The modelling does not include the raised ground at Windsor Road. The results suggest that following the development, Lower Bullingham Lane will become a dry access route. Given that road levels are higher up than modelled, there will be an ongoing access issue.

The provision of upstream attenuation adjacent to the flow route (Flood Compensation location 3) will only have the effect of reducing the flow rate down Lower Bullingham Lane until the compensation area fills with water. The problem of flooding on the lane arises because flood water is trapped there. This is not reflected in the modelling results.

To address the issue of pedestrian access during and after floods, we consider that off-site works could be delivered by the developer to improve the profile of Lower Bullingham Lane so that water is not retained after a flood. Improvements could also be made to the highway drainage.

We understand that the Conceptual Design Strategy (SW Strategy Appendix 6) makes an allowance for additional flow into Basin 1. Please clarify whether the attenuation volume has been based on the contributing area from the Red Line area or does it include for addition areas upstream.

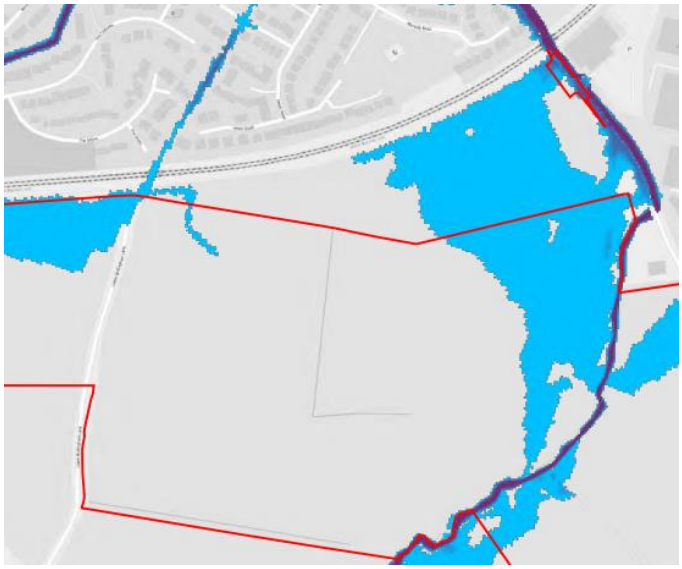
<u>Watery Lane</u>



Ordinary Watercourse with River Wye Impact Analysis 30 year

During floods, water spills from the Withy Brook along the edge of the railway and discharges under the railway bridge onto Lower Bullingham Lane.

The model results show that the flood storage area north of the proposed SuDS Basin (Location 1) will only flood from the Wye during an exceptional flood event (100 year + 37% CC). This area is not shown as flooded during a 100 year event.



Ordinary Watercourses with River Wye 100 year

The water level difference mapping does not show this area as having flooded. We recognise that compensatory storage has been provided because a basin is proposed here, but we are unclear why it has been assumed that the flood storage will provide downstream benefits. We recognise that there is a low lying paved path alongside the railway, which could flood with shallow water but most water drains below the bridge.

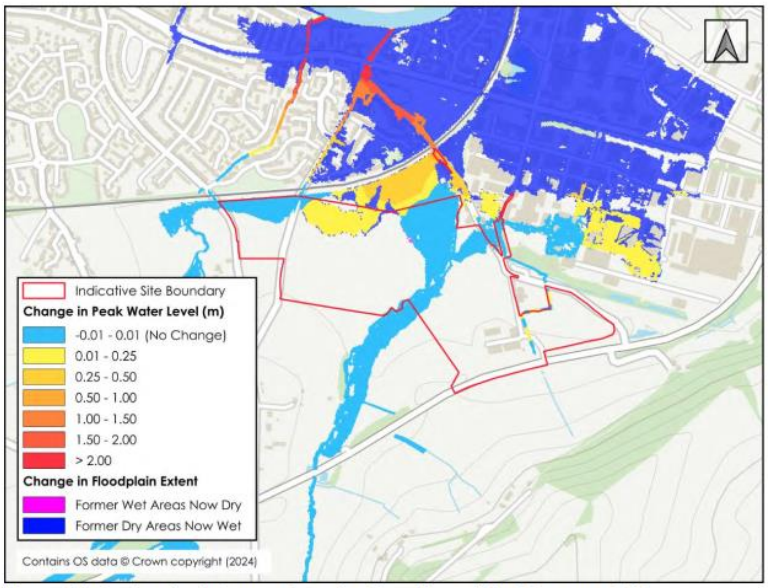


Figure 4.6: Backwater Influence from the River Wye – 1 in 100-year + 37%

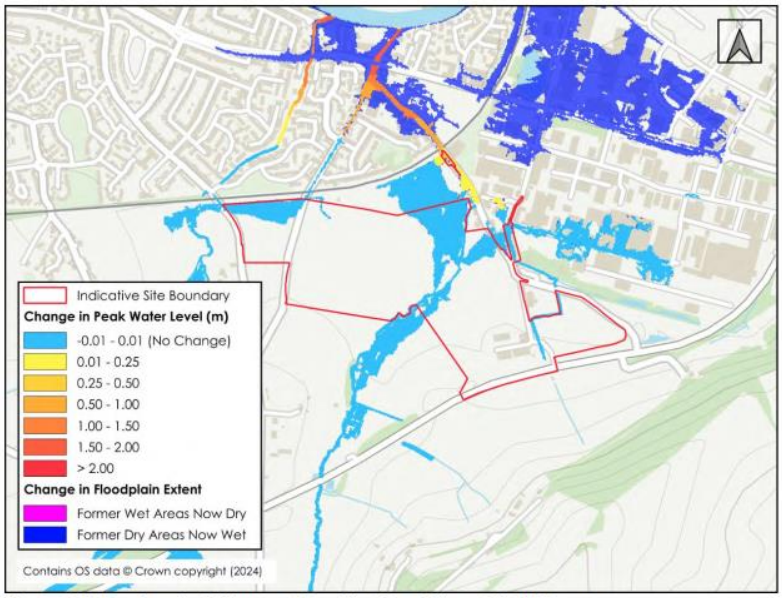
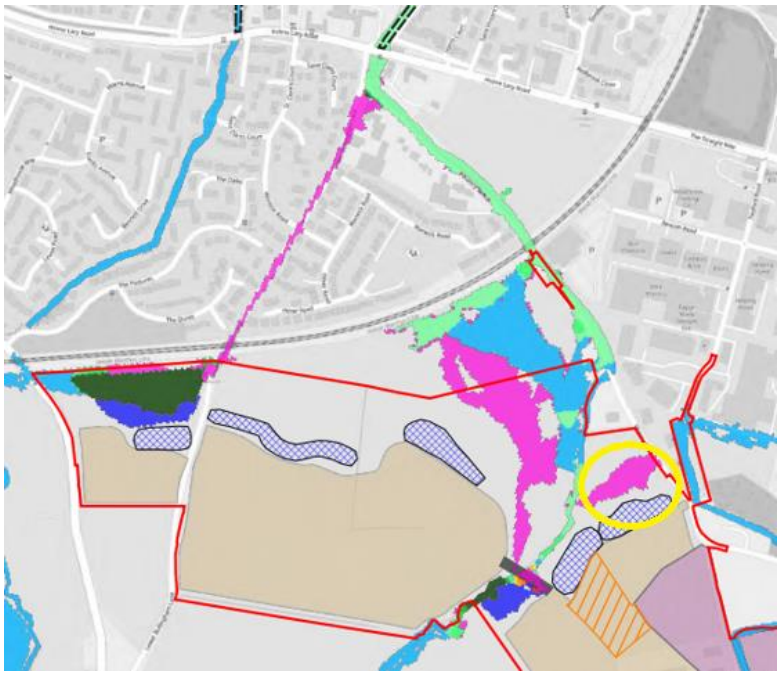


Figure 4.5: Backwater Influence from the River Wye – 1 in 100-year

The modelling results show flow spilling from the right bank of the Red Brook but only in acute storms of 50 year return (the 30 year plots do not show this route).



Ordinary Watercourses Impact Analysis - 50 year

Ordinary Watercourses with River Wye 30 year

We note the proposals for a new access bridge (with a 450mm dia overflow) that would throttle flows on the Red Brook, with the intent of attenuating water in Flood Compensation Location 2. We respect that the purpose of the compensation area is to facilitate construction of the bridge within Flood Zone 3. However, it is clear from a review of the flood storage table that most of the storage volume is low down and so would be flooded mid-way through a storm. Whilst the developer is offering additional storage, due to the forementioned issue there may be a limited impact on downstream flood risk.

Conversely, the Impact Analysis plots show marginal reductions in flood depth on Watery Lane in all flood events. All results are similar, but there is no explanation as to why these benefits arise in small events.

The mapping does specifically show the difference in flood depth as between 50mm and 25mm. if there are any benefits then they have been proven to be marginal in scale.

The FRA states (Page iv) :-

> ‘Hydraulic modelling of the proposed development has shown that it could potentially offer marginal betterment to downstream flood risk through throttling of flows at the proposed Red Brook crossing in combination with the floodplain compensation areas. However, due to the influence of the River Wye, and the majority of the contributing flood flows being generated from land outside of the site, it is not possible to offer substantial betterment.’

Core Strategy SD3 advises : -

> ‘where flooding is identified as an issue, new development should reduce flood risk through the inclusion of flood storage compensation measures, or provide similar betterment to enhance the local flood risk regime ‘

As referenced above, there is scope for the developer to work with Herefordshire Council to facilitate improved access to routes affected by flooding.

Floodplain Compensation

Appendix 7 of the FRA includes an assessment of Flood Plain compensation. We request that these assessment calculations are not only based on high intensity storms. It is necessary to assess the storage areas in accordance with Flood Zone 3b criteria (30 year storm).

We note that the EA have requested the provision of flood risk improvement works within the Country Park. We understand that the ground near the watercourse is sloped, which may limit the extent of any ground lowering. This issue needs to be further considered by the applicant, by means of fluvial modelling .

The Hereford Integrated Catchment Study commissioned by Herefordshire Council in 2019 considered options to reduce fluvial flood risk associated with the Withy, Norton and Red Brooks. The study highlighted the potential opportunities that could be delivered by the Lower Bullingham site to

reduce and slow flood flows through the Red Brook and Withy Brook, for example by incorporating Natural Flood Management (NFM) measures such as leaky dams, enhancing the natural floodplain adjacent to these watercourses, or providing online or offline flood storage features.

Notwithstanding this, any measures need to be considered to not increase the risk of the Norton Brook flooding the B4399 carriageway.

We recommend that opportunities are explored further as part of the Lower Bullingham development, noting that this recommendation aligns well with Policy HD6 of the Core Strategy that discusses the provision of green infrastructure corridors and strategic greenways along Red Brook and Norton Brook.

Property Thresholds

Planning Practice Guidance to NPPF identifies five classifications of flood risk vulnerability and provides recommendations on the compatibility of each vulnerability classification within each of the Flood Zones, as shown in Table 1:

Table 1: Flood risk vulnerability and flood zone compatibility

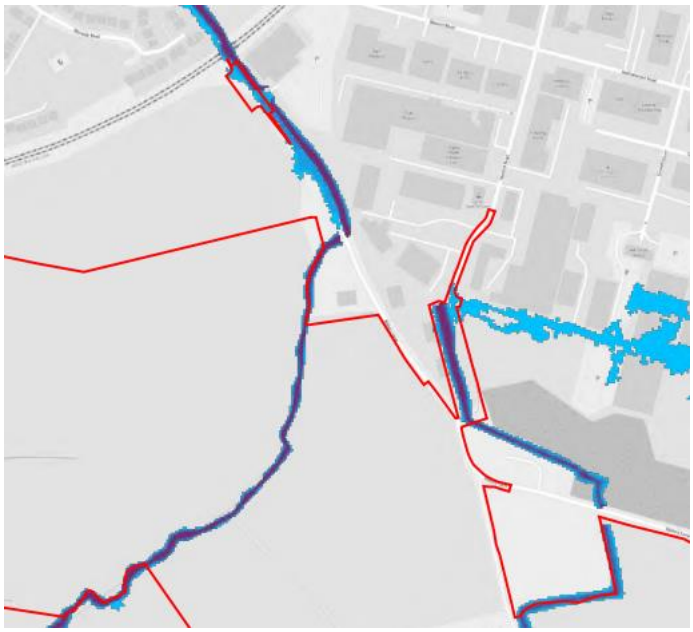
EA Flood Zone	**Essential Infrastructure**	**Water Compatible**	**Highly Vulnerable**	**More vulnerable**	**Less vulnerable**
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	✓	Exception test required	✓	✓
Zone 3a	Exception test required	✓	×	Exception test required	✓
Zone 3b	Exception test required	✓	×	×	×
✓ Development considered acceptable × Development considered unacceptable					

The Planning Practice Guidance to NPPF states that residential development is to be considered as 'more vulnerable' development. With reference to Table 1, 'more vulnerable' development would be considered appropriate in Flood Zones 1 and 2. However, for 'more vulnerable' development in Flood Zone 3a the Exception Test would need to be passed. No development would be considered acceptable in the functional floodplain Flood Zone 3b.

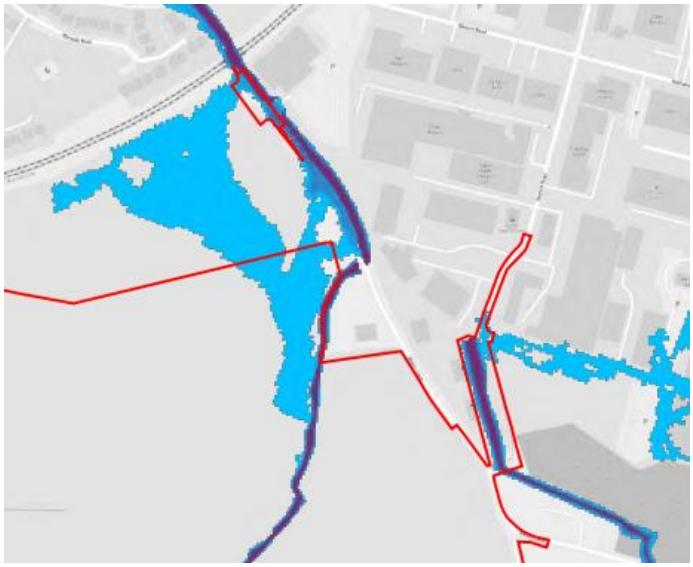
Finished floor levels will need to be raised to protect the proposed development against flood risk. Typically, this would be 0.3m above adjacent ground levels and / or 0.6m above the 1 in 100 year + 37% central Climate Change flood level and allowing for the potential effects of climate change (as advised in the NPPF), whichever is greater. We concur with commentary provided by the EA regarding this issue, noting the request that wherever possible a 600mm threshold should be provided to Less Vulnerable development (although following further engagement it may in some cases be possible to reduce this and provide a 300mm threshold plus flood resilient measures for a further 300mm).

We have reviewed the FRA and have the following comments

Modelling assumptions



Ordinary Watercourses and River Wye – Baseline 5 year

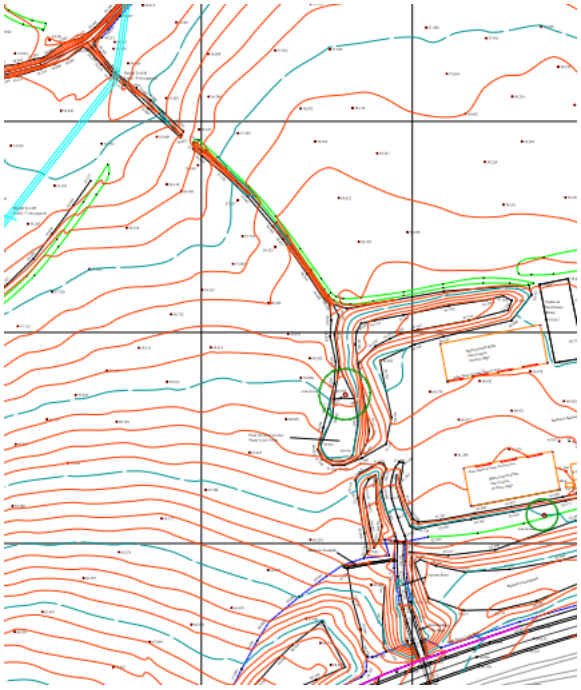


Ordinary Watercourses and River Wye – Baseline 30 year

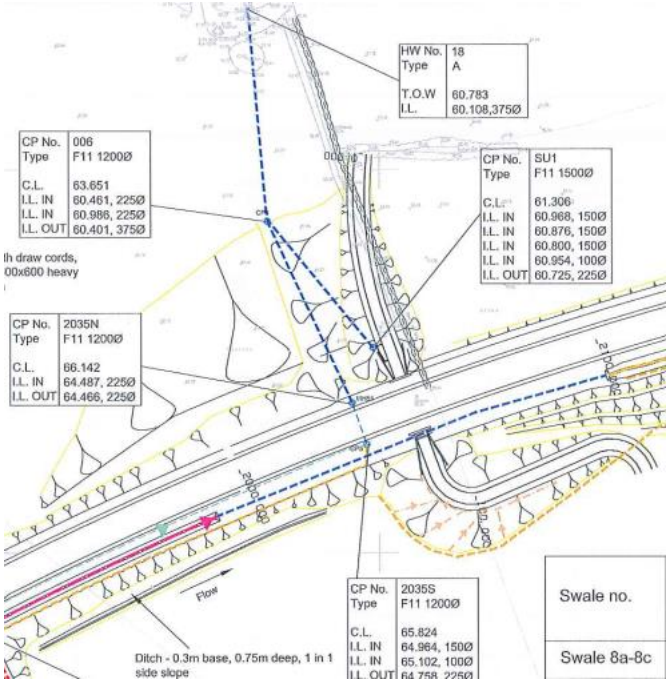
The Red Brook can cause flooding issues in the vicinity of this area of the Rotherwas Industrial Estate, most likely in storms more intense that 5 years

Please clarify which cross sections of the watercourse were surveyed in this area. The ditch from the scrap yard discharges into the Red Brook via a series of culverts (below the Caravan Park and then below an industrial premises). Section 2.2 refers to the un-named ditch discharging in the Red Brook. However, it appears that the model shows water from the scrap yard ditch discharging across the surface, to the east. Accordingly, there would be less flow in the Red Brook.

Land Drainage

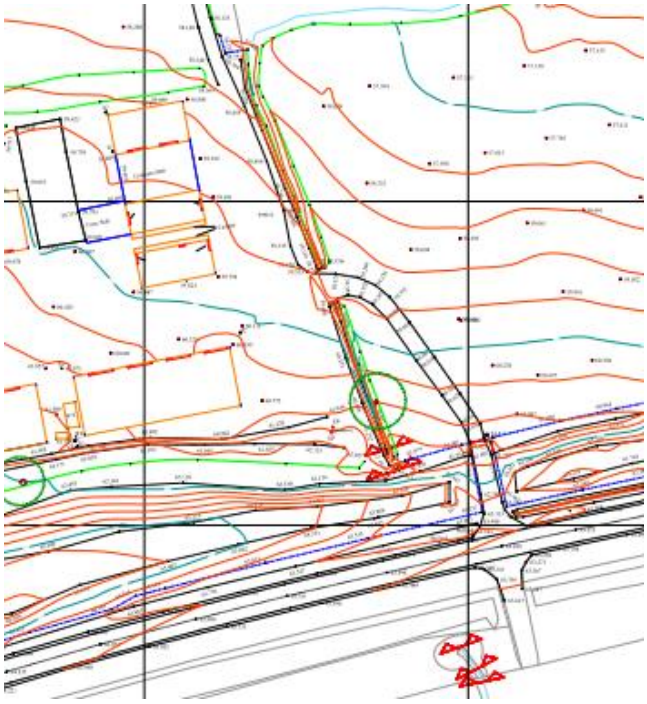


Topographical Survey showing existing ditch discharging into Red Brook

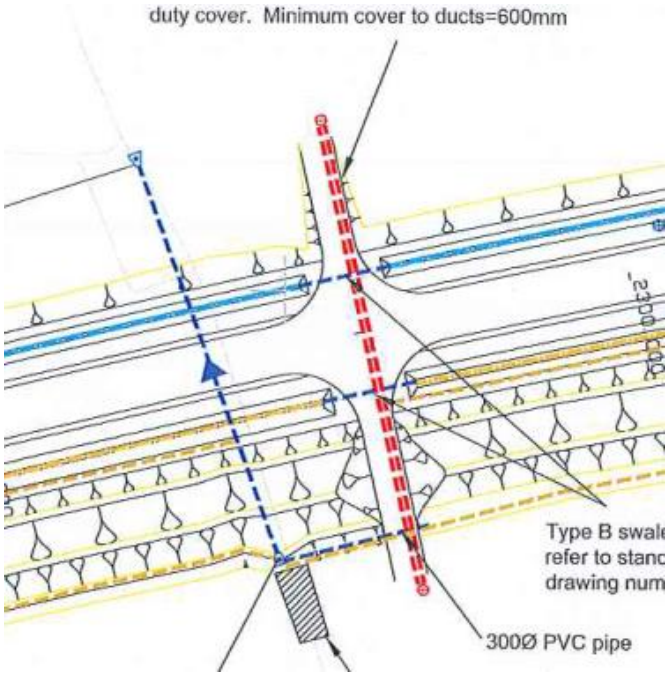


B4399 design drawing showing highway drains

The masterplan does not include provision for the land drainage referenced above.



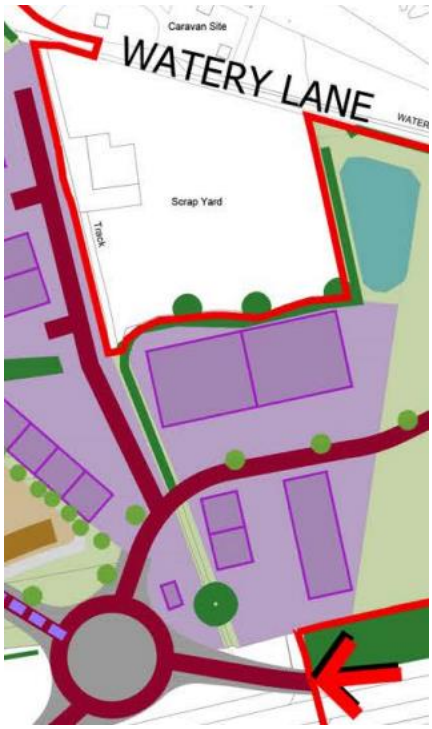
Topographical Survey showing existing ditch



B4399 design drawing showing existing culvert

The Illustrative Floodplain Management Strategy does not include for a new culvert below the diverted B4399. We assume that the applicant would seek to extend the existing highway culvert. However, the culvert would become close to an urbanised area, so would require redesign in accordance with the Culvert Design guide. There are no details, there could be ecological issues to consider. It would be impractical to de-culvert a short section on the south side because there is an existing swale there which forms a part of the highway SuDS.

A strategy for conveying this land drainage below the new B4399 would need to be addressed at Reserved Matters stage.



The Conceptual Drainage Strategy drawing does not show the watercourse/ditch that runs anticlockwise around the scrap yard. This is however referred to as a watercourse on the Illustrative Floodplain Management Strategy.

The ditch/watercourse would need to run as open channel alongside the proposed new service road. It is not shown as an open watercourse at the south of the extract below, although the green infrastructure plan does show an open watercourse. We request clarity on this issue, noting that there would be no vehicular access to the area alongside the roundabout.

Design of new highway culvert

We note that the proposed highway would be located above the 1000 year flood zone. This is broadly similar to the 100 year higher central climate change projection, which is acceptable.

Owing to the pipe size the secondary 450mm diameter culvert below the proposed Red Brook highway crossing would need to be designed in accordance with the Culvert Design Guide. There would be a risk of personnel entry which could require the provision of security screens. The screens would blind with debris and if the road became adopted then regular cleansing would be required. The performance of the 450mm diameter culvert during floods would be adversely impacted by the presence of the screens.

The proposed 450mm dia culvert crossing could also become a habitat for animals, as it will not carry a baseflow.

A mammal pass may be needed on the main culvert.

Further design will be needed at outline stage to present a solution that does not require security screens.

Surface Water Flood Risk

The FRA includes a recommendation that building thresholds will be raised a minimum of 150mm to mitigate the risk of surface water flooding. Noting the requirements of the Building Regulations Part M, we request clarification from the developer as to whether this approach will be implemented.

Surface Water Drainage

Layout

Surface water from the proposed roundabout and spine road is shown draining into the site. If the highways are to be adopted, then this presents a problem because current HC policy is that highway drains should discharge to HC assets. A revised design will be needed that allows for adoption to proceed.

Levels need to be shown on the drawings. Our initial assessment is based on a cursory review, further information to support the proposed design is needed, particularly levels on drawings including the topographical base mapping.

The drawings do not indicate how the respective basins operate. Although microdrainage simulations have been provided, we are unclear where the base of the respective basins sit compared to the adjacent ditches.

Table 3.2 – There is no plan showing which the numbers of the basins/catchments. It is unclear how the flow controls work in tandem. Several of the basins are listed together. We assume, for example that the water level in basins 1 and 2 would be the same, with one flow control at basin 2. Please also provide a cross section showing the respective levels of the basins.

There is an open ditch shown. Please clarify whether there are any proposals for access points for pedestrians and maintenance vehicles. We also note that there are no pedestrian crossing points proposed on the Red Brook.

We note that this ditch crosses different levels of land, accordingly in order to create a steady profile the width of the banks will vary. The full width of the ditch needs to be considered, so that maintenance issues can be reviewed at an early stage.

We understand that Flood Compensation Location 1 would fill only in an acute Wye flood. In such an event, water arising from the Wye floodplain would back up this ditch. It would be important to control bank levels so that Flood Compensation Location 1 filled and emptied as the designer intended. Please clarify the extent and level of Flood Compensation Location 1 with respect to this ditch.

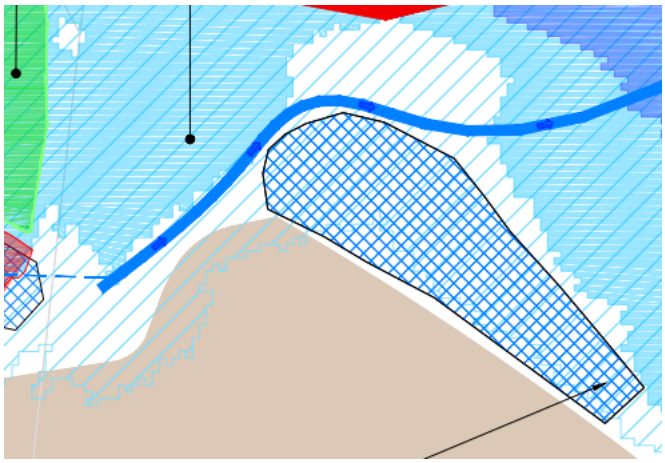
The EA have passed comment regarding the location of Flood Compensation Location 1, however our understanding is that this is not in the functional flood plain 3B.

The SuDS are designed as Green SuDS which is welcomed. The WFD Scoping Report recommends the provision of “appropriate surface water storage and treatment features at the construction and operation stages”. However, the SuDS Drainage Statement advises that the drainage system should be designed in accordance with the Design and Construction Guidance (DCG) and put forwards for adoption by Welsh Water. The presence of the open ditch would render the upstream network as unadoptable, unless a statutory authority was to maintain it.

Drawings are needed to demonstrate that there is adequate space to build the raised bunds whilst providing the proposed attenuation volume. The overflow on balancing ponds is normally installed 300mm above the 100 year Central CC Projection (30%), as referenced in the drainage strategy. The proposed ponds appear to have indicative side slopes to meet existing ground elevations. Pond side

slopes should be considered given close proximity of the flood compensation areas to the ponds and the displacement of floodplain in some locations.

The proposed ditch alongside this basin would need to be routed away from the flood zone but also away from the edge of the embankment. It needs to be possible to maintain the ditch safely. Please clarify the depth of this ditch and provide a cross section.



We reiterate comments made under 194402 which we understand have been broadly followed in the design :

> 'the invert of the attenuation basins will be at or above the 100 year fluvial flood level of the receiving watercourse….we also stress that it is expected that outfalls to watercourses are made c.300mm above bed level to prevent siltation/blockage of the outfall, and that further raising of the basin invert may be required to facilitate an appropriate connection.'

<u>The use of soakaways</u>

Under planning application 194402, only four soakaway tests were completed. The original Sustainable Drainage report advised that the "Investigation of the western parcel is not currently available, the report assumes that the observations made of the Eastern parcel will be applicable to the wider site."

Following the 194402 submission we reviewed the trial pit information and noted that there are areas of the site where soakaways may work. Clearly the presence of clay below much of the site may hinder this approach, but this needs to be properly considered as part of the reserved matters submission.

Section 4.32 of the FRA :-

> 'The BGS holds historical records of borehole samples across the UK which include measurements of groundwater levels taken during the sample. These are measurements taken at one point in space and time and are not a substitute for a long-term record of groundwater levels. However, they can provide an indication of groundwater levels that could potentially be experienced. There is one borehole record available in the site, located in the Alluvium Deposits of Parcel 1 (reference: SO53NW179). The borehole was taken in 2021 and reports a groundwater strike at 3.9m Below Ground Level (bgl).'

Section 6.3 of the FRA :-

> 'It is recommended that groundwater monitoring is undertaken to confirm the potential seasonal variations in the water table across the site. The presence of the shallow groundwater levels should be considered in the design of the earthworks, foundations, and below ground infrastructure.'

The outline design can be based on a viable strategy utilising attenuation, but it is possible that some shallow infiltration features may work. This needs to be addressed at Reserved Matters, but groundwater monitoring should be implemented to capture sufficient field data.

The provision of groundwater monitoring data will also inform the basin design, noting that springs may be created or the base may become boggy.

Parameters

A 6 hour storm was used for the outline design. It is possible that the critical storm could be different. A full assessment will be required at Reserved Matters stage to identify the critical storm in order to ensure that adequate space is provided for the basins.

The Drainage Strategy confirms the intent to utilise the 30% central Climate Change and 45% upper Climate Change predictions. All the calculations presented to date are based on the central figure.

Given the scale of development and because variable flow controls are proposed we request that the 30 year and 50 year attenuation designs are also designed with the central Climate Change prediction.

We note that in section 3.2 it has been assumed that the site will have 55% impermeable areas (it would appear that the calculations assume 65% IA with 6% urban creep, please clarify). The proposed basins are often downstream of landscaped areas, please clarify how these areas will drain.

Variable Flow Controls

The designers have presented proposals for variable flow controls. These utilise floats to facilitate changes to the orifice. Please present details.

We note the proposals in Table 3.2 to seek to replicate greenfield runoff rates for different storms. At Catchments 8 and 9 flow rates are low, it may be impractical to achieve the proposed low rates.

The ongong performance of the hydroslide hydrobrakes is critical to the performance of the SuDS. Please explain which party would be responsible for visiting the flow controls and checking their performance. Under the CDM Regulations all activities that present risks to operatives are to be avoided where necessary. Accordingly, a confined space entry would need to be arranged, with respective risk assessment completed each time an inspection was required. On this basis the designer should be considering reducing the need for an inspection to prove that the hydroslide is operational, by considering a design that utilises two or more flow controls mounted at different heights.

Exceedance Flows

There is no commentary on how drainage exceedance (overland flood flow) routes through the development may be provided. Normally site roads are used to divert water towards the above ground detention basins for events in excess of the capacity of the drainage system. Runoff can be temporarily retained in low vulnerability areas such as car parks. We await clarity on this issue. A plan of the proposed exceedance flow routes will need to be provided.

Basin serving catchment 8

Insufficient space has been provided for future ditch maintenance. The basin appears to be too close to the scrap yard.

Surface water flooding frequently occurs on Watery Lane at the north eastern corner of the scrap yard. It is likely that the existing highway culvert is too small. The water on the carriageway could impede the performance of the hydrobrake unless it is raised up. The pond base would need to be raised up (insufficient space appears to have been allocated).

Foul Water Drainage

Foul sewerage would be facilitated by means of a pumping station, utilising a rising main. The route of the rising main is shown along part of the B4339. We request that this is installed using no-dig techniques due to the risk of damaging the B4399 green SuDS.

Overall Comment

HOLDING OBJECTION

The above commentary includes a series of issues that will need to be addressed by the applicant

Emergency Planning will need to review our commentary and pass comment on the access issues