

Our ref: 100148-PEF-ZZ-XX-RP-YE-000400
Planning Ref: BN/11/22/OUT
EA Ref: HA/2022/123981/01-L01

Arun District Council
Development Control

Issued Electronically

05th October 2022

To whom it may concern

BARNHAM EASTERGATE WESTERGATE – RESPONSE TO ENVIRONMENT AGENCY’S HOLDING OBJECTION IN RELATION TO FLOOD RISK ISSUES

I am writing in response to the Environment Agency’s holding objection to the planning application on flood risk grounds (reference above, dated 28 March 2022). The aim of this note is to provide a written response to the specific points raised by the Environment Agency to allow approval of the scheme in flood risk terms.

A Flood Risk Assessment prepared by Pell Frischmann (report ref: 100148-PEF-ZZ-XX-RP-YE-000020-S2-P03 dated 11/01/2022) was submitted alongside the planning application and should be read in conjunction with this note and will be cross-referenced throughout as appropriate.

The Environment Agency holding objection outlines two matters to be addressed as follows:

- Take the impacts of Climate Change into account
- Outline Floodplain Compensation related to the Lidsey Rife Bridge

Each item is then subdivided into key themes that will be addressed below. We have made several attempts to contact the Environment Agency since receiving the comments to discuss and agree these principles, but nevertheless have provided this response to the points raised as no response has been received.

We consider that this response fully addressed the EA’s comments and would be grateful for confirmation of this at the earliest opportunity.

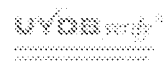
Climate Change Considerations

The EA’s response states that “...we would need to see reference to the latest Climate Change allowances...and their potential impact on the 200m multi-span Lidsey Rife Bridge option at multiple points.”

To clarify, the submitted Flood Risk Assessment provides an analysis of the most up to date climate change allowances as part of the assessment, notably through sections 4.2.3 to 4.2.17. This assesses the risk to the site, proposed development and preferred Lidsey Rife bridge crossing using

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these latest allowances in line with the prevailing guidance. Furthermore, since the submission of the Flood Risk Assessment, the Planning Practice Guidance in relation to 'Flood risk and coastal change' has been updated (as of August 2022). One notable change relates to the definition of Flood Zone 3b (Functional Floodplain), which remains as "...land where water from rivers or the sea has to flow or be stored in times of flood." Previously this related to the 1 in 20 year (5% annual probability) event, whilst the latest guidance defines the Flood Zone 3b event as "...land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively". This would typically result in increasing flood extents as they relate to a more severe, less frequent flood event, and these Flood Zone extents should be defined by the LPA as part of their Strategic Flood Risk Assessment. As the proposed development extents have been defined throughout the process from framework masterplan to planning application considering the published Flood Zone 3a extents, an increase in functional floodplain would have no detrimental impact on the built development. Soffit levels of the proposed Lidsey Rife bridge crossing have also been designed with a suitable freeboard above the modelled 1% annual probability event, including an appropriate allowance for climate change.

As part of the FRA, Appendix 3 included the 'A29 Crossing of Lidsey Rife: Flood Risk Technical Note'. This included hydraulic modelling of the preferred bridge crossing (30m span) using climate change allowances from the previous guidance, which applied a 105% increase in the peak river flows.

In response to the Environment Agency's comment, the analysis has been revised to take into account the latest climate change allowances, which suggests for such schemes the higher central allowance should be used. For the Arun and Western Streams management catchment this equates to a 36% increase in peak river flows to the 1% annual probability design event. The Environment Agency model included hydrology for the 35% increase event, which has been used to assess the proposals in line with these updated allowances. Results are appended to this letter for reference.

This demonstrates that with the bridge embankments in place, there is a minor increase in peak flood depth within the corresponding flood cell, which extends from the railway to the north to the canal towpath to the south (see drawing A11394-PEF-ZZ-XX-SK-YE-0804). These increases are in the order of 0.03m (30mm) within an area flooding to an average depth of 1.0-1.5m (see drawing A13394-PEF-ZZ-XX-SK-YE-0802), which in the context of the proposals is not considered a significant change to the floodplain.

Within the Lidsey Rife channel itself, water levels upstream of the proposed structure at cross section '1.013!!' (refer to drawing A11394-PEF-ZZ-XX-SK-YE-0806 for cross section locations) peak water levels increase by a maximum of 0.036m (36mm) although the average increase over the entire flood hydrograph is 0.007m (7mm). This is because levels at this section during the falling limb of the flood hydrograph are lower than the baseline event.

Further downstream, beyond the extent of the wider land ownership, water levels have been compared to understand the wider implications of the proposals. Section '1.008!!-4-1.007!!' is located downstream of the canal towpath crossing and reports nominal water level changes (+/- 3mm) that are considered well within model tolerance.

It can therefore be concluded that the proposals have no discernible impact on water levels downstream of the site. Any changes to water level are localised, within the local, well-defined flood cell. As discussed within the FRA, the main flood mechanism for this flood cell results from surcharging of the small, restrictive culvert under the former canal towpath, which water surcharges within the Rife and associated floodplain up to the railway crossing. Therefore, the proposed embankments do not impede key flood flow routes or affect conveyance within the floodplain.

The 'A29 Realignment – Lidsey Rife Bridge Options' Technical Note (document ref: 13394-PEF-XX-BR-RP-S-000002) prepared by Pell Frischmann outlines an option of a multi-span bridge in section

4.1.3. An option for a multi-span bridge to bridge the entire floodplain and defined valley of the Lidsey Rife was considered and discounted, because:

- Approximately 7 piers, plus abutments at either end of the bridge would be required and would not be perpendicular to the predominant flow direction, which can disrupt flows and increase the risk of blockage. The road alignment cannot be amended due to the design speeds of the road that requires minimum radii for curves, coupled with the constraints on the alignment as it passes over the Lidsey Rife, then heads south over the access to the treatment works and other facilities.
- Maintenance constraints in terms of accessibility for inspections and the introduction of increased points of vulnerability and degradation at expansion joints between the bridge sections.
- It increases the intrusive piling and foundation works needed to construct the additional piers, which in an area with known elevated groundwater could cause additional works in terms of dewatering of excavations and/or introduce potential pathways for surface contaminants and pollutants to enter groundwater receptors.

Overall, due to the introduction of a number of additional locations vulnerable to degradation, increased difficulty in inspection, heightened vulnerability to structural damage and anticipated cost of the structure, means this design was discounted as an unviable option.

Nevertheless, hydraulic modelling has been carried out of the design event to understand the flood risk implications of such a structure. When including the location and number of piers recommended as part of the Bridge Options report this results in a change to the 2D mesh within the hydraulic model that means direct comparison of the 2D results is inappropriate. A drawing has been prepared (A1994-PEF-ZZ-XX-SK-YE-0805) that shows spurious changes to peak water levels throughout the domain that are unlikely to be caused as a result of the bridge piers. However, comparing the in-channel levels as before shows a nominal increase in water level upstream of the structure of 0.005m (5mm) and similar changes in the order of +/-4mm downstream of the site to the embankment option.

Whilst the multi-span option with piers results in smaller changes to the peak flood depths, it is not considered a substantial enough betterment to the existing flood situation to warrant its preference over the embankment option due to the associated disadvantages of the design approach. With the piers set skewed to the preferential flow direction, the possibility of blockage and structural damage is increased and does not warrant progression of a solution that would be more susceptible to damage, and potentially be unviable from a cost perspective.

Therefore, it is considered that these points of the current objection have been addressed.

Floodplain Compensation

The second matter raised as part of the objection relates to the provision of floodplain compensation related to the Lidsey Rife bridge.

The first matter relates to provision of compensatory floodplain on a level-for-level basis in areas out of the current floodplain where floodplain volume is lost as a result of the bridge. This is technically difficult to achieve in this particular area of the Lidsey Rife floodplain given the existing topography and would require a disproportionate scale of earthworks movements that would be unsustainable (due to the number of vehicle movements and volume of material that would need to be excavated and relaid) and uneconomical.

Rather, the submitted hydraulic modelling based on the 35% increase in peak river flows has demonstrated a modest increase in peak flood levels in the immediate vicinity. For areas beyond the applicants control downstream of the proposed crossing, flood levels showed a nominal decrease.

Therefore, it is concluded that floodplain compensation is not required in this case, as the crossing shows a nominal increase in flood depths within an existing floodplain that would remain as landscaping. Provision of floodplain compensation measures are considered unsustainable in this case and not proportionate to the scale of change in risk posed because of the works. As per paragraph 049 of the Planning Practice Guidance on 'Flood risk and coastal change' (2022), this note and the submitted FRA detail the extent and nature of flood risk increases where floodplain compensation cannot be provided. It is then a decision for the Local Planning Authority to determine whether the multiple benefits offered by the scheme outweigh the increase in an existing, established floodplain.

On matters relating to the multi-span bridge and approach embankments outside of the floodplain, this solution is not technically or economically viable as discussed above and so is not possible to provide.

The hydraulic modelling has been reviewed in relation to the proposed bridge option and presented here. We have made several attempts to contact the Environment Agency to discuss various matters and seek an appropriate way to submit these files so would welcome any feedback as necessary.

On matters related to the attenuation basin near Flood Zone 2, the Lead Local Flood Authority (both Arun District Council and West Sussex County Council) have reviewed the application in their role as the lead technical advisors on surface water drainage matters and provided their approval to the presented surface water drainage strategy. Within their response, and the submitted drainage documentation it is noted that this is an outline application and drainage matters are to be refined as part of reserved matters applications for each parcel of development. The exact location and position of the attenuation basin can be agreed at that stage.

Therefore, this additional information confirms that the FRA has been completed in line with the latest guidance on climate change as issued in both the 'Flood risk assessment: climate change allowances' guidance by the Environment Agency and follows the updated guidance of the Planning Practice Guidance on 'Flood risk and coastal change' updated in August 2022 that was issued following the submission of the FRA accompanying the planning application.

We trust this provides a satisfactory response to the matters raised by the Environment Agency such that their holding objection can be removed. We would welcome a meeting with the Environment Agency and Arun planning officers to discuss this further.

Yours sincerely
On behalf of **Pell Frischmann**

Daniel Allum-Rooney
Drainage & Flood Risk Technical Director

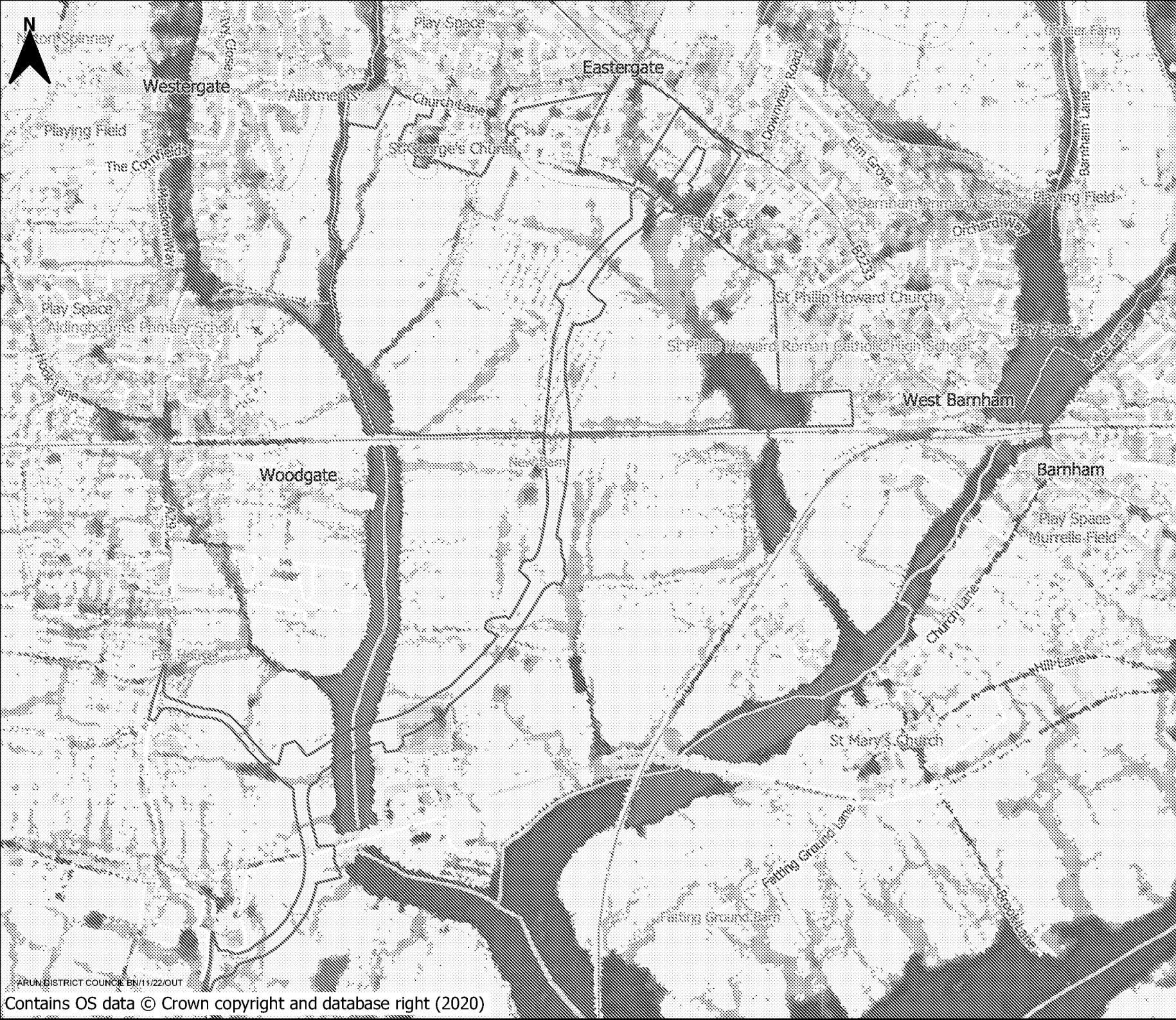
Enc.

Water Depth Baseline 1%AEP +35% Climate Change map, drawing ref: A13394-PEF-ZZ-XX-SK-YE-0801

Water Depth Proposed Embankments 1%AEP +35% Climate Change map, drawing ref: A13394-PEF-ZZ-XX-SK-YE-0802

Water Depth Difference Embankments – Baseline 1%AEP +35% Climate Change map, drawing ref: A13394-PEF-ZZ-XX-SK-YE-0804

Water Depth Baseline 1%AEP +35% Climate Change map, drawing ref: A13394-PEF-ZZ-XX-SK-YE-0806



Pell Frischmann

BLOCK B, BLENHEIM COURT
86-88 MANSFIELD ROAD,
NOTTINGHAM, NG1 3HD

Legend

----- Site Boundary

Water Depth (m)

- <= 0
- 0 - 0.1
- 0.1-0.25
- 0.25-0.5
- 0.5-1
- 1-1.5
- 1.5-2
- 2-2.5
- >2.5

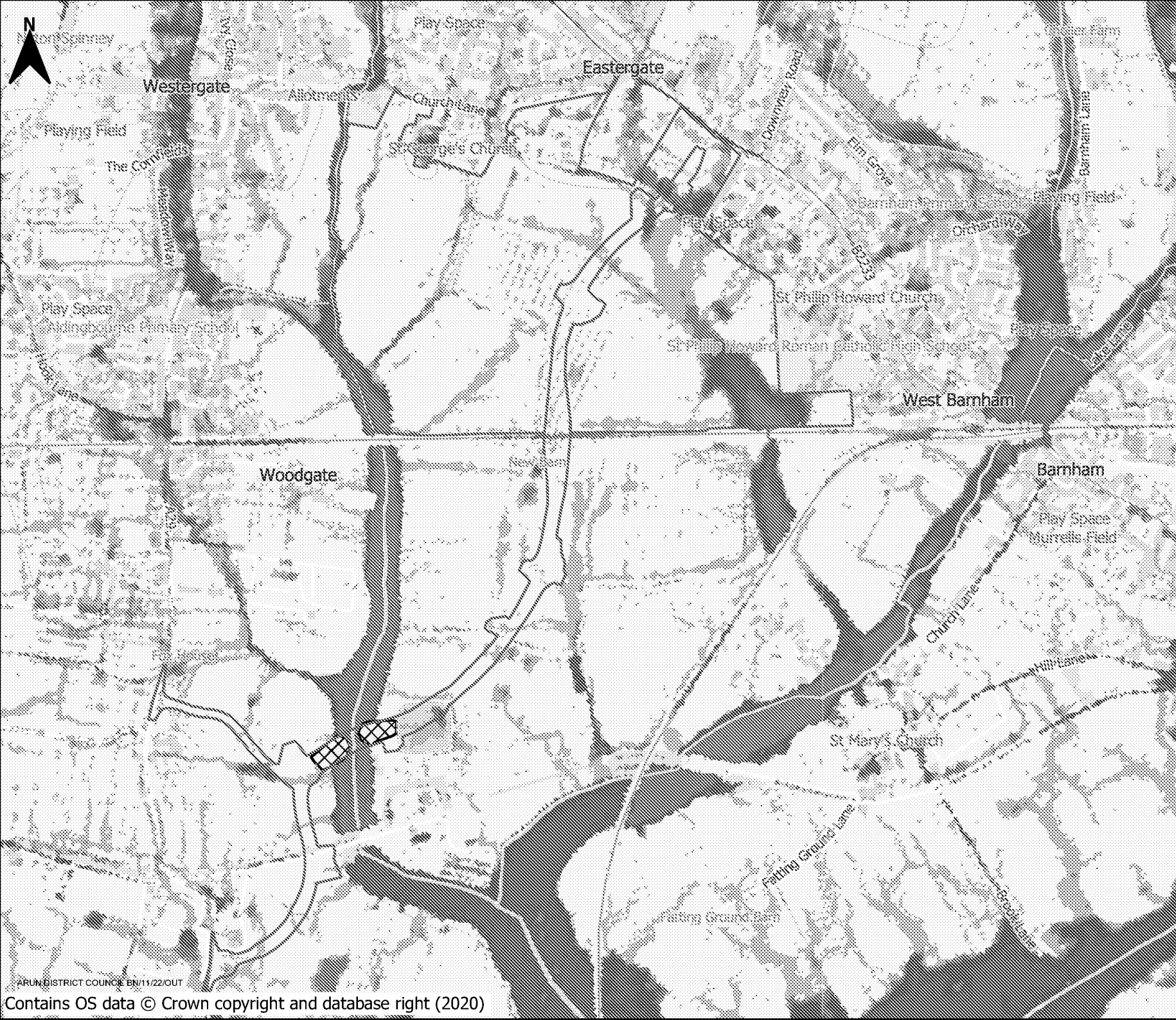
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Project Name:
Barnham Eastergate Westergate

SCALE 1:12500

Drawing Title:
WATER DEPTH BASELINE
1% AEP + 35% CLIMATE
CHANGE

Drawing Reference:
PROJECT-ORIGINATOR-VOLUME-LEVEL-TYPE-ROLE-NUMBER
A13394-PEF-ZZ-XX-SK-YE-0801



Pell Frischmann

BLOCK B. BLENHEIM COURT
86-88 MANSFIELD ROAD,
NOTTINGHAM, NG1 3HD

Legend

Site Boundary

Proposed Bridge Embankments

Water Depth (m)

<= 0

0 - 0.1

0.1-0.25

0.25-0.5

0.5-1

1-1.5

1.5-2

2-2.5

>2.5

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Project Name:

Barnham Eastergate Westergate

SCALE 1:12500

Drawing Title:

WATER DEPTH PROPOSED

EMBANKMENTS

1% AEP + 35% CLIMATE

Drawing Reference:

PROJECT-ORIGINATOR-VOLUME-LEVEL-TYPE-ROLE-NUMBER

A13394-PEF-ZZ-XX-SK-YE-0802



Pell Frischmann

BLOCK B, BLENHEIM COURT
86-88 MANSFIELD ROAD,
NOTTINGHAM, NG1 3HD

Legend

- Site Boundary
- Proposed Bridge Embankments
- Water Depth Difference
 - 0.0600
 - 0.0400
 - 0.0200
 - 0.0000
 - 0.0200
 - 0.0400
 - 0.0600

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Project Name:
Barnham Eastergate Westergate

SCALE 1:12500

Drawing Title:
WATER DEPTH DIFFERENCE
EMBANKMENTS - BASELINE
1% AEP + 35% CLIMATE

Drawing Reference:
PROJECT-ORIGINATOR-VOLUME-LEVEL-TYPE-ROLE-NUMBER
A13394-PEF-ZZ-XX-SK-YE-0804



Pell Frischmann	
BLOCK B, BLENHEIM COURT 86-88 MANSFIELD ROAD, NOTTINGHAM, NG1 3HD	
Legend	
	Site Boundary
	Location of cross sections for water level comparison between scenarios
	Area of floodplain where impact is analysed
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Project Name: Barnham Eastergate Westergate	
SCALE 1:12500	
Drawing Title: WATER DEPTH BASELINE 1%AEP + 35% CLIMATE CHANGE	
Drawing Reference: PROJECT-ORIGINATOR-VOLUME-LEVEL-TYPE-ROLE-NUMBER A13394-PEF-ZZ-XX-SK-YE-0806	