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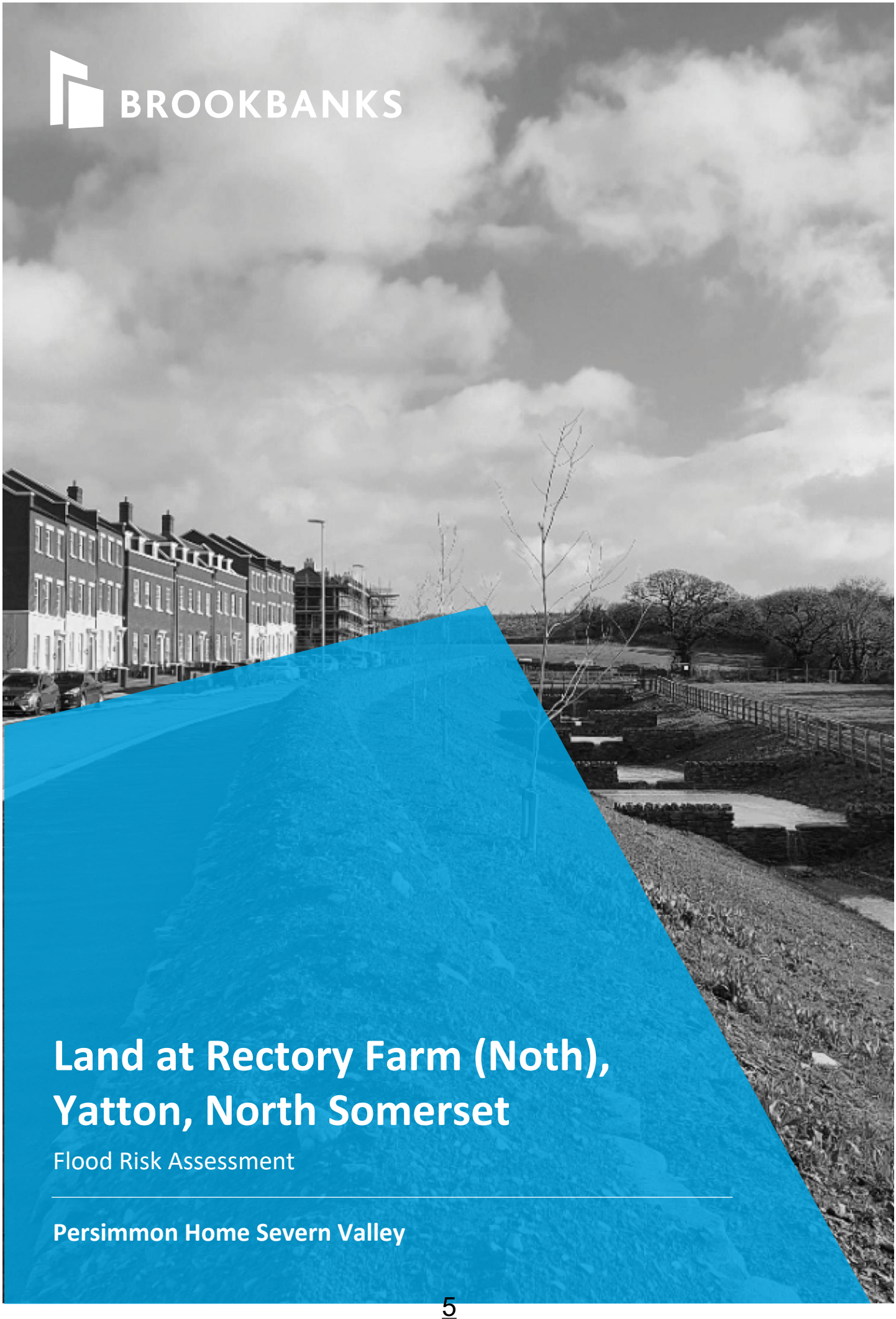

BROOKBANKS

Land at Rectory Farm (Noth), Yatton, North Somerset

Flood Risk Assessment

Persimmon Home Severn Valley

Document Control Sheet

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1 Introduction

1.1 Brookbanks is appointed by Persimmon Homes Severn Valley to complete a Flood Risk Assessment (FRA) for a residential development on Rectory Farm, Yatton, North Somerset (BS49 4EU).

1.2 The proposed development is to comprise of:

- Up to 190 dwellings, including 50% affordable homes;
- 0.13ha of land reserved for Class E uses, allotments, car parking, earthworks to facilitate sustainable drainage systems, open space and all other ancillary infrastructure and enabling works with means of access from Shiners Elms for consideration.

1.3 On November 14, 2022, a preliminary discussion occurred with North Somerset Lead Local Flood Authority. During this meeting, the conversation revolved around the flood risk posed to the site location and the broader Yatton region. It was ascertained that the primary risk factor in this vicinity stemmed from tidal influences, and this factor should take precedence when assessing potential development mitigation measures.

1.4 During the meeting it was also explained that there are currently two modelling studies available which include the site. The first of these is the Congresbury Yeo 2015 model. Whilst this model includes tidal downstream boundaries its primary function to model fluvial extents associated within the watercourse. The second model which covers the area is the Woodspring Bay 2020 model and this is a tidal model. Owing to the dominant source of flooding to the site being from tidal sources the LLFA stated that any assessment of risk should be based on the tidal Woodspring Bay model and particularly the impact of a complete failure of the existing defences (i.e. undefended scenario) and the impacts of the latest climate change allowances (policy has been updated since 2020).

1.5 Further to this a FRA was produced by Hydrock Consultants Limited (Ref 23257-HYD-XX-XX-RP-FR-000, dated March 2023) and submitted in support of the Outline Planning Application (Ref 23_P_0664_O). The Environment Agency (EA) and North Somerset Council (in their role as the Lead Local Flood Authority (LLFA)) provided comments and further hydraulic modelling was required in order to address these.

1.6 This document forms a FRA, to accord with current guidance and addresses national, regional and local policy requirements in demonstrating that the proposed development lies within the acceptable flood risk parameters. The objective of the study is to demonstrate the development proposals are acceptable from a flooding risk viewpoint whilst also ensuring the provides comments from both EA and LLFA are suitable addressed through further works.

1.7 This report summarises the findings of the study and specifically addresses the following issues in the context of the current legislative regime:

- Flooding risk
- Hydraulic Modelling

1.8 Local Planning Authorities are advised by the Government's National Planning Policy Framework (NPPF) to consult the EA and LLFA on development proposals in areas at risk of flooding. For a development of this nature the EA and LLFA normally require a Flood Risk Assessment to be submitted in support of such an application. The report has been prepared to consider the requirements of NPPF through:

- Assessing whether the proposed development is likely to be affected by flooding;
- Assessing whether the proposed development is appropriate in the suggested location; and,
- Detailing measures necessary to mitigate any flood risk identified, to ensure that the proposed development and occupants would be safe, and that flood risk would not be increased elsewhere.

1.9 The **National Planning Policy Framework** (NPPF), updated in July 2021, sets out Governmental Policy on a range of matters, including Development and Flood Risk. The policies were largely carried over from the former PPS25: Development & Flood Risk, albeit with certain simplification. The allocation of development sites and local planning authorities' development control decisions must be considered against a risk-based search sequence, as provided by the document.

1.10 Chapter 14: Meeting the challenge of climate change, flooding and coastal change of the NPPF reviews how new development should plan around flood risk and future climate change. Paragraph 161 states that:

All plans should apply a sequential, risk-based approach to the location of development – taking into account all sources of flood risk and the current and future impacts of climate change – so as to avoid, where possible, flood risk to people and property.

1.11 An assessment of the sites current flood risk and a review of the site in regards to the sequential test are reviewed in later chapters of this report.

1.12 The **National Planning Practice Guidance** (NPPG) flood risk and coastal change, updated August 2022, sets out tests that have been set out to protect people and property from flooding.

1.13 Allocation and planning of development must be considered against a risk-based search sequence, as provided by the NPPG. In terms of fluvial flooding, the guidance categorises flood zones in three principal levels of risk, as follows in **Table 1-1.**

Flood Zone	Annual Probability of Flooding
Zone 1: Low probability	< 0.1 %
Zone 2: Medium probability	0.1 – 1.0 %
Zone 3a / 3b: High probability	> 1.0 %

Table 1-1: NPPF Flood Risk Parameters

1.14 In accordance with the NPPG, residential development, being designated as "More Vulnerable" classifications, should lie outside the envelope of the predicted 1 in 100-year (1%) flood, with preference given to sites lying outside the 1 in 1,000 (0.1%) year events and within Flood Zone 1.

1.15 Sites with the potential to flood during a 1 in 100 (1%) year flood event (Flood Zone 3a) are not normally considered appropriate for proposed residential development unless on application of the "Sequential Test", the site is demonstrated to be the most appropriate for development and satisfactory flood mitigation can be provided. Additionally, proposed residential developments within Flood Zone 3a are required to pass the "Exception Test", the test being that:

- the development is to provide wider sustainability benefits.

- the development will be safe for its users for the development's lifetime and will not increase flood risk overall.

Planning Application

1.16 This FRA has been produced to address EA and LLFA comments that have been provided as part of an ongoing Outline Planning submission (Ref:23/P/0664/OUT) as is to supersede the FRA (Ref: 23257-HYD-XX-XX-RP-FR-0002, prepared by Hydrock Consultants Limited on 20 03 2023) that previously support the application. in order to provide information for an outline planning application.

2 Site Context

2.1 The proposed development lies on Rectory Farm, Chescombe Road, Yatton.

2.2 The site is bound to the north by agricultural fields, to the west by disused railway line, Strawberry Line, to the south by Rectory Farm buildings and agricultural fields and to the west by existing residential area.

2.3 The site falls within the drainage catchment of the River Yeo (also known as Congresbury Yeo and referred to within this report as such). There are several drainage features / rhynes flowing through the site and in the surrounding area to the west and south. The rhynes within the site and the subject area fall under the North Somerset Levels Internal Drainage Board's (IDBs) Management.

2.4 Online mapping indicates five named rhynes either within the site boundary or connected to the site, these are: Cookes Rhyne, Williams Rhyne, Branch Rhyne East, Branch Rhyne and Biddlestreet Rhyne (see Figure 1). The rhyne network drains to the Congresbury Yeo located approximately 800m west of the site, flowing in a general north westerly direction towards Woodspring Bay and the Bristol Channel, a further 5.5km downstream.

2.5 The majority of the site is predominately undeveloped agricultural land, apart from the existing Poultry House in the south that is associated with Rectory Farm. The land is not thought to have been historically subject to any significant built development.

2.6 The site location and boundary is shown indicatively on **Figure 2-1**.

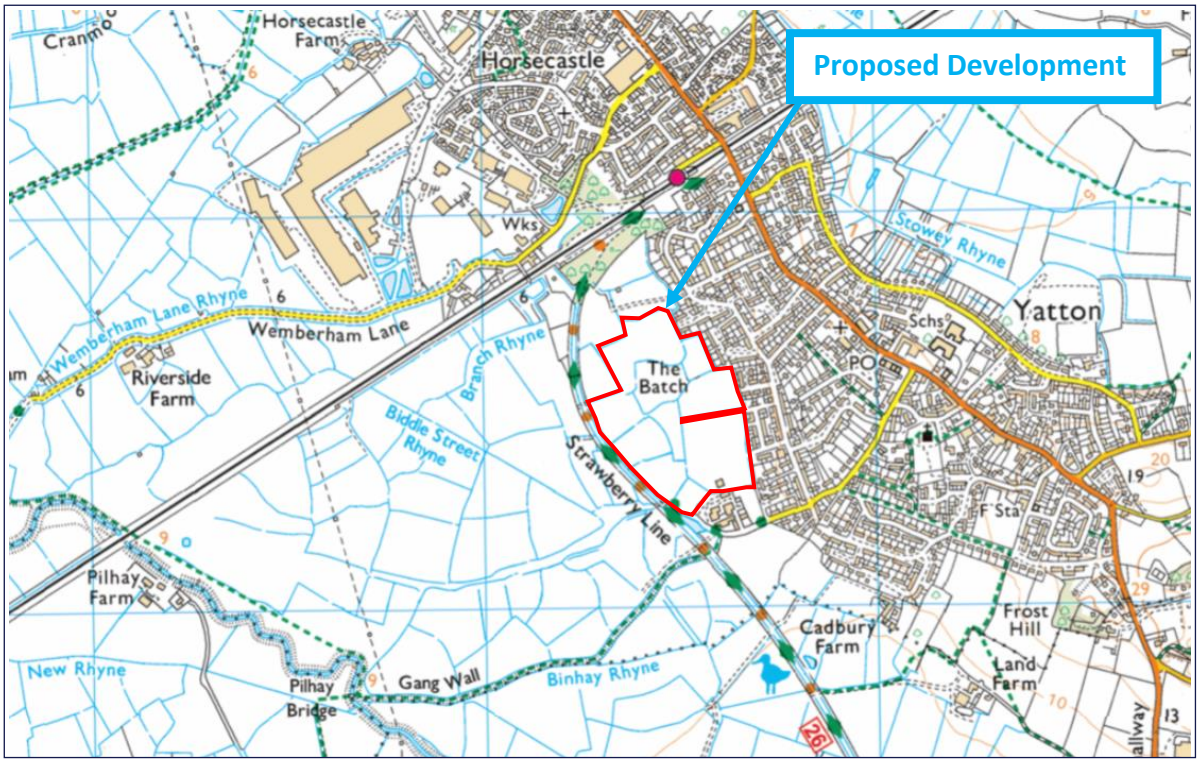

Figure 2-1: Site Location (Bing Maps, 2023)

3 Baseline Conditions

Present Day

3.1 The proposed development site is located within the River Yeo drainage catchment. The site comprises of a number of drainage, including Rhynes, these Rhynes are designated under the North Somerset Levels Internal Drainage Board's (IDBs) Management.

3.2 **Figure 3-1** below illustrates the site at present.

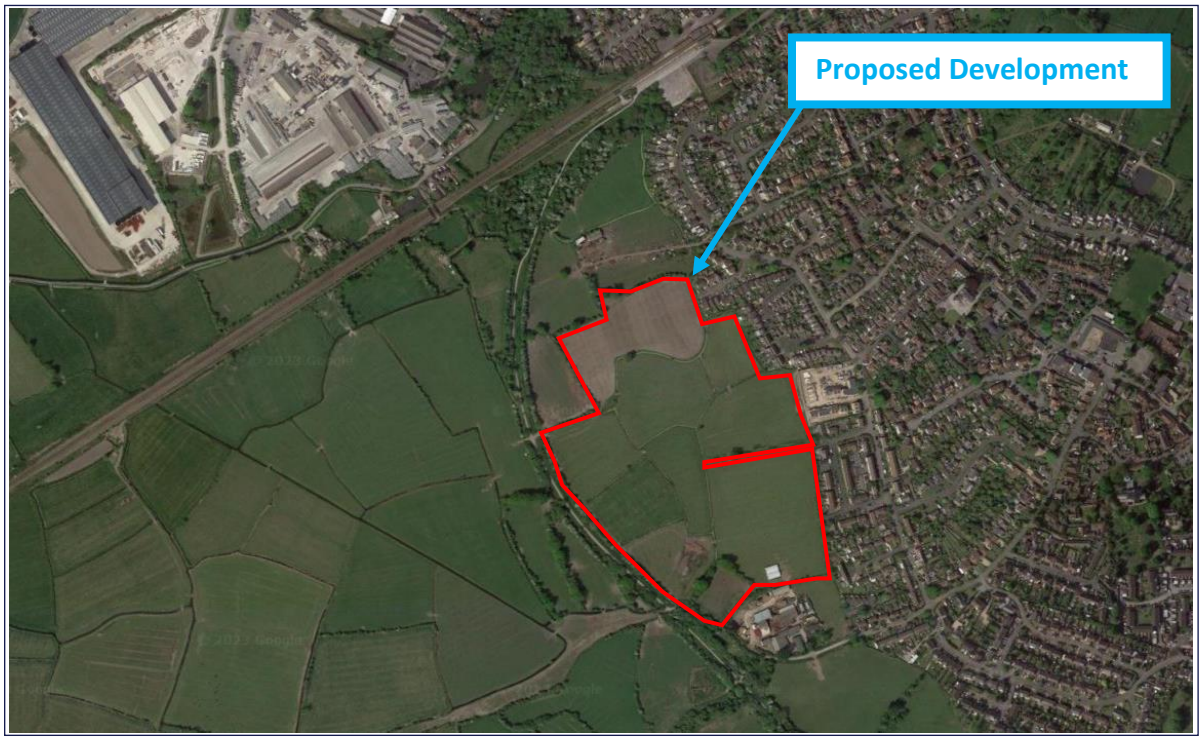

Figure 3-1: Site Location (Bing Maps, 2023)

Topography & Site Survey

3.3 A detailed topographical survey of the site was completed in October 2022. The proposed development site covers circa 13.8ha and is separated into nine land parcels by the Rhye hydrological network. A review of the survey indicates that the topography across the site is characterised by no clear gradients. Levels fall from a high point of circa 5.5m AOD, to a low point of circa 4.89mAOD.

3.4 The topographical survey also indicates in some of the parcels to be minor ridge and furrows, with the maximum height of these ridges indicated to be approximately 0.2m higher than adjacent ground levels - so only local fluctuations.

3.5 The rhyne network that separates that parcels has also been surveyed and these are generally 4 to 5m wide with depths between 1 - 1.5m.

3.6 The topographical survey for the site does not include levels for the Strawberry Line running to the West of the site boundary. In the absence of surveyed information, the EA LiDAR (Figure 2) is considered the best available data. LiDAR data along the Strawberry Line identifies embankment crest levels to fall in a northerly direction from a high point of approximately 7.1m AOD found to the West of the existing Rectory Farm developments, to a low of approximately 5.7m AOD, located approximately 130m north of the site boundary.

3.7 Whilst topographical survey data is available for the site, EA LiDAR has been used within the approved Woodspring Bay 2020 model. As such a ground truthing assessment has been carried out by Hydrock to confirm the suitability of this data in comparison to the topographical survey data. On comparison of spot levels across the site, LiDAR levels on the land parcels are shown to have a negligible (0.05m) difference with the surveyed data and is considered acceptable for use. However, around the rhyne network, LiDAR accuracy is indicated to decrease as a result of vegetation coverage and standing water. As such, and as is standard topographical survey on site should be used as this is considered more site specific and the more accurate.

Geology & Hydrogeology

3.8 With reference to the British Geological Survey (BGS) online Geology Viewer, the site is shown to be underlain by Mecia Mudstone Group bedrock which consists of mudstone and halite stone. There are superficial tidal flat deposits of clay and silt.

3.9 The published site geology for bedrock and superficial is illustrated in **Figure 3-2**

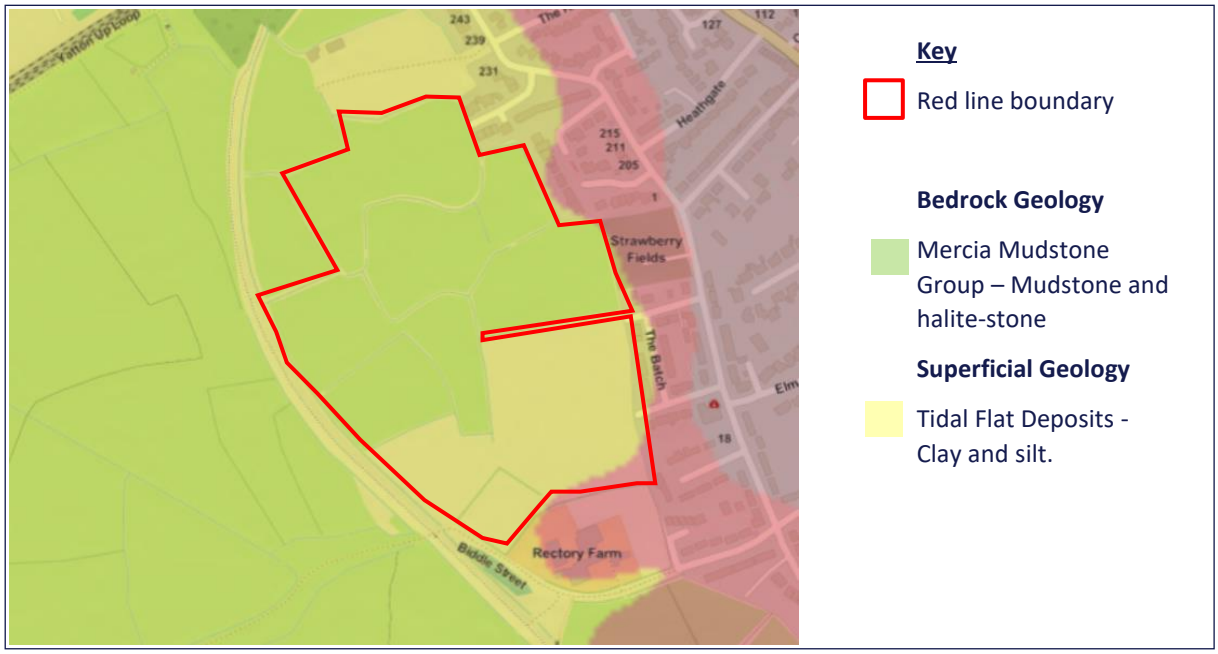

Figure 3-2: BGS Published Bedrock and Superficial Geology (2023)

3.10 The EA provides the following definitions for Aquifers:

Secondary B *- predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.*

3.11 The EA Groundwater Vulnerability Zones (GVZ) Mapping summarises the overall risk to groundwater, taking into account groundwater vulnerability, the types of aquifer present (superficial and/or bedrock) and their designation status, as discussed previously.

3.12 The Site is shown (**Figure 3-3**) to be situated within a medium to low risk in terms of groundwater vulnerability.

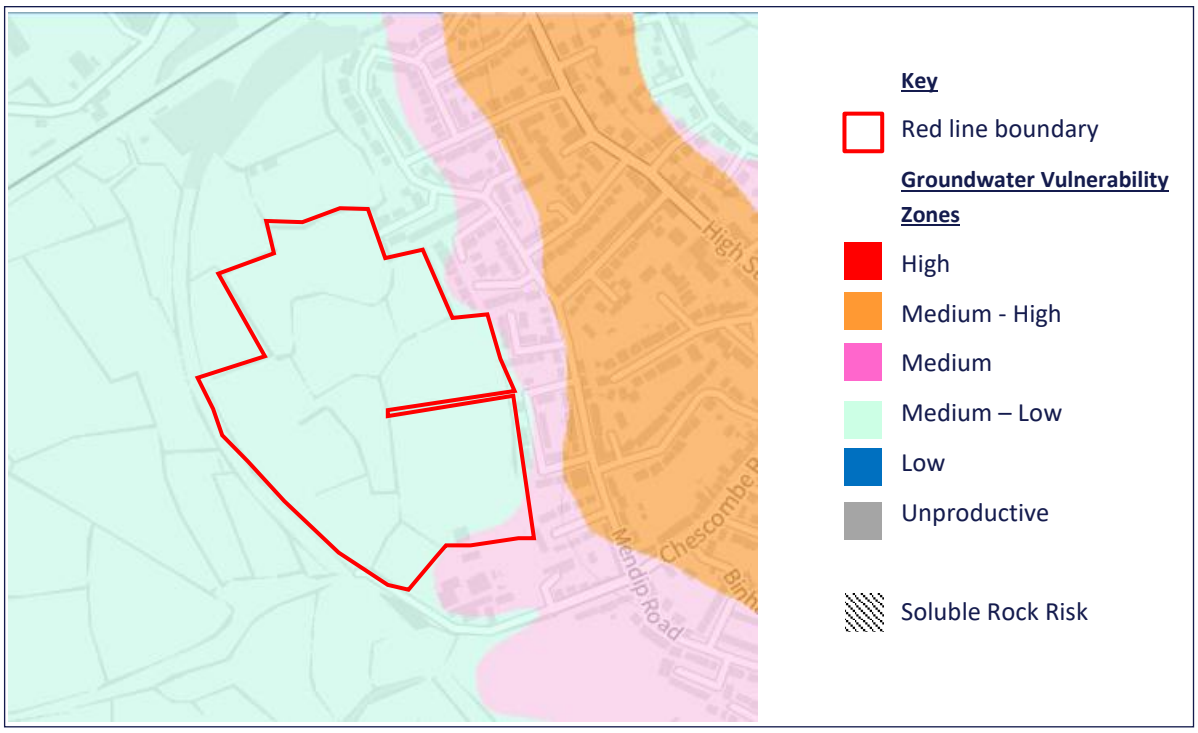

Figure 3-3: EA Groundwater Vulnerability Zones Map (Magic Maps, 2023)

3.13 The EA provides the following definition for the underlying GVZ:

Medium - *these are medium priority groundwater resources that have some natural protection resulting in a moderate overall groundwater risk. Activities in these areas should as a minimum follow good practice to ensure they do not cause groundwater pollution.*

Medium-low - *these are lower priority groundwater resources that have some natural protection resulting in a moderate to low overall groundwater pollution risk. Activities in these areas should follow good practice to ensure they do not cause groundwater pollution.*

4 Flood Risk

Flood Mechanisms

4.1 Having completed a site hydrological desk study and walk over inspection, the possible flooding mechanisms at the site are identified as follows.

Coastal Flooding

4.2 The EA Flood Zone are identified in the NPPG for Flood Risk and Coastal Change. Flood Zone 3 is defined as:

- Flood Zone 3a (High Risk) comprises land assessed as having a ≥1% AEP of fluvial flooding or ≥0.5% AEP tidal flooding in any given year, equivalent to the ≤100yr return period flood event.
- Flood Zone 3b (The Functional Floodplain) comprises land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters.

4.3 Functional floodplain will normally comprise:

- Land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or
- Land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding).

4.4 A pre-application response from North Somerset Council (ref: 22/P/2451/PR2) details the key points from the pre-app response with regards to flood risk are:

- The EA updated Flood Map identifies the northern part of the site to be subject to surface water flooding,
- The whole of the site is located within Strategic Flood Risk Assessment (SFRA) L1 Tidal Flood Zone 3a (Figure 4) and EA Flood Zones 2 and 3 (Figure 3)
- The site is entirely within tidal flood zone 3a as shown on the Council's Strategic Flood Risk Assessment (2020) and this accords with the national Flood Map designation. It should be noted that this plan does not include for any flood defences and is considered the worst case ‘undefended scenario’.
- Policies on flooding apply, such as DM1 of the adopted Development Management Policies Plan and CS3 of the Core Strategy that reflect national planning policy with respect to flood risk. Section 5.1 and 5.2 of this report provide full details regarding national and local planning and policy guidance.
- All development must consider its vulnerability to flooding, taking account of all sources of flood risk and the impacts of climate change, up to 100 years ahead on residential, or mixed- use sites.
- It will therefore be necessary to carry out a Sequential Test on a risk-based approach in advance of submitting a planning application for the development of the site.

4.5 In addition to the pre-application response from North Somerset Council, a meeting has been held with the LLFA. Within this meeting the methodology for assessing the risk to the site was confirmed and the key points are:

- Confirmed tidal sources from the Woodspring Bay area are the biggest risk to the site and the surrounding areas.
- Two EA hydraulic models are currently available for the site "Congresbury Yeo and Hydrology Update 2015" (EA) and the "Woodspring Bay 2020" (JBA). The Woodspring Bay 2020 is the more appropriate for assessing risk and this was requested to be used in this assessment.
- No compensation storage would be required as a result of tidal flooding being the dominant source however an assessment should be undertaken to understand any potential impacts of the proposals.
- Agreed to use the existing model and update this to include the uplift for climate change and additional structures not included in the original model (i.e. culverts under Strawberry Line) to provide a more accurate assessment of mechanisms and depths of flooding at the site both now and across the proposed development design life.

4.6 The level of risk to site is shown to vary significantly between the defended and undefended scenarios. During the undefended scenario flood depths are shown to exceed 2m within the site. However, when reviewing the defended scenarios the level of risk to the site is shown as being significant reduced with protection being provided up to the 1 in 200 year event. The only flooding, which is to a significantly reduced depth (and circa 300m within the site), is when making an allowance for climate change allowances as these then overtop the existing defences and cause inundation.

4.7 Given the residual risk nature of the undefended scenario (and strategic nature of the defences) it is considered that the design event for the proposed development would be the 1 in 200 year plus climate change tidal event. This was agreed for a neighbouring development where a requirement was agreed, in the run up to an appeal, that the design event would be the defended scenario but consideration should be given to the undefended scenario in relation to access and egress to ensure these are known and measures in place for the unlikely event of a complete failure of the flood defences. Whilst this has not been discussed specifically for this development the approach adopted mirrors that of a neighbouring scheme and therefore precedent has been set and this is assumed as agreeable to both the EA and LLFA.

Fluvial Flooding

4.8 The site is located within the drainage catchment of the Congresbury Yeo, which is located approximately 800m west of the site and flows in a general westerly direction before discharging into Woodspring Bay and the Bristol Channel approximately 6km north west of the site. The site is included within the Severn River Basin District.

4.9 The site and the surrounding areas include a network of land drainage features (rhynes), that drain through a number of culverts, towards the Congresbury Yeo and subsequent Bristol Channel.

4.10 The Environment Agency's (EA) National Generalised Modelling (NGM) Flood Zones Plan indicates predicted flood envelopes of Main Rivers across the UK.

4.11 The mapping on **Figure 4-1** shows that entire of the site to lies within Flood Zone 3; meaning the site has high probability of flooding from rivers and the sea.

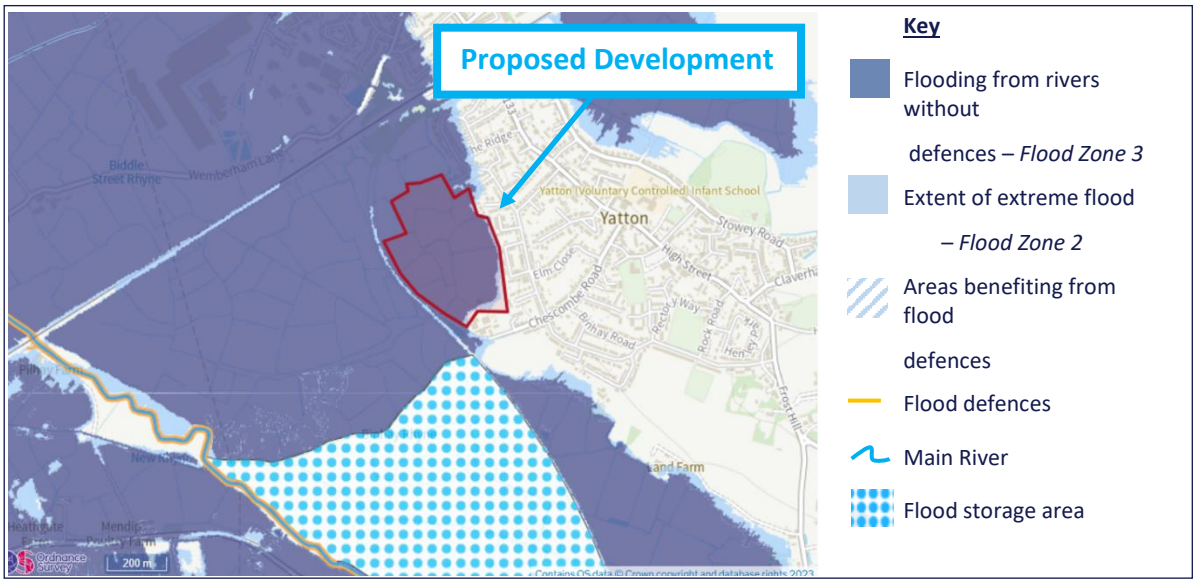

Figure 4-1: EA Flood Zone Plan showing 1 in 100 & 1 in 1,000 year floodplains (Gov.Uk website)

4.12 The Environment Agency Flood Zones are defined within Paragraph 078 of the NPPG for Flood Risk and Coastal Change as:

- Flood Zone 1 (Low Risk) comprises land assessed as having a ≤0.1% AEP of fluvial or tidal flooding in any given year, equivalent to the ≥1,000yr return period flood event.
- Flood Zone 2 (Medium Risk) comprises land assessed as having a 0.1-1% AEP of fluvial flooding or 0.1-0.5% AEP of tidal flooding in any given year, equivalent to the 1,000-100yr return period flood event.
- Flood Zone 3a (High Risk) comprises land assessed as having a ≥1% AEP of fluvial flooding or ≥0.5% AEP tidal flooding in any given year, equivalent to the ≤100yr return period flood event.
- Flood Zone 3b (The Functional Floodplain) comprises land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters.

4.13 Functional floodplain will normally comprise:

- Land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or
- Land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding).

4.14 As part of the consultation response the LLFA raised the comment about additional detailed being required in relation to fluvial flood risk as the Woodspring Bay model is focussed on tidal flooding sources both for defended and undefended scenarios and is therefore not suitable for use in assessment fluvial flooding to the site. The other available modelling study for the wider area is the Congresbury Yeo model from 2015. As part of this assessment this model has been reviewed and relevant updates to fluvial climate change allowances has been made. The outputs from this model has confirmed that for all events modelled (100year plus climate change and 100yr) no fluvial flows are shown to reach the

site. Flows are shown to reach the Strawberry Line but these, unlike the 200yr tidal climate change event, do not overtop these, or are of sufficient depth to flow 'up' through any culverts under the embankment and affect the site.

4.15 The EA (as part of their consultation response) made reference to a site specific model that was undertaken for a site neighbouring the site to the south. Whilst this model has not been made available for writing this note, readily available information via the planning portal has indicated that this also is not a true representation of fluvial flooding as the inflows are tidal at the downstream limit of the model and surface water for the Rhyne network within the study site boundary. It is also considered that this modelling is overly conservative as is based on peak 200 year plus climate change tidal levels occurring at the same time as peak surface water flows and a blockage to key culverts – which does not follow the modelling guidance for assessment present day risk.

4.16 In the absence of any confirmed fluvial modelling the only other data that can be used to inform fluvial flood risk would be the surface water mapping. Whilst this is also not specifically fluvial modelling it is often accepted as given a worst case assessment in the absence of any specific data. This mapping, as detailed in the FRA, shows that whilst there is an area of increased risk in the site to the south, this does not extend into the application site and therefore it is concluded that the dominant source of flooding to the application site is from tidal sources with the mechanisms being flows overtopping the Strawberry Line to the north west of the site and flowing in a southerly direction towards Chescombe Road. Once the site is inundated the mechanism shown in the modelling for the site to the south (i.e. flows coming through the culverts under the Strawberry Line and heading north) then reaches the site but these are shown to be as a result of tidally driven sources and not fluvial as is suggested by the EA.

Pluvial Flooding

4.17 Overland flow mechanisms result from the inability of unpaved ground to infiltrate rainfall or due to inadequacies of drainage systems in paved areas to accommodate flow directed to gullies, drainage downpipes or similar. In minor cases, local ponding may occur. In more extreme events, flows accumulate and may be conveyed across land following the topography.

4.18 Surface water flooding occurs as the result of an inability of intense or prolonged rainfall to infiltrate the ground. This often happens when the maximum soil infiltration rate (high intensity rainfall events) or storage capacity is reached i.e. the ground becomes saturated (prolonged period rainfall events). Flows generated by such events either enter existing land drainage features or follow the general topography which can concentrate flows and lead to localised ponding/flooding.

4.19 The EA have produced a risk of flooding from surface water map on behalf of government, to observe how rain water flows and ponds. By using information and input from LLFA's, the maps produced take into account local topography, weather patterns and historical data as stated within the EA Guidance – Flood risk maps for surface water: how to use the map (2013). The available mapping is banded into four levels of flood risk.

4.20 The mapping on **Figure 4-2** illustrates areas of low to high risk from surface water flooding.

4.21 The mapping above identifies that most of the Site has a 'very low' risk of surface water flooding. However, However, the mapping indicates areas of increased risk, up to 'High' risk, associated with the existing rhyne networks. Within the rhynes, the risk is identified to be up to 'High' risk in areas whilst the predicted flood extents that are indicated to extend onto the land parcels is mostly shown to be 'Low' Risk.

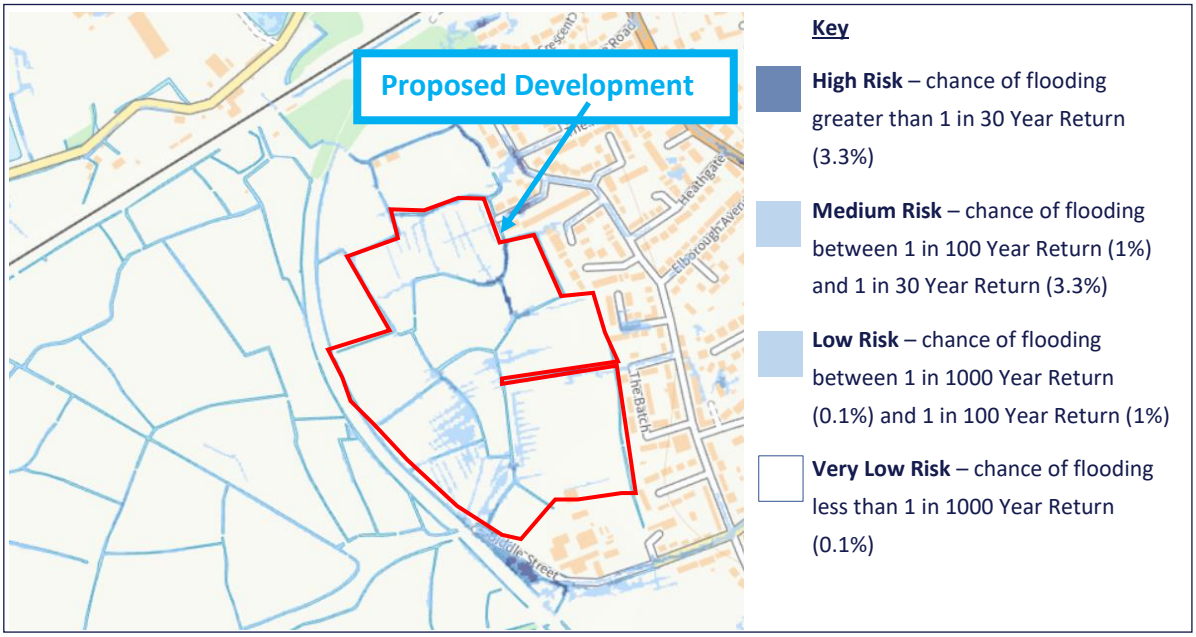

Figure 4-2: EA Long Term Flood Risk Maps – Flood risk from Surface Water (Gov.Uk website)

4.22 Based on the extent mapping the majority of the predicted areas at risk of flooding from surface water show connectivity between the rhyne network and the land parcels however, there are some isolated areas of flooding identified within the site boundary which show no connectivity. The extent mapping also shows examples of the ridge and furrows that were identified within the topographical survey.

4.23 EA Long Term Flood Risk Mapping shows estimated velocities and predicted flow directions for the onsite flooding. The velocity vector mapping identifies the majority of rhynes within the site boundary to have a general flow towards the western and southern boundaries but also indicate some potential flow north. Mapping identifies that the predicted flooding shown to pond on the land parcels to have a general flow direction into the rhyne network and confirming connectivity i.e. surface water runoff on the land parcels will generally drain towards the existing rhyne network. Although, there are areas of isolated ponding identified within the site boundary and these are not shown to flow anywhere.

4.24 The mapping indicates flows predominantly travel at velocities of below 0.25m/s, although flows exceed 0.25m/s within the rhynes flowing along the northern site boundary and these are therefore a higher risk due. The velocity vectors on the mapping indicate a potential 'off-site' flow route entering the site along the northern boundary originating from the residential developments to the east and also in the south of the site a flow route is identified along Chescombe Road which is also shown to potentially enter the site. Although mapping does not indicate a significant amount of ponding / flood extents as a result of these offsite flows, these will likely contribute to surface water on site and therefore needs to be managed accordingly.

4.25 The Long Term Flood Risk Service also provides predicted flood depths for the identified surface water flood risk (Figure 18). The banding for the depth maps were selected by the EA based on feedback from

the LLFA's, the following categories were selected:

Depth (m)	
<0.15	
0.15-0.30	At 0.15m, flooding would: » typically exceed kerb height (standard kerb height is 125mm) » likely exceed the level of a damp-proof course » cause property flooding in some areas
0.30-0.60	At 0.30m flooding is likely to cause property flooding. This is based on average property threshold levels.

Table 4-1: EA Banding for Flood Water Depth

4.26 The published map available to view on the EA Long Term Flood Risk Service as part of the Risk of Flooding from Surface Water map groups these into categories of 'below 300mm', '300 – 900mm' and 'above 900mm'.

4.27 The mapping indicates that the majority of predicted surface water flooding on site, both in the rhynes and on the land parcels to be predominantly below 300mm and would therefore be considered shallow. However, within the rhyne network, the mapping identifies small reaches which are predicted to have deeper depths between 300 – 900mm although these deeper areas are not indicated to extend onto the neighbouring land parcels.

4.28 Shallow overland flooding, such as those areas identified on to be at risk on the land parcels, is likely representative of shallow sheet flow and between the ridge and furrow. Sheet flow is defined as shallow overland flow which follows local topographical flow routes. As shown by the vector velocity mapping, the majority of the flooding on the land parcels are shown to flow towards the rhyne network and likely local topography.

4.29 Whilst the EA mapping indicates some areas on site to be at an increased risk, the majority of this is limited to either the rhyne network or is indicated to flow towards the rhyne network rather than pond on the land parcels. However, whilst this may be so, as the mapping identifies the flooding on the land parcels, it must be managed in accordance with national and local policy.

4.30 As stated by Paragraph 059 of the NPPG this report has described the surface water flood risk to the site and identified large portions of the site to be at 'Very Low' risk of flooding with regards to surface water sources but has also identified areas on site, mainly the rhyne network, to be at an increased risk, up to 'High' risk.. However, as identified within this report, offsite flows are indicated to enter the site along the northern and southern boundaries of the site and the proposed development must ensure these flow routes are maintained to ensure no detrimental impact to third party land (i.e. blocking of flow routes through raising of development).

4.31 Further to this, and in order to assess the impacts of the proposed development on this source of risk a direct runoff model has been constructed for the baseline and proposed scenarios. This outputs from the baseline scenario has provided results that closely match those shown on the available flood mapping and therefore provides an acceptable assessment of risk and confirm that the mapping

outlined above provides a suitably representative assessment of risk to the site based on current conditions.

Artificial Water Bodies - Reservoirs & Canals

4.32 Non-natural or artificial sources of flooding comprises of reservoirs, canals and lakes where water is retained at or above the natural ground level. Artificial water bodies have the potential to cause flooding due to the release of large volumes of water, resulting from a dam, bank or lock failure.

4.33 The Environment Agency has produced mapping to indicate a worst case scenario of flooding that would be caused, as a result of unlikely structural failure or damage of a reservoir. The site is shown to lie within 'normal' river levels, as illustrated in **Figure 4-3**.

4.34 Mapping identifies the site lies within the maximum extent of flooding in the event of a catastrophic failure of Blagdon Lake, located approximately 9.5km south east of the site. Given the monitoring and maintenance requirements for such reservoirs under the Reservoirs Act 1975 in England, which requires reservoir owners to regularly inspect and maintain the reservoirs, the risk of such an occurrence is considered to be very low, and would be considered a 'residual' risk. Whilst no further information is available with regards to the reservoir flooding from Blagdon Lake, *EA Reservoir flood maps: when and how to use them* identifies that "if development is to be considered in an area at risk of reservoir flooding that the developer should contact the reservoir owners to understand the flood risk in more detail and how development could be affected."

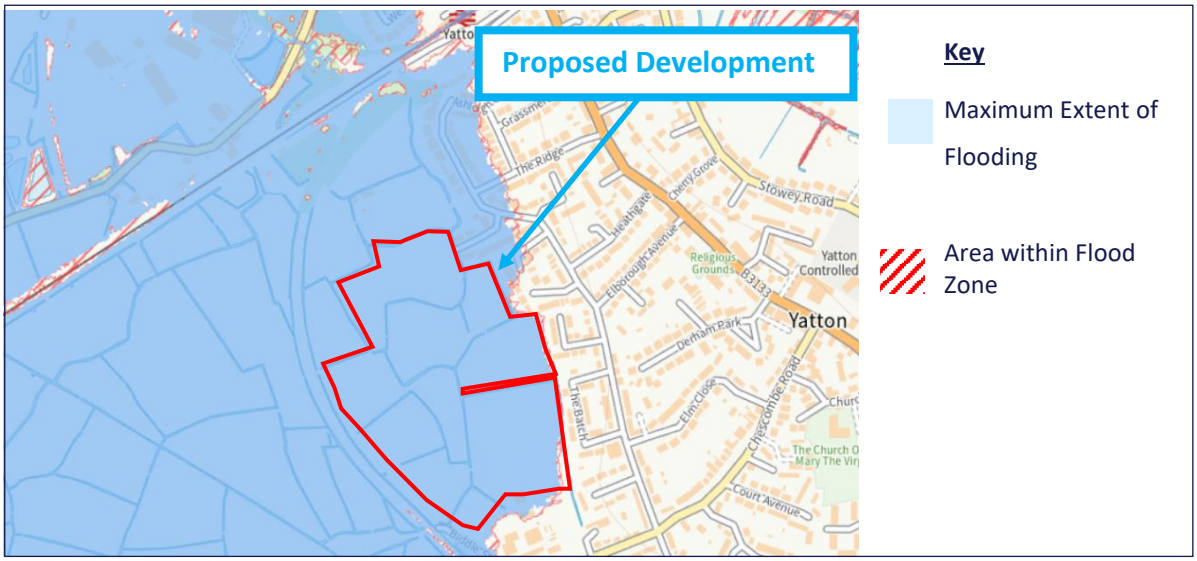

Figure 4-3: EA Long Term Flood Risk Maps – Flood risk from Reservoirs (Gov.Uk website)

4.35 The developed nature of the surrounding area to the East of the site suggests it is likely that there are drainage systems serving the adjacent development. In the event of surcharging of the sewer network up-catchment of the site, flows will likely be directed towards the existing rhyne network on-site using the road network as a preferential flow route before following local topography on site, as indicated by the EA Surface Water Mapping velocity vectors.

4.36 The SFRA identifies the Congresbury and Yatton postcode (BS49) to be amongst the higher risk areas with regards sewer flooding when viewing the total number of properties flooded from sewers. In the sites postcode (BS49 4), Wessex Water Property Sewer Flooding Records indicates one property has reported internal flooding and 15 have reported external flooding, however no specific locations have the properties have been provided. No information is given in the SFRA as to the cause of the flooding incidents however given that the risk of sewer flooding is likely only in the event of failure or blockage, this is considered to be a 'residual risk'. The Surface Water Mapping velocity vectors suggest any flooding on site (either generated on site or from off-site sources up catchment (Yatton)) will ultimately flow into the existing rhyne network using the existing road network as a preferential flow route and travel overland before reaching the rhyne network. Flood extents in these areas are not indicated to be significantly larger as a result of the offsite flows.

4.37 The EA Long Term Flood Risk Service provides extent mapping for flooding from reservoirs both when river levels are normal and when there is also flooding from rivers. Mapping identifies the site lies within the maximum extent of flooding in the event of a catastrophic failure of Blagdon Lake, located approximately 9.5km south east of the site. Given the monitoring and maintenance requirements for such reservoirs under the Reservoirs Act 1975 in England, which requires reservoir owners to regularly inspect and maintain the reservoirs, the risk of such an occurrence is considered to be very low, and would be considered a 'residual' risk. Whilst no further information is available with regards to the reservoir flooding from Blagdon Lake, EA advice4 is clear that "if development is to be considered in an area at risk of reservoir flooding that the developer should contact the reservoir owners to understand the flood risk in more detail and how development could be affected." As such, at the request of the LLFA via e-mail (28/02/2023) contact has been made with the reservoir owner (Bristol Water) to establish the risk category for the reservoir and the depth and hazard ratings of the predicted flooding, yet no further information has been received to date.

4.38 There is no known risk of flooding from canals or any other artificial sources at the site and as such the site is concluded to be at 'negligible risk' from infrastructure failure flooding.

Groundwater

4.39 Groundwater flooding is characterised by low-lying areas often associated with shallow unconsolidated sedimentary aquifers which overly non-aquifers. These aquifers are reported to be susceptible to flooding, especially during the winter months, due to limited storage capacity.

4.40 Groundwater related flooding is fortunately quite rare, although where flooding is present, persistent issues can arise that are problematic to resolve. Such mechanisms often develop due to construction activities that may have an unforeseen effect on the local geology or hydrogeology.

4.41 The SFRA identifies a historic waterlogged area to the north-east of the Site (**Figure 4-4**).

4.42 his mapping indicates the entire site is underlain by bedrock geology of the Mercia Mudstone Group, consisting of mudstone and halite stone. This is overlain by superficial tidal flat deposits, consisting of clay and silt. At the time of writing, a Geophysical Survey report has been completed by Headland Archaeology but no intrusive ground investigation work has yet been undertaken.

4.43 It is understood, from a review of readily available information that:

"With little to no superficial geology covering the majority of the site, especially the southern parcel and the nature of the underlaying geology (Mercia Mudstone Group) it can be inferred that the ground conditions

are relatively impermeable and clayey resulting in little shallow groundwater. Any shallow ground water that is present is likely to drain south towards the Binhay Rhyne brook. As a result of the potentially low permeability of the subsurface the flux of water is likely to be small".

4.44 Whilst the predicted generally low permeability of mudstone type geologies suggests there is limited potential for groundwater emergence, the SFRA shows the north-eastern portion of the site to lie within a Historic Waterlogged Area. Figure 19, taken from Figure 035, in the North Somerset SFRA, shows the area along the north western boundary which is indicated to be within the Historic Waterlogged Area, limited information is available within the SFRA regarding the waterlogged area however the SFRA does identify that the majority of areas where this historic waterlogging has occurred in North Somerset all have mostly clayey soils. The clayey type soils are likely to act as an impermeable layer with water unable to infiltrate through to the bedrock causing waterlogged areas following prolonged periods of rainfall.

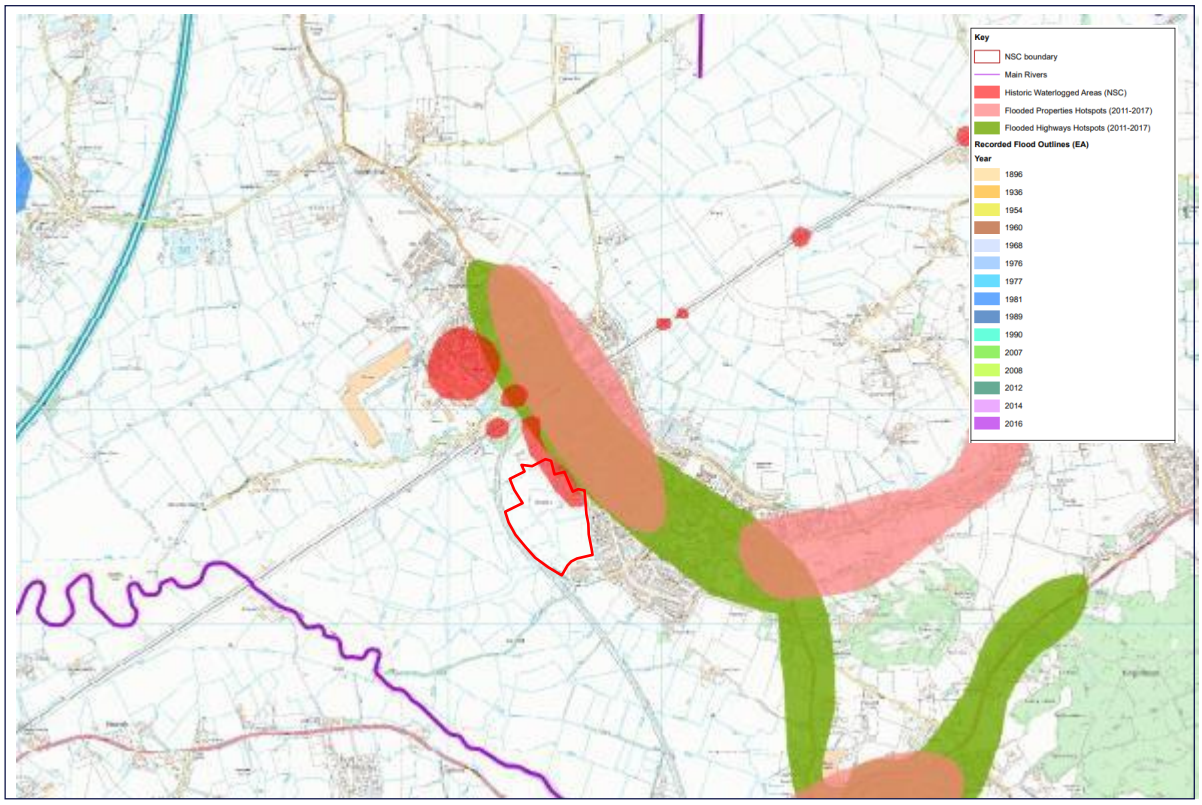

Figure 4-4: Historic Flood Map

4.45 Online Soilscapes viewer from the Cranfield Soil and Agrifood Institute (CSAI), supported by Defra, identifies the site to be overlain by 'loamy and clayey soils of coastal flats with naturally high groundwater'. The drainage type within this soil is identified by this service to be 'naturally wet'. The clayey type soils identified by the Soilscapes viewer therefore align with the information within the SFRA regarding waterlogging areas and having mostly clayey based soils.

4.46 Tere is an extensive rhyne system within the site boundary. It is likely that this rhyne network will be hydraulically linked with any groundwater and act as a natural drawdown point and as such, groundwater is unlikely to get higher than normal channel water levels. Should flood events occur, on site, water levels within the rhynes will likely raise potentially overtopping bank tops and thus causing potential groundwater emergence however, in these scenarios it is likely there would be significant

flooding from other sources (e.g. tidal) and as such the recommended mitigation would be sufficient in protecting the development.

4.47 Nevertheless, given the identified Historic Waterlogged Area in the north east of the site and the identified clayey soils from Soilscapes mapping there is potential for high groundwater (subject to confirmation) and therefore potential for groundwater emergence in the waterlogged areas.

Sewerage Systems

4.48 Flooding related to sewerage systems is a result of there being insufficient capacity within an existing sewerage system (combined and surface water sewers) or from there being a blockage within the system.

4.49 Initial investigations suggest due to the existing developed area to the east of the site, there are drainage systems. In the event of surcharging of the sewer network up-catchment of the site, flows will likely be directed towards the existing rhyne network on-site using the road network as a preferential flow route before following local topography on site, as indicated by the EA Surface Water Mapping velocity shown in **Figure 4-5**.

4.50 The SFRA investigated flooding from sewers by collecting historic flooding incidents data from Wessex Water. Congresbury and Yatton postcode (BS49) are deemed the higher risk areas for sewer flooding when viewing the total number of properties flooded from sewers. In the sites postcode (BS49 4), Wessex Water Property Sewer Flooding Records indicates one property has reported internal flooding and 15 have reported external flooding, however no specific locations have the properties have been provided.

4.51 There is no information provided in the SFRA that indicates reasoning behind the cause of the flooding incidents. Yet, sewer flooding risk is likely in the event of failure or blockage, therefore is considered 'residual risk'.

4.52 Surface Water Mapping velocity illustrated in Figure 4-5 suggest any flooding on site (either generated on site or from off-site sources up catchment (Yatton)) will ultimately flow into the existing rhyne network using the existing road network as a preferential flow route and travel overland before reaching the rhyne network. Flood extents in these areas are not indicated to be significantly larger as a result of the offsite flows.

4.53 Positive drainage measures incorporated on site, coupled SuDS and a new foul and surface water sewer network will ensure that no increase in surface water will result from the site. Flood risk associated with sewer flooding is therefore considered to be a low probability.

4.54 Therefore, it is deemed that there is no known risk of flooding from canals or any other artificial sources at the site and as such the site is concluded to be at 'negligible risk' from infrastructure failure flooding.

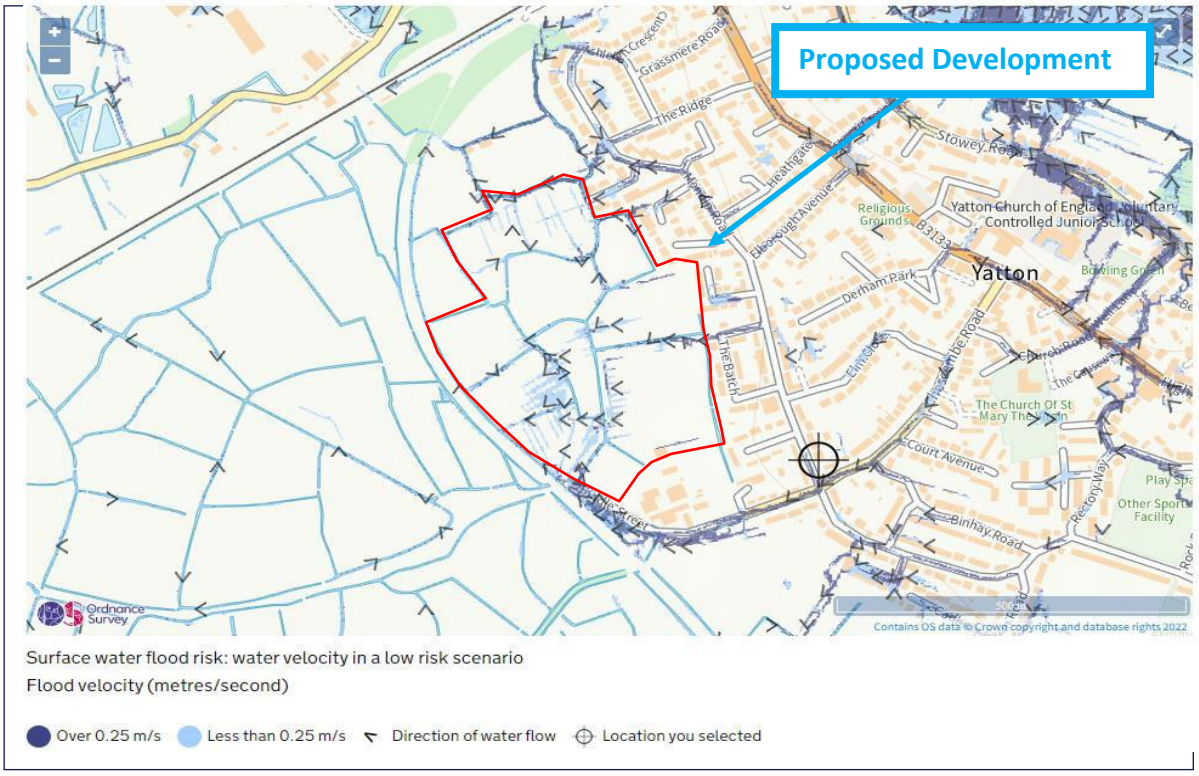

Figure 4-5: Surface Water Flood Risk Velocity Map

Flood Risk Mitigation

4.55 Measures recommended to mitigate any 'residual' flood risks ensures that the proposed development will be safe for its lifetime. This takes in account of the vulnerability of its users, without increasing flood risk elsewhere.

Level Raising

4.56 The proposed development should be located in the areas of site with the predicted shallowest flood depths in the present-day scenario in the eastern portions. However, for the developments design life (100 years) inclusive of climate change to the Woodspring Bay 2020 model indicates, the entire of site to be inundated with a maximum flood level of 7.88m AOD in 2122 0.5% AEP (1 in 200-year) in addition to Higher Central climate change tidal event. In accordance with local and national policy, and through a combination of ground raising and setting of finished floor levels (FFLs) the entire proposed dwelling area is recommended to be set to include a 600mm freeboard above the 1 in 200-year plus climate change event. This means the FFLs should be set to a minimum level of 8.48mAOD.

4.57 However, this recommendation is based on the worst case defended flood level and, as outlined above, it has been accepted on neighbouring schemes that the defended scenario is more appropriate for use and is considered the design event. The provided flood level for the 1 in 200 year plus climate change tidal event for this scenario was 6.28m AOD. As such, and again in line with the suggested conditions for the Mead Development, it is proposed for ground levels (and finished flood levels) to be set at a level no lower than 6.68m AOD. This would ensure all development is a minimum of 600mm above the defended 1 in 200 year plus climate change event and in line with accepted principles within the general Yatton area.

4.58 Through discussions with the EA, and as noted in their formal consultation response, compensation storage for any displaced flooding as a result of this ground raising would not be required owing to it being tidal in nature. However the EA have requested that detail modelling be undertaken to understand that impacts of this ground raising. This modelling has been undertaken through using the approved (and provided) Woodspring Bay model and 'stamping' on the proposed development levels (i.e. 6.68m AOD) and comparing the outputs from both scenarios (i.e. pre and post development). On review of this it is noted that no increase in flood extent is shown but there is a localised areas around the northern and eastern site boundary (and surrounding area) where a slight 17mm increase is predicted. This only affects the immediate surrounding area and no increases are shown to the north of the existing railway line, to the west of the Strawberry Line, or to the south of the site.

4.59 Whilst this increase in depth is predicted it should be noted that this is minor and when making an allowance for modelling tolerances it is considered that this is below the accepted confidence levels within the model. Within the modelling report provided as part of the freedom for information request a statement is made which states that whilst the typically accepted tolerance is 10mm, that is for fluvial events and given the nature of this model (and scale) the information used in determining flood levels relies heavily of wider area LiDAR Data and this would therefore likely result in a conservative assessment on ground levels due to the removal of existing features such as roads, buildings, tress, hedgerows etc. In addition it should be noted that the use of LiDAR for waterbodies is also known to underestimate the available storage within the channels (such as the complex rhyne network) as the water cannot be penetrated and therefore the bed level shown in the model (where survey hasn't been provided) it more representative of water levels. It is for these reasons that the confidence for the Woodspring Bay model is understood as being '15-20mm'. Given the predicted increase as a result of the proposed ground raising falls within this limit (17mm), it is considered that this would be acceptable on the ground of modelling being a computerised representation of reality and therefore within tolerances agreed during the construction (and sign off) of the modelling.

Safe Access and Egress

4.60 The prosed development will have two access and egress routes, one located in the north leading on the existing Shiners Elms and the second in the south leading onto the existing Chescombe Road. Existing flood zone mapping and outputs form the Woodspring Bag 2020 model, indicates that the northern site entrance is within Flood Zone 2 and 3. Whereas, southern access onto Chescombe Road is within Flood Zone 1 and thus has the lowest risk of fluvial and tidal flooding so is deemed a safe access point and egress route during a flood event.

4.61 Considering climate change, the 1 in 200 year plus Higher Central allowance indicates that the access onto Chescombe Road will increase into Flood Zone 3a, although at the very limit of flooding where flood waters are predicted to be much shallower than those experienced on site with maximum depths up to 1m on the access road. As outlined above, and different to the land raising, the access and egress has been assessed based on the undefended scenario so as to understand 'worst case' events.

4.62 Modelling outputs have also identified areas of lowest hazard in accordance with Defra 'Framework and Guidance for Assessing and Managing Flood Risk for New Development' (FD2320/TR2). This guidance assesses the threshold for flood hazard ratings and classifies them as:

- Low (Hazard) - Caution - "Flood zone with shallow flowing water or deep standing water"
- Moderate (Hazard) - Dangerous for some (i.e. children) - "Danger: Flood zone with deep or fast flowing water"
- Significant (Hazard) - Dangerous for most people - "Danger: flood zone with deep fast flowing water
- Extreme (Hazard) - Dangerous for all - "Extreme danger: flood zone with deep fast flowing water"

4.63 The results of the modelling (**Figure 4-6**) show the site to be classified as an Extreme degree of flood hazard however the southern vehicular access is shown to pass through areas identified as lower hazard ratings, with part of it shown to be outside of the flooding extent entirely.

4.64 Therefore, to address safe access and egress onto the site, it is recommended that this be addressed through a Flood Warning and Evacuation Plan (FWEP) which is to be secured through a suitably wording planning condition. The proposed FWEP should make residents and visitors aware of the potential risks to site and what to do should an extreme tidal flood occur, showing access and egress routes off the site. The recommended mitigation also ensures that in the event residents cannot leave the site during a flood event, there will be an area for safe refuge in the properties where residents can remain until flood waters recede.

4.65 It should be noted that whilst sections of the site and access are shown as being at increase hazards this is at the very peak of the modelling tidal event and the above figures do not show the reaction to the event. Given the dominant source is tidal this is a very predicted mechanism of flooding with high tides being predicted a long way into the future (i.e. weeks) so as to ensure suitable warnings and measures can be implemented (i.e. evacuation etc).

4.66 Further to this the modelling has been used to determine the length of time from first out of bank flooding occurring to this impacting the site. Modelling, shown in **Figure 4-6**, indicates that flooding first occurs within the site **15 hours** after the first out of bank flows occur north of the M5 Motorway / Mouth of the Congresbury Yeo and some 4.5km north west of the site.

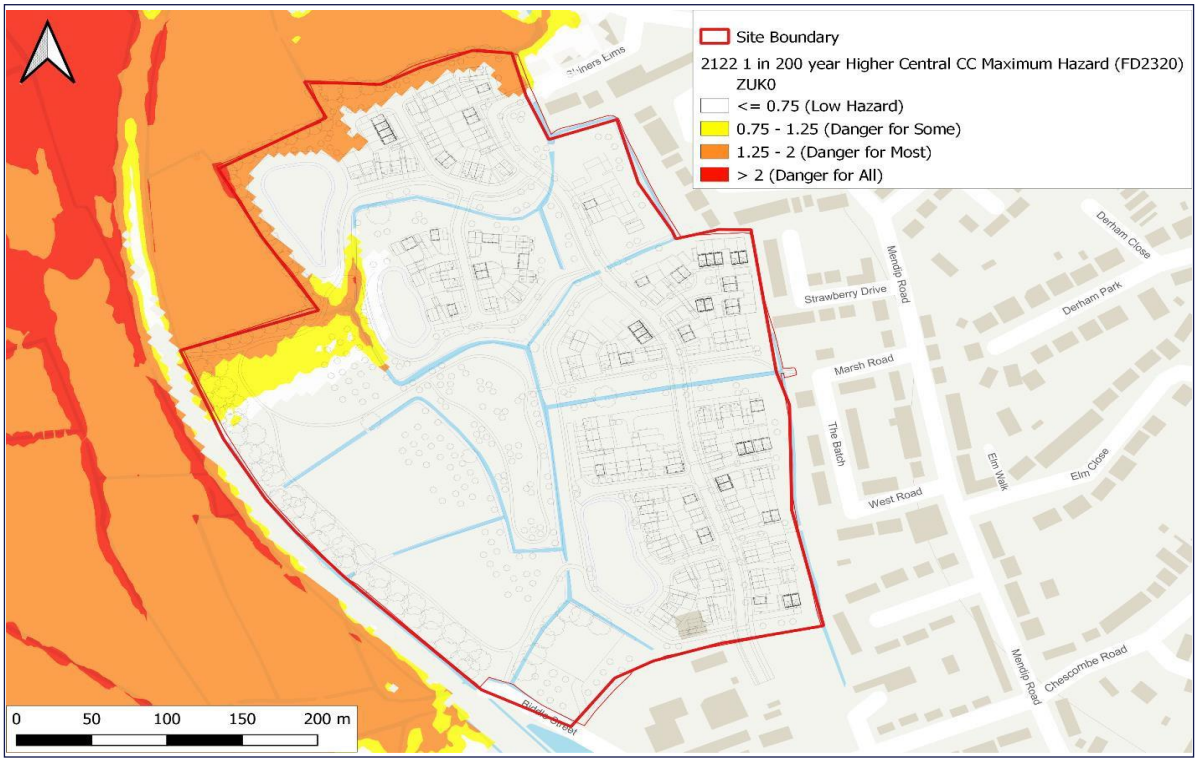

Figure 4-6: Hazard Mapping for 2122 0.5% (1 in 200 year) AEP Higher Central Tidal Event – Initial Onsite Flooding

4.67 Water levels on the site then continue to increase throughout the site with maximum flood levels and hazards as shown in **Figure 4-7**. Given the minimum lead in time of **15 hours** on a predictable event it is considered that through preparation of a Flood Warning and Evacuation Plan suitable measures will have time to be implemented such that access and egress can be achieved safely through the site.

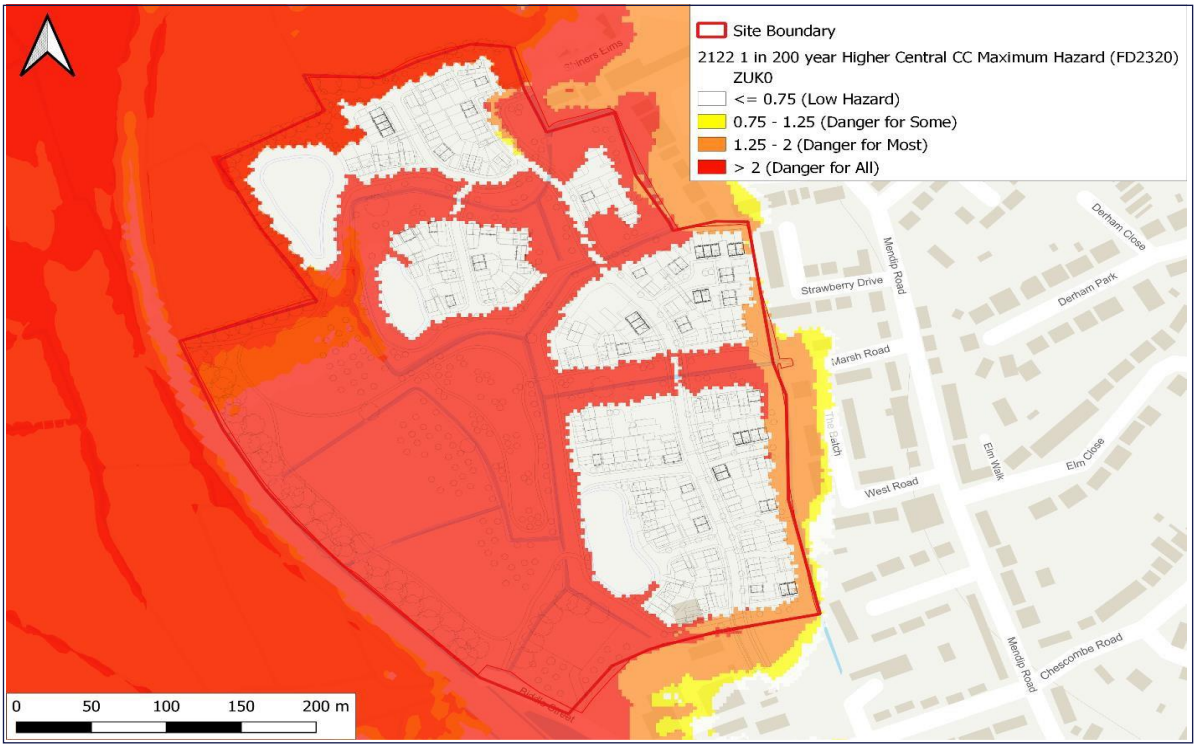

Figure 4-7: Maximum Hazard Mapping for 2122 0.5% (1 in 200 year) AEP Higher Central Tidal Event

Floodplain Storage and Cumulative Impacts

4.68 This report has confirmed the dominant source of flood risk to the site is from tidal sources in the undefended scenario. Tidal extents are often much larger than fluvial flood events and as a result do not require compensation storage as a result of proposed development.

4.69 The Paragraph 049 of the NPPG states: "The loss of floodplain storage is less likely to be a concern in areas benefitting from appropriate flood risk management infrastructure or where the source of flood risk is solely tidal." Therefore, no compensatory storage is required for the tidal flooding as discussed and agreed with the LLFA.

4.70 With regards to surface water compensatory storage, the EA Surface Water Flood Risk Map (**Figure 4-5)** identifies all areas of 'High' risk classified as "each year, the area has a chance of flooding of greater than 1 in 30 (3.3%)" and 'Medium' risk classified as "each year, the area has a chance of flooding of between 1 in 100 (1%) and 1 in 20 (3.3%)" to be located in the rhynes and are not predicted to extend out into the floodplains. As development will be restricted to the land parcels, there will be no loss of floodplain storage for these areas of risk and as such no compensatory storage is required for surface water.

5 Flood Risk Vulnerability

5.1 In accordance with the NPPG:

"Flood risk is a combination of the probability and the potential consequences of flooding. Areas at risk of flooding are those at risk of flooding from any source, now or in the future. Sources include rivers and the sea, direct rainfall on the ground surface, rising groundwater, overwhelmed sewers and drainage systems, reservoirs, canals and lakes and other artificial sources. Flood risk also accounts for the interactions between these different sources."

5.2 When building within a FZ, the vulnerability of the development must be taken into consideration. The impacts of flooding will affect types of development differently.

5.3 The EA's vulnerability classification table is illustrated below in **Table 5-1.** This table is taken from NPPG – Table 2, paragraph 079. The table outlines the NPPG technical guidance for flood risk vulnerability and FZ compatibility assessment to propose which type of development is appropriate for which sites.

Flood Zones	Flood Risk Vulnerability Classification				
	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test Required	✓	✓	✓
Zone 3a	Exception Test Required	X	Exception Test Required	✓	✓
Zone 3b	Exception Test Required	X	X	X	✓

Table 5-1: Environment Agency's Flood Risk Vulnerability Classification Table

5.4 In accordance with **Table 5-1**, More Vulnerable features are allowed to be developed within Flood Zone 3a, an Exception Test would be required. The following examples are classified as More Vulnerable features:

- Hospitals.
- Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels.
- Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels.
- Non–residential uses for health services, nurseries and educational establishments.
- Landfill and sites used for waste management facilities for hazardous waste .
- Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.

Sequential Testing

5.5 The NPPG states that:

"a sequential, risk-based approach is followed to steer new development to areas with the lowest risk of flooding, taking all sources of flood risk and climate change into account. Where it is not possible to locate development in low-risk areas, the Sequential Test should go on to compare reasonably available sites:

- *Within medium risk areas; and*
- *Then, only where there are no reasonably available sites in low and medium risk areas, within high-risk areas."*

5.6 The site is currently on land designated as Flood Zone 2 and 3a by the EA's Flood Zone Mapping. The assessment has also shown the site to benefit from significant flood defences however it is not classified by the EA as being 'defended' on their mapping however this has been further assessed through detailed modelling.

5.7 This modelling identifies the site to be impacted by the 3.3% AEP (1 in 30-year) event (FZ3b) in the undefended scenario, the site is not predicted to be impacted by any tidal flooding up to and including the 0.5 % AEP (1 in 200-year) event due to the presence of defences (as confirmed through detailed modelling). Whilst the LLFA has requested that an undefended scenario be undertaken it is considered this is to inform suitable mitigation to adopt a design for exceedance approach and across residual risks. Whilst this is 'an extra' it has been confirmed (and accepted on neighbouring applications) that the defended scenario is to be used as the 'design event' for the development and proposed ground finished flood levels. It should be noted that within the SFRA, North Somerset Council delineates Flood Zone 3b "…where the risk of flooding is predicted to be 1 in 20 (5%) AEP or greater, taking into account the presence of defences.". In line with this, the site is concluded as being within Flood Zone 3a due to 3b being defended both present day and development design life.

5.8 With the inclusion of climate change based on the latest EA sea level rise allowances, the 1 in 200- year event (FZ3a) up to 2122 for the developments design life shows the entire site would be within Flood Zone 3a as a result with flood levels reaching a maximum depth of circa 300mm. This compares to flood levels in excess of 2m within the defended scenario.

5.9 The specific site is not allocated within the local plan, however Yatton (including the site) has been identified within the North Somerset Council Core Strategy (2017) as a Service Village which states: Vision 6 Service Villages Vision - "By 2026 the Service Villages will become thriving rural communities and a focal point for local housing needs, services and community facilities. They will become more self-contained in terms of providing jobs and serving the local and surrounding community for all their day-to-day needs, whilst protecting their individual character."

5.10 In line with NPPF, NPPG and Local Policy CS3 from the North Somerset Core Strategy (2017) development in Flood Zones 2 and 3a must demonstrate that it complies with the Sequential Test as set out in the NPPF. As such, it is recommended the Planning Consultant undertake the Sequential Test in anticipation of the planning submission to confirm site suitability but the current allocation should add weight to the acceptability of residential development in this location.

5.11 In order to steer development towards areas and sites with the lowest probability of flooding, Diagram 2 of the NPPG (illustrated in Figure 5-1) must be followed for all types of flooding.

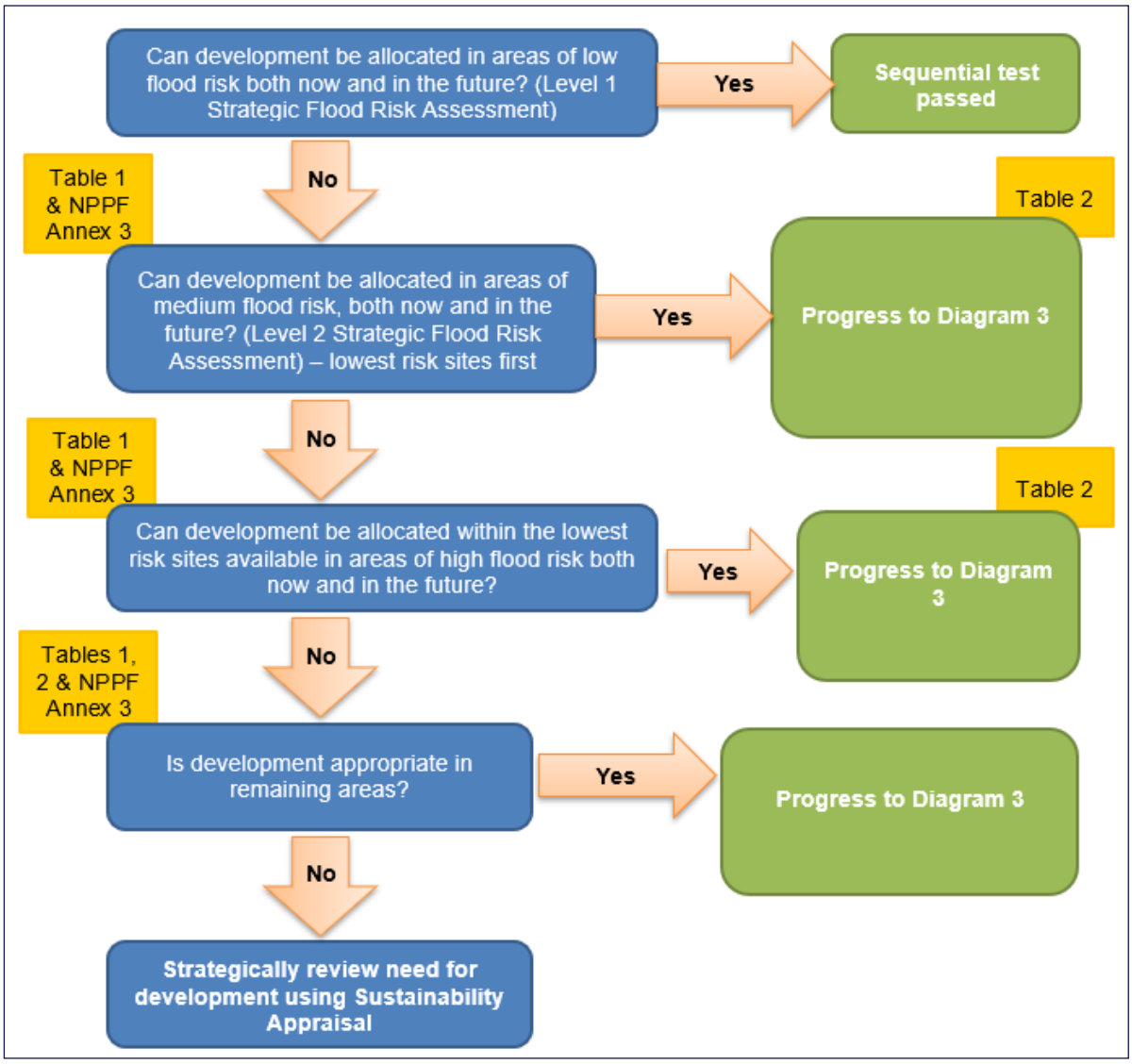

Figure 5-1: Diagram 2: Application of the Sequential Test for plan preparation

Exception Test

5.12 An exception test should only be applied as set out in **Table 5-1** and only if the sequential test has shown that there are no reasonably available, lower-risk sites, suitable for the proposed development, to which the development could be steered.

5.13 Paragraph 031 of the NPPG states that as part of the Exception Test, two elements must be "satisfied before allowing development to be allocated or permitted situations where suitable sites at lower risk of flooding are not available following application of the sequential test. It should be demonstrated that:

a. *development that has to be in a flood risk area will provide wider sustainability benefits to the community that outweigh flood risk; and*
b. *the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall*."

5.14 This flood risk assessment demonstrates *part b*, which means that the recommended mitigation confirms the development will be safe for its lifetime without increasing flood risk elsewhere. Although, evidence supporting a planning application should demonstrate 'part a' can be passed following the application of the Sequential Test.

6 Hydraulic Modelling

6.1 From discussion with the LLFA during the pre-app meeting (14/11/2022), it was confirmed that there are two EA approved models which include the site within the models' subject areas, the EA's "Congresbury Yeo and Hydrology Update 2015" model and the "Woodspring Bay 2020" model created by JBA. Within the pre-app meeting the LLFA, Congresbury Yeo 2015 model has a focus on the Congresbury Yeo catchment and the watercourses / rhyne network within it and considers a more fluvially dominant risk. However, the Woodspring Bay 2020 model provides flood risk information for the tidal risk within the Woodspring Bay catchment (including the Congresbury Yeo and surrounding areas) and is also used to define the EA's Flood Zones for the area. Also, the Congresbury Yeo modelling would be considered outdated as it does not use the latest UK Climate Change Projections (UKCP18) and would therefore underestimate the tidal flood risk in the area. As such, the LLFA requested Hydrock undertake this assessment using the Woodspring Bay 2020 model as it is more up to data and a more accurate representation of both current and future climate change risk and aligns with their preference.

6.2 The Woodspring Bay 2020 model uses the latest climate change projection based on UKCP18 however, the assessment of hydrology for this model was done in 2018 and as such the hydrographs require uplifting to present day levels, using the EA Sea Level rise allowances for climate change. This was agreed and deemed an acceptable approach to the LLFA during the pre- app meeting. Therefore, as part of this assessment have updated the approved Woodspring Bay 2020 hydraulic model to include the latest climate change information for both the present day (2022) and for the design life (100 years) of the proposed development (2122).

6.3 Within the pre-app meeting, it was agreed with the LLFA that the design event for the site would be the 1 in 200 year plus Higher Central climate change allowance up to 2122 and, in line with policy and standard modelling practice, this would assess in the undefended scenario in order to understand the 'worst case' scenario at the site. It should be noted that this doesn't align with local policy but should be used to inform mitigation to provide a robust approach. This meant the all formal defences (i.e. EA assets) were 'removed' from the model. However, informal defences such as motorway embankments and the Strawberry Line embankments would remain as these are deemed more as topographical features rather than a 'defence' per se..

6.4 Additionally, and on review, the provided model does not include culverts on the rhyne networks through the site or under the Strawberry Line. As such, and given the potential importance of these, a site walkover was undertaken to identify and measures that and, where not already, these will be included in the updated modelling.

Woodspring Bay 2020 Model

6.5 The Woodspring Bay 2020 model was undertaken by JBA on behalf of the EA to assess coastal flood risk along the north coast in the Bristol Channel and subsequently used to generate the existing EA Zones.

6.6 Existing approved outputs from this model are included within the "Woodspring Bay and Severn House Farm Coastal Flood Modelling and Mapping Report" (ref:2018s0923, dated: September 2020). The modelled results for the defended scenario in the present-day flood extents (**Figure 6-1**) confirm the Woodspring Bay catchment to benefit from flood defences along the Woodspring Bay frontage and along the Congresbury Yeo, with **Figure 6-1** showing all events other than the 0.1% AEP (1 in 1000-year) event are contained by the defences (Site location outside of map extent in Figure 6-1).

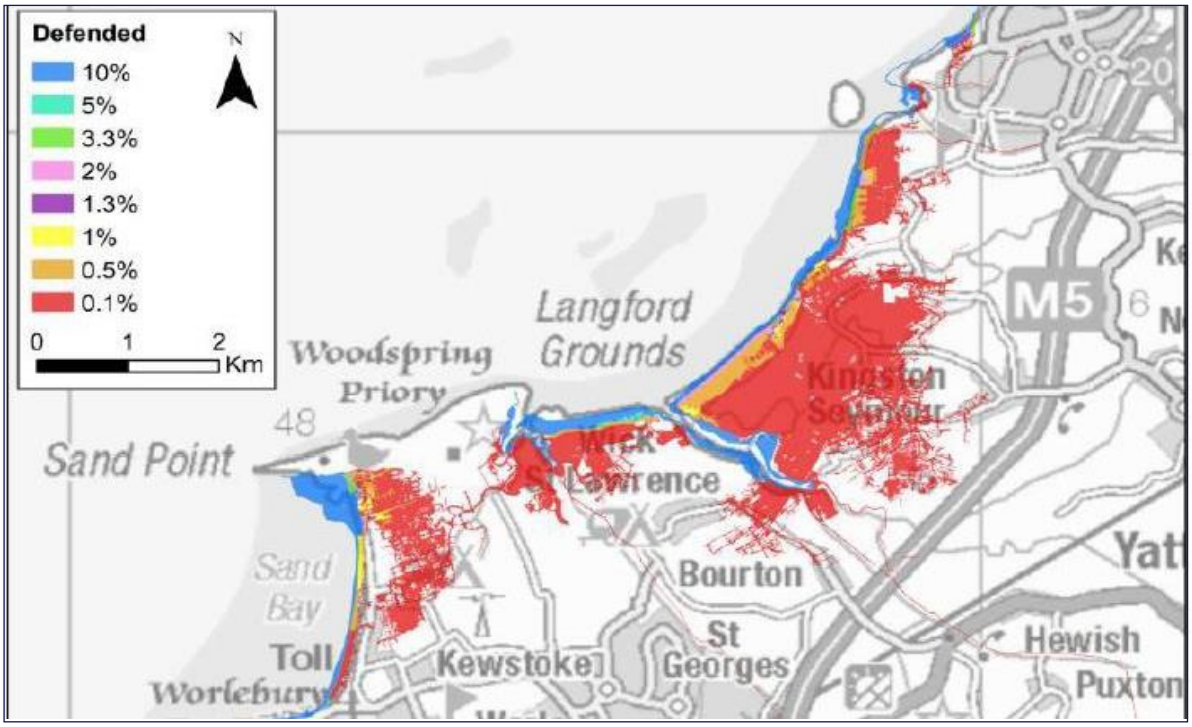

Figure 6-1: Woodspring Bay Defended scenario present day flood extents – taken from the Woodspring Bay and Severn House Farm Flood Modelling and Mapping Report (JBA, 2020)

6.7 However, in the undefended scenario flooding is shown to be significantly more widespread across the study area with all events modelled showing extreme flooded extents **(Figure 6-2).** This confirms that the flood issue associated with an extreme and/or undefended (i.e. defence failure or overtopping) event would result in large areas of both Yatton and North Somerset being inundated.

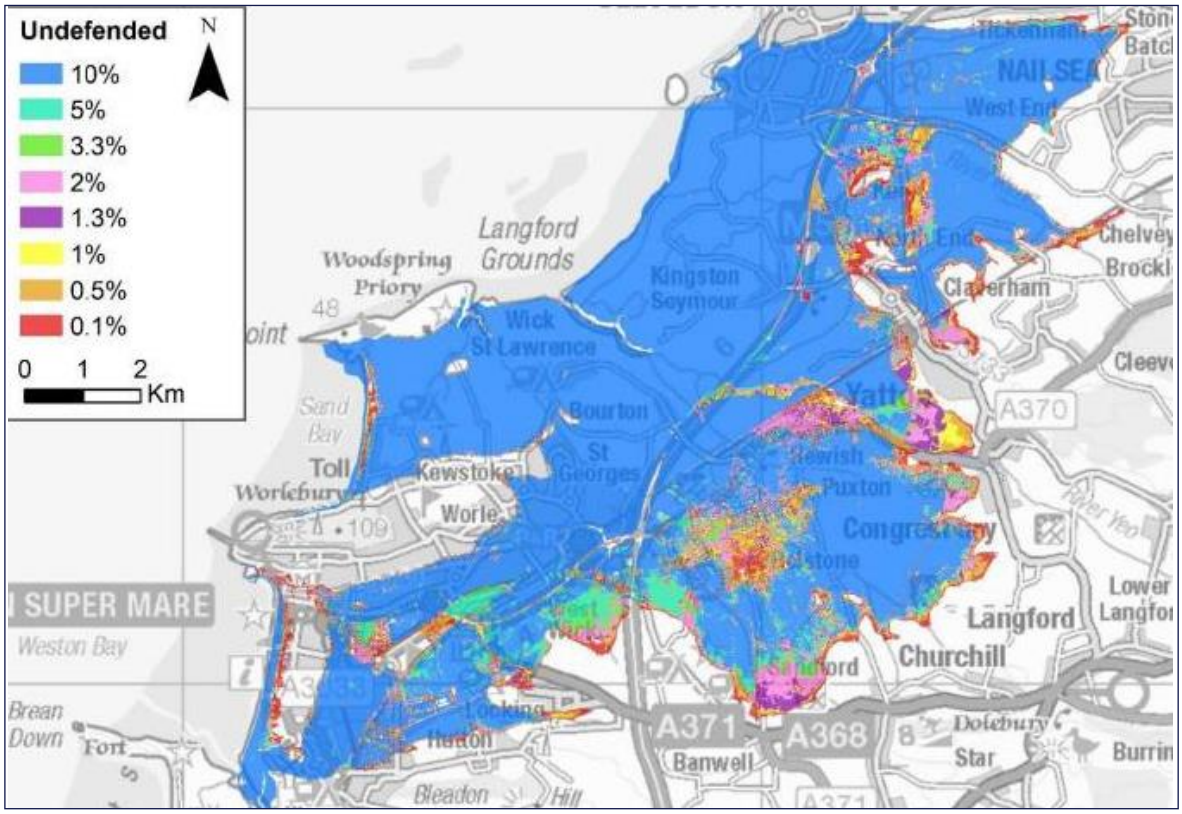

Figure 6-2: Woodspring Bay Defended scenario present day flood extents – taken from the Woodspring Bay and Severn House Farm Flood Modelling and Mapping Report (JBA, 2020)

Hydraulic Modelling – Updates and Climate Change

6.8 The Woodspring Bay 2020 model has been agreed as being that used to assess the tidal flood risk to the site however, whilst the approved model was deemed appropriate for use some updates to the model were agreed to ensure an accurate assessment of tidal risk to the site as detailed below.

6.9 It should be noted a separate hydraulic modelling report will be provided with the full planning submission.

Hydrology Updates

6.10 As part of the NPPG for flood risk and coastal change, all Flood Risk Assessments for new development must ensure the proposed development will be safe from all sources of flooding, not and in the future, taking account of the impacts of climate change. To do this, the "design flood" should be assessed which is defined as:

- tidal flooding with a 0.5% annual probability (1 in 200 chance each year); or
- surface water flooding likely to occur with a 1% annual probability (a 1 in 100 chance each year), plus an appropriate allowance for climate change.

6.11 The Woodspring Bay 2020 is a tidal model and includes the latest sea level rise allowances as set out by the EA Guidance for Flood risk assessments: climate change allowances. The allowances within the guidance have been revised in line with the UK Climate Projections 2018 (UKCP18).

6.12 The Woodspring Bay 2020 model uses information with regards to climate change however the baseline event is based on 2018. Therefore, to ensure a more accurate representation of baseline (2022 – correct at the undertaking of the modelling) conditions, an uplift based on Table 1 of the Guidance for Flood risk assessments: climate change allowances) was applied. The uplift applied was therefore 4 years of 2000 to 2035 epoch i.e. 20.32mm for the agreed Higher Central allowance for the South West region.

6.13 To ensure the impact of climate change across the design life of the development, an uplift for 100-years (residential developments design life) was applied to the 2022 baseline hydrograph. Both the 'Higher Central' and 'Upper End' climate change allowances were applied as is standard practice, these uplifts in total were 1.03m and 1.39m respectively.

6.14 Similarly to the inflow hydrographs, all Initial water level (IWL) shapefiles within the approved model were amended to include the adjustment for climate change although this is not predicted to impact final results and is mainly used for model initialisation.

Area of England	Allowance	2000 to 2035 (mm)	2036 to 2065 (mm)	2066 to 2095 (mm)	2096 to 2125 (mm)	Cumulative rise 2000 to 2125 (m)
South west	Higher central	5.8	8.8	11.7	13.1	1.21
South west	Upper end	7	11.4	16	18.4	1.62

Table 6-1: Sea level Allowances for each epoch in mm for each year (based on 1981 to 2000 baseline)

Model Updates

6.15 The provided Woodspring Bay Model is an ESTRY-TUFLOW 1D-2D hydraulic model and has been agreed and granted approval with the EA. The Woodspring Bay model covers approximately 131km^2, therefore given the study undertaken by Hydrock is to assess the risk to site and include additional culverts along the Strawberry Line and within the site, it was deemed appropriate to not deviate from the approved approach.

6.16 The model was provided in full by the EA as part of a Product 5 and 7 freedom of information data request. As above, inflow hydrographs have been updated to account for the climate change uplift and no additional changes, other than those mentioned below, are deemed to have been necessary. A summary of changes made to the model are:

- Uplift of inflow hydrographs using the EA Climate Change allowances
- Addition of culverts under the Strawberry Line and within the site boundary
- Reinforced levels of rhynes within the site boundary from topographical survey data.

6.17 The only additions that have been included within the model are centred around the site (either within the boundary or in close proximity). **Figure 6-3** shows a model schematic centred on the site of interest showing the locations of all structures (and channels), and the additional features that have been included in the larger strategic model.

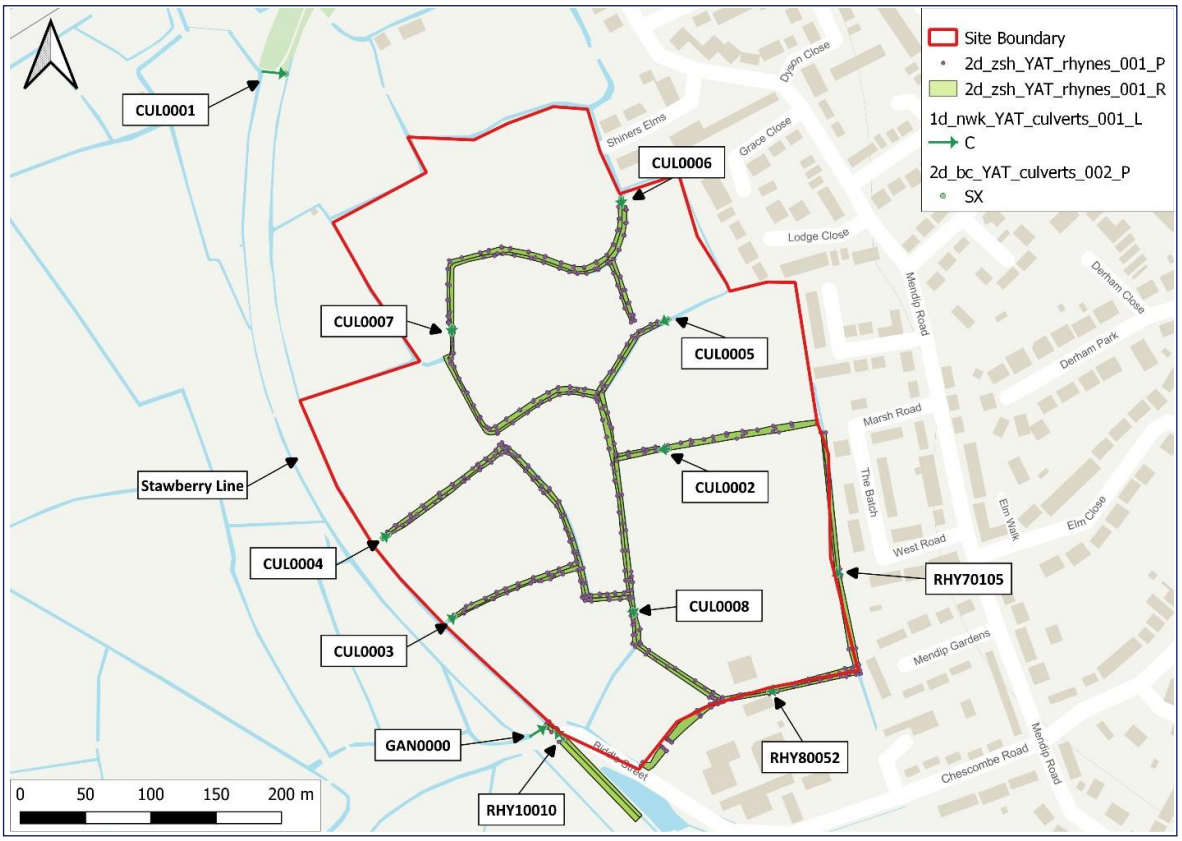

Figure 6-3: Model schematic centred on the site showing additional features included within the model

6.18 The version of the software that was used is:

- TUFLOW – 2020-10-AE
- The following TUFLOW control files were used to run the models:
- TCF – WSB_~e~_~s~_005_YAT_001.tcf
- TRD – WSB_General_Commands_005_YAT_001.trd
- TEF – WSB_Events_005_HYD.tef
- TGC – WSB_005_YAT_001.tgc
- TBC – WSB_Boundary_Control_005_YAT_001.tbc
- All shapefiles and level data (DTM) are referenced within the TCF, TGC and TBC.

Terrain Data and Topographical Survey

6.19 The sources of data used for this hydraulic modelling study were:

- EA 1m Digital Terrain Model (DTM) LiDAR flown in 2017.
- A comparison check was undertaken with the latest EA LiDAR available at the time (2020) and a negligible difference was found between data sets for the site.
- A site topographical survey undertaken October 2022.
- A site walkover was undertaken by Hydrock (November 2022) to obtain spot measurements and additional information for the culverts on site and under the Strawberry Line. However, due to

dense vegetation some areas and culverts were not possible to access.

Structures

6.20 In the original approved model, no culverts within the site boundary or under the Strawberry Line have been included. The majority of additional structures (1d_nwk_YAT_culverts_001_L.shp) included within the site are farm access culverts connecting the rhyne network under farm tracks.

6.21 Where invert levels are not present at the culverts, these were collected following a site walkover or have been interpolated from the nearest known bed level if access was not possible. Where assumptions have been made, a conservative approach has been adopted i.e. choosing the highest bed level and/or lowest bank levels.

6.22 Two culverts, CUL0003 and CUL0004 were not possible to access due to dense vegetation at the time of the site walkover. Assumptions have had to be made on these two culvert sizes and owing to the upstream culvert (CUL0008) being 0.6m it has been assumed these are the same size on the basis that inflows and outflows are limited to this capacity - and this is considered an acceptable assumption in the absence of site clearance/more detail survey being practicable. Whilst this is an assumption it should be noted that due to the extreme flood level that occurs across site in the 1 in 200-year present day event (6.12m AOD) the overall impact of these assumptions is considered negligible as these two culverts become surcharged and provide little impact to mitigate onsite flooding. Topographical survey data shows bank top levels around CUL0003 and CUL0004 to be 5.14m AOD and 5.18m AOD respectively and therefore submerged in approximately 1m deep water.

6.23 In total, an additional 12 culverts have been included as 1D network lines within the model - 10 farm access culverts (0.3-0.75m diameter) and two larger culverts under the Strawberry Line. All culverts measured were circular pipe culverts. **Table 6-2** comprises of a list of additional culverts included with the model and their dimensions.

Culvert ID	Inlet / Outlet Dimension (m)	Culvert ID	Inlet / Outlet Dimension (m)
GAN0000	1.2	CUL0003	0.6
RHY10010	0.7	CUL0004	0.6
RHY70105	0.6	CUL0005	0.6
RHY80052	0.3	CUL0006	0.3
CUL0001	0.9	CUL0007	0.75
CUL0002	0.6	CUL0008	0.6

Table 6-2: List of additional culverts included within the model and their dimensions

6.24 Connecting the sites rhyne network to the wider network south west of the Strawberry Line, two large culverts were measured on a site walkover and included within the model. One culvert to the north of the site (CUL0001) is a 0.9m diameter culvert and one located in the south east corner of the site (GAN0000) was

measured at 1.2m diameter pipe. For the smaller culvert (CUL0001) the outlet to the west of the Strawberry Line was located on third-party land to which access was not possible, as such the culvert included in the model was assumed to have a flat gradient. LiDAR in this area of the culvert outlet did not show clear and accurate coverage with levels suggesting a lowest bed level of 4.32m AOD – approximately 0.3m above the inlets measured invert level.

6.25 A profile of existing LiDAR at the point of this culvert shows ground levels at the outlet (West – 4.32m AOD) and inlet (East – 4.34m AOD) to have a difference in levels of 0.02m, given this small increase in ground levels onto the site the approach taken is considered to be conservative as the flat gradient will allow easier ingress of potential flood waters onto the site from land to the West of the Strawberry Line.

6.26 2D boundary conditions points (2d_bc_YAT_culverts_002_P.shp) with type 'SX' have been snapped to the upstream and downstream of each culvert to allow interaction of water between the 1D feature and the 2D domain, see Figure 9. To reinforce culvert invert levels, the SX points have the Z attribute included to adjust DTM levels at the inlets / outlets of the culvert.

6.27 LiDAR coverage across the site shows the rhyne network however ground levels picked up on the topographical survey have been reinforced using 2d Z Shape files (2d_zsh_YAT_rhynes_001_R.shp | 2d_zsh_YAT_rhynes_001_P.shp). These shapefiles have been applied using the topographical survey to determine bank tops (location and heights) and bed levels where possible. This method has been discussed and agreed as acceptable with the LLFA. However, due to access issues, (overgrown plants and barbed wire fencing) not all rhynes were possible to measure on the site walkover or topographical survey and as such those have been kept as LiDAR in the absence of any further data.

6.28 The EA approved Woodspring Bay 2020 model 'materials' layer has been used to represent roughness across the 2D domain and is based on Ordnance Survey MasterMap data across the site and entire model. This has been reviewed against the latest OS Mapping and there are deemed to have been no significant changes since the approved modelling was carried out.

6.29 The above has been incorporated into an updated version of the Woodspring Bay 2020 model to assess the impacts of tidal flooding to the site in an “undefended” capacity i.e. all formal defences within the model removed. This does not include removing raised topographical features such as the M5 or specifically to the site the Strawberry Line embankment. Outputs from the original supplied Woodspring Bay 2020 model (**Figure 6-1** and **Figure 6-2**).

6.30 The inclusion of climate change allowances and the removal of all formal defences provides a ‘worst-case’ assessment of potential tidal flood risk to the site with flooding predicted to enter the site via the culverts under the Strawberry Line and, in the larger events, potentially overtop the embankment causing more widespread flood extents and greater flood levels onsite.

6.31 In the undefended scenario, this is the removal of all formal defences and, as stated within the Woodspring Bay and Severn House Farm Coastal Flood Modelling and Mapping Report in this scenario “almost the entire coastline would be at still water flood risk during extreme sea level events.”

6.32 In addition to the above, a modelling exercise was undertaken to understand the risk posed to the site when making an allowance for the existing flood defences. This included all the updates outlined above in order to ensure any assessment was as representative as possible of existing conditions – culverts within the Strawberry line etc. This assessment was also progressed to include the proposed development levels to again understand the implications on the development. The main change when compared to the previous

FRA submitted is that it has now been agreed that the design event would be the 1 in 200 year plus climate change event for the defended scenario and not, as previously detailed within the Hydrock report, the undefended. Instead an allowance would be made to ensure future occupants are able to 'manage' any flooding from an undefended scenario. The defences were therefore included, as per the provided details, within the defended scenario to inform development requirements (ground levels etc)

6.33 The final events chosen for both the defended and undefended baseline assessment (with the inclusion of climate change and changes outlined) of flood risk are:

- 2122 0.5% AEP (1 in 200-year) – Higher Central Climate Change Allowances (NPPF) – 1.03m uplift – Design flood for the proposed development

6.34 For the above event flood levels were provided as 6.28m AOD for the defended scenario and 7.88m AOD for the undefended scenario.

Update Model Results

6.35 Maximum on site flood levels are shown in **Table 6-3,** due to the tidal nature of the flood events the flooding onsite is shown to be one flat level with negligible (<10mm) variation. Whilst flood levels are shown to be flat, flood depths vary across the site with the deepest parts attributed to the existing rhyne network.

6.36 Maximum flood depth outputs have been provided for the critical design event, 0.5% AEP (1 in 200-year) plus higher central climate change allowance (2122).

6.37 The results of the modelling confirm the site would be impacted in the event of climate change vents overtopping the defences within the defended scenarios. For all events less than (and including) the 1 in 200 year event no flooding is predicted within the site. Within the undefended scenario, in all events modelled. This again should be considered as worst case and would only occur in the event of a complete failure of all existing defences.

6.38 For the larger events for both scenarios (and when the defences are overtopped in the future) the 2022 0.5% AEP (1 in 200-year), 2022 0.1% AEP (1 in 1000-year) and 2122 0.5% AEP (1 in 200-year) plus Higher Central and Upper End climate change events, flooding is first predicted to enter the site through the two culverts under the Strawberry Line (CUL0001 and GAN0000) however, as levels increase flood waters are indicated to overtop the Strawberry Line in the lower areas to the north causing more widespread flood extents across the site. For the largest events modelled. i.e. the two Climate Change events and 2022 0.1% AEP (1 in 1,000 year) event, flood extents show the Strawberry Line along the western boundary of the site to be entirely submerged (as shown in **Figure 6-5**).

6.39 The 0.5% AEP (1 in 200-year) plus higher central climate change allowance (2122) is the critical design event for this development (100-year design life for residential development). As shown in maximum onsite flood level is 6.28m AOD, across the entire site with depths up to maximum depths on the land parcels indicated to be around 300mm within the proposed development parcels (depths increase within the rhyne network but these have been discounted as rhynes are unaffected by the development). Given the position of the LLFA this event is the design event and is that used to inform potential mitigation required.

Figure 6-4: Present Day 0.5% AEP (1 in 200 year) Tidal Event Maximum Depths with 1% AEP (1 in 100 year) Fluvial Event and EA Flood Zone 3 Extents

6.40 As can be seen through the attached plans the site is shown as being at risk from the modelled events and the LLFA requested design event but it should be noted that during such an event the existing defence infrastructure is overtopped and therefore the level of risk is not limited only to the proposed development site and highlights that large areas of both Yatton and the wider North Somerset area would be at risk during any such event. This is shown in **Figure 6-7** below.

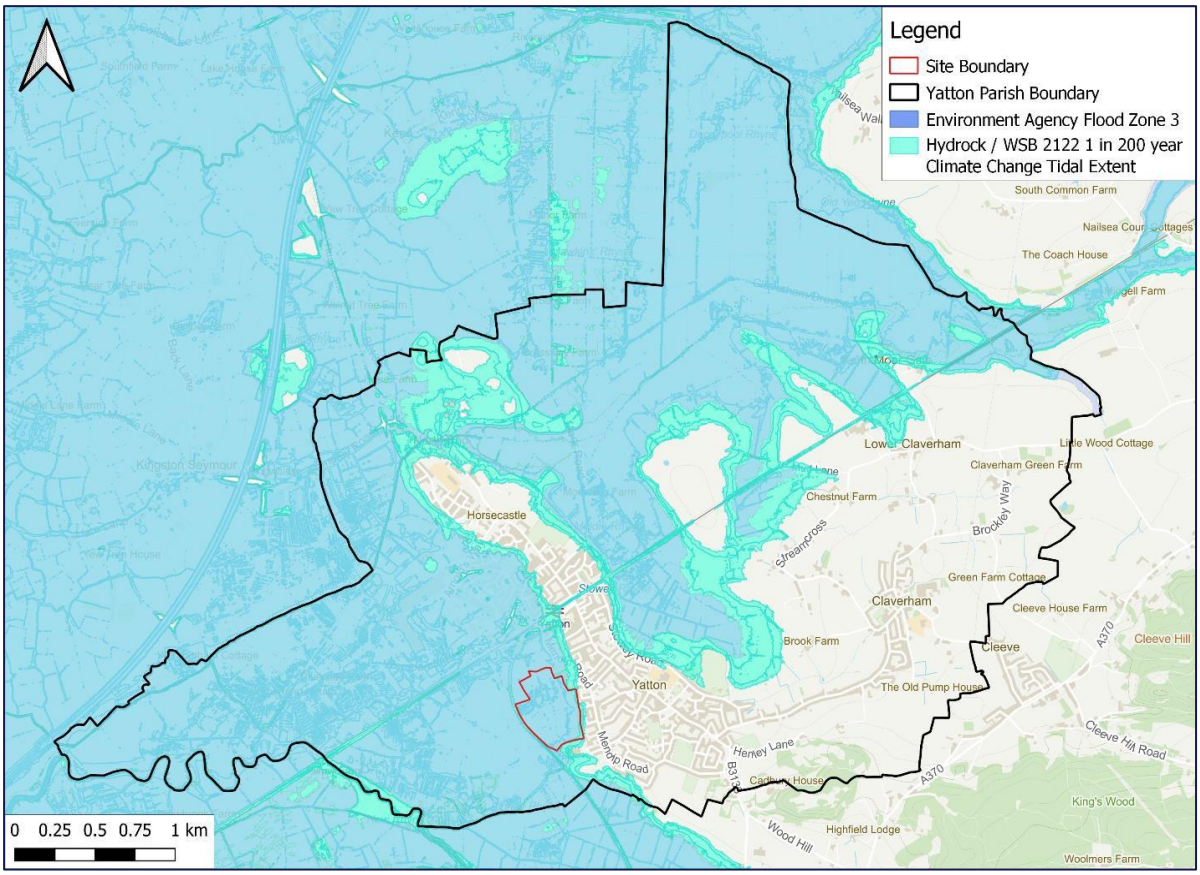

Figure 6-5: EA Flood Zone 3 and Woodspring Bay 2122 1 in 200 Climate Change Tidal Extent – Yatton Parish

Modelling Summary

6.41 The results of the existing Woodspring Bay 2020 Model and the updated modelling exercise undertaken by confirms the site benefits from flood defences up to the 1 in 200-year present day event. However, with the impacts of climate change, these defences are predicted to be overtopped and cause widespread flooding to the Woodspring Bay catchment area in this climate impacts event. The modelling also confirms the site to be impacted by all modelled events in the undefended scenario i.e. removal of all formal defences and that that the LLFA have requested be used to inform worst case risk.

6.42 In the event of the defences being overtopped, flood waters are not only predicted to enter the site via the culverts under the Strawberry Line but also overtop the disused railway line cause widespread flood extents across the site. For the critical design event, 0.5% AEP (1 in 200-year) with higher central climate change allowances (2122) event, the maximum flood level found on site is 6.28m AOD and maximum depths up to 0.3m on the land parcels. These depths are significantly increased when ignoring the impact of the flood defences (circa 2.7m depth) but this is agreed as being a worst case residual risk.

6.43 Therefore, the majority of the site is confirmed to be within the defended Flood Zone 3a in the present day but the entire site is predicted to be within this Flood Zone 3a with the effects of climate change.

6.44 The updated modelling confirms the site would be impacted by flooding in the undefended 0.5% AEP (1 in 200-year) event for the present day thus confirming the EA Flood Zone 3 extents and the SFRA's Tidal Flood Zone 3a extents. Maximum flood levels for the 1 in 200-year event in the present day are 6.12m AOD, which is a constant level and would not impact the site as defended. Therefore the critical flood level for the purposes of the site is 6.28m AOD which is the 1 in 200 year plus climate change event.

Flood Defences

6.45 **Figure 6-8** shows an extract from Figure 040 of the SFRA showing defence types and areas benefitting from defences.

6.46 The SFRA states:

"This dataset shows those areas that benefit from the presence of defences in a 1 in 100 (1%) chance of flooding each year from rivers; or 1 in 200 (0.5 %) chance of flooding each year from the sea."

6.47 **Figure 6-8** therefore confirms the site to benefit from the protection of flood defences up to the 1 in 200-year tidal event, with the mapping showing local flood defences running along the Congresbury and Woodspring Bay frontage. This is further confirmed by the EA Flood Map for Planning service which states:

"This location may have a reduced flood risk because of flood defences on a particular river or sea. The flood defences do not remove the risk completely because they can fail."

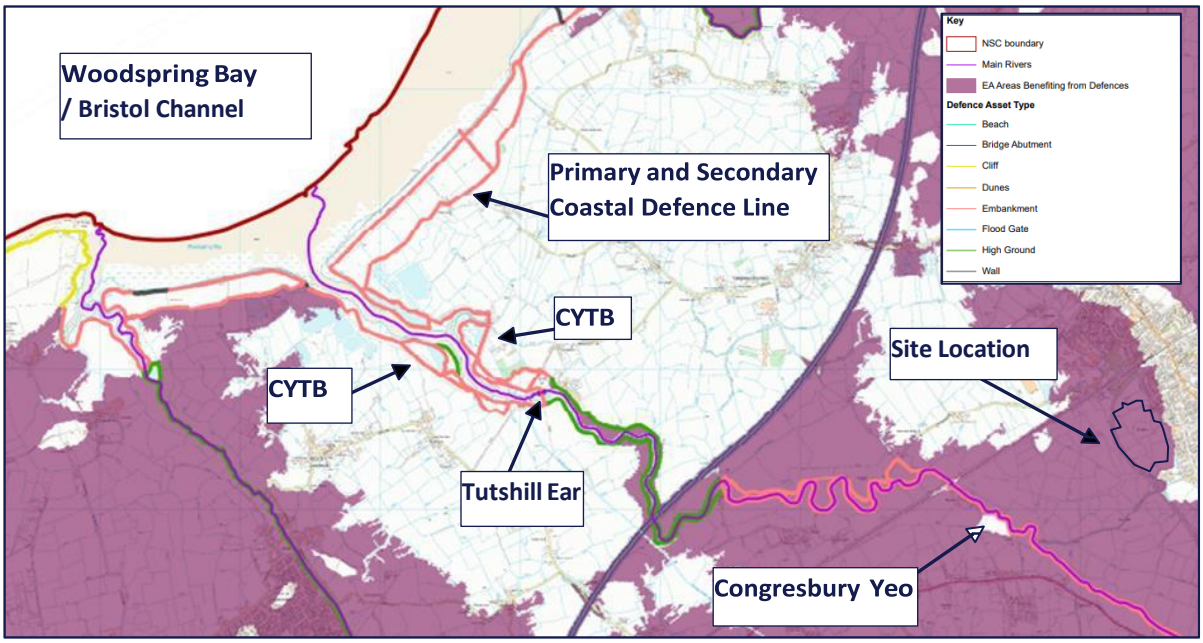

Figure 6-6: Defence Types and Areas Benefitting from Defences - taken from North Somerset Council Level 1 SFRA Figure 040

6.48 The main type of formal flood defence along the Congresbury Yeo are embankments (**Figure 6-8**) which run along the left and right bank of the river. EA product 4 data identify the embankments along the right bank of the Congresbury Yeo to have a lowest crest level of 7.33m AOD and a maximum crest level of 7.79m AOD. In comparison to the modelled flood levels, the crest levels of these embankments indicate the site would be protected against flooding in the 0.5% AEP (1 in 200-year) event for the present day (maximum onsite flood level of 6.12m AOD) however, with the inclusion of climate change, the 0.5% AEP (1 in 200-year) for 2122 shows a maximum flood level of 7.88m AOD and therefore above the maximum crest level for the defences

along the Congresbury Yeo indicating flood defences will be overtopped with the impacts of climate change - as have been confirmed by the detailed modelling.

6.49 The EA FMfP and EA Asset Management Database indicates two water storage areas along the Congresbury Yeo to the south and south east of the site. The SFRA identifies the Gang Wall Flood Storage Area and the Gooseum Rhyne Flood Storage Area are two informal flood storage areas which the SFRA indicate to act as "over-spills" from the Congresbury Yeo and protect Congresbury and Yatton and therefore the site. Whilst the EA Asset Management Database does not give a standard of protection for the areas, the SFRA indicates the two areas to lie within the functional floodplain (Flood Zone 3b) thus confirming the flood storage areas to be in use during a 1 in 30-year event as a minimums and act as defence for the functional floodplain.

6.50 The SFRA states "The Congresbury Yeo was tidal up until 1940 when Phipps Sluice was constructed approximately 6km downstream of the site. The tidal limit was moved further downstream in the 1970s to Tutshill Ear in order to allow the M5 motorway to be built above high tide level (RH, 2009, Section 3.1.4, pp20)." Whilst this sluice limits the ingress of tidal waters up the river and therefore limiting the interaction between fluvial flows from the Congresbury Yeo and high tidal levels from Woodspring Bay and the Bristol Channel, it does not protect against still water flood risk during extreme sea-level events.

6.51 Along the Woodspring Bay frontage at Wick St. Lawrence, approximately 6km north west of the site are a series of embankments, a primary and a secondary defence line. The smaller primary defence along the coastal frontage acts to break waves before reaching the secondary defence as stated within the Woodspring Bay and Severn House Farm Flood Modelling and Mapping Report (JBA, 2020). The crest levels of these embankments range 7.05 – 9.63m AOD and are away from the site, as indicated within the modelling files of the approved Woodspring Bay 2020 model. Similarly, to the defences along the Congresbury Yeo, the minimum crest level of the embankments along the coastal frontage is above the maximum flood level predicted on site in the 1 in 200-year event for the present day (6.12m AOD) however with the again with the inclusion of climate change, flood levels in the 1 in 200 year event (7.88m AOD) for 2122 confirm defences would be overtopped in some places. This is further identified in Figure 5, which confirms the defences along the Woodspring Bay frontage to protect up to the 0.5% AEP (1 in 200-year) event.

6.52 The modelling report also discusses the Congresbury Yeo Tidal Bank Scheme (CYTB) which is another key piece of coastal defence infrastructure. The report states the CYTB "…is a tidal defence scheme that was completed to provide improved flood protection for more than 4,100 homes and businesses in North Somerset. The CYTB scheme involved upgrading the existing tidal banks (widening and raising) along the Congresbury Yeo estuary, and the construction of three new sections of bank. The CYTB scheme is located between the towns of Clevedon (to the north) and Weston-super- Mare (to the south)." The existing embankments were raised to levels of 8.49-9.49m AOD and thus above all flood modelled levels experienced onsite, however, the embankments along the Woodspring Bay frontage are at a lower level and flood waters would still overtop there with the inclusion of climate change allowances. This is further confirmed by results of the original approved Woodspring Bay 2020 model which shows the defences protecting the subject area (including the site) from extreme tidal events in the present day but are overtopped with the impacts of climate change (**Figure 6-9**).

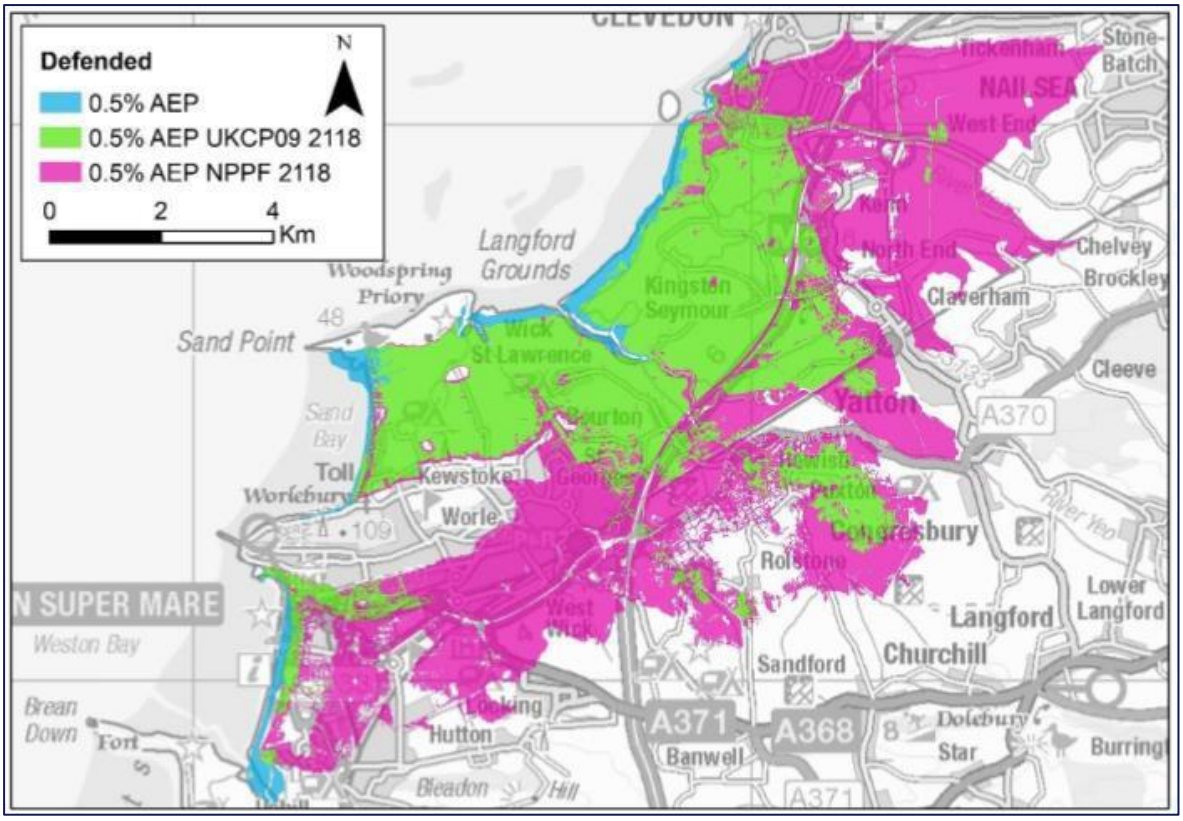

Figure 6-7: Woodspring Bay Defended scenario 0.5% AEP present day and climate change (2118) comparison – taken from Figure 11-2 of the Woodspring Bay and Severn House Farm Coastal Flood Modelling and Mapping Report (JBA, 2020)

6.53 The outputs from the modelling therefore confirms the site to be within the tidal Flood Zone 3a both in the present day and with the inclusion of climate change however, the site is identified to benefit from flood defences up to and include the 1 in 200-year event (Flood Zone 3a) in the present day. With the inclusion of climate change, flood defences are shown to be overtopped and as such the recommended mitigation has provided based on the undefended 0.5% (1 in 200-year) plus higher central climate change allowance up to 2122.

7 Compliance with Local Policy

7.1 This chapter will demonstrate how the proposed development will comply with the policies presented in Local Planning Policy.

7.2 The following policy documents have been identified as being of relevance to this Planning Application and Flood Risk Assessment:

- NPPF (2021)
- National Planning Practice Guidance for Flood Risk and Coastal Change (2022)
- North Somerset Council (Level 1) Strategic Flood Risk Assessment (SFRA) (2020)
- North Somerset Council Development Management Policies (2016)
- North Somerset Council Core Strategy (2017)

7.3 Paragraph 159 of the NPPF states 'Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.'

7.4 With Paragraph 161 states: 'All plans should apply a sequential, risk-based approach to the location of development – taking into account all sources of flood risk and the current and future impacts of climate change – so as to avoid, where possible, flood risk to people and property'

7.5 Paragraph 162 states: 'The aim of the sequential test is to steer new development to areas with the lowest risk of flooding from any source. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding. The strategic flood risk assessment will provide the basis for applying this test. The sequential approach should be used in areas known to be at risk now or in the future from any form of flooding.'

7.6 With regards to the exception test the NPPF states: '…To pass the exception test it should be demonstrated that:

a. the development would provide wider sustainability benefits to the community that outweigh the flood risk; and
b. the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.'

7.7 Paragraph 167 states: '…Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:

c. within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;
d. the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;
e. it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;

f. any residual risk can be safely managed; and
g. safe access and escape routes are included where appropriate, as part of an agreed emergency plan

National Planning Policy Guidance – Flood Risk and Coastal Change

7.8 On the 25th August 2022, the National Planning Policy Guidance (NPPG) for flood risk and coastal change was updated to bring it in line with the latest policy position on flood risk introduced in the updates to the National Planning Policy Framework in 2018 and 2021.

7.9 The key changes to impact the site within the NPPG are as follows:

Design Flood

7.10 Paragraph 002 states: This is a flood event of a given annual flood probability, which is generally taken as:

- river flooding likely to occur with a 1% annual probability (a 1 in 100 chance each year); or
- tidal flooding with a 0.5% annual probability (1 in 200 chance each year); or
- surface water flooding likely to occur with a 1% annual probability (a 1 in 100 chance each year), plus an appropriate allowance for climate change.

Functional Floodplain Definition

7.11 The definition of the functional floodplain is now regarded as the 3.3% AEP, or 1 in 30-year event. Previously this was defined as the 5% AEP or the 1 in 20-year event and will need to be considered.

Sequential Test

7.12 The Sequential Test ensures that a sequential, risk-based approach is followed to steer new development to areas with the lowest risk of flooding, taking all sources of flood risk and climate change into account. Where it is not possible to locate development in low-risk areas, the Sequential Test should go on to compare reasonably available sites:

- Within medium risk areas; and
- Then, only where there are no reasonably available sites in low and medium risk areas, within high-risk areas

Flood Mitigation

7.13 This iteration of the PPG adopts an updated hierarchical approach to flood risk within the guidance. The hierarchy states that (in order of preference) flood risk to development should be reduced through:

- Avoidance of flood risk in plan making, decision making and within sites through sequential allocation.
- Control of flood risk through engagement with flood risk management authorities
- Mitigation of flood risk through use of flood resistance and resilience measures
- Management of residual flood risk through management measures and flood warnings.

Local Policy and Guidance

North Somerset Council (Level 1) Strategic Flood Risk Assessment (SFRA) (2020)

7.14 Section 6.1 of the North Somerset Council SFRA (2020) identifies current levels of flood risk. In relation to Yatton and Congresbury it states

7.15 "The area partly falls within Tidal and Fluvial Flood Zone 2 and 3, however most of the residential areas lie within Flood Zone 1. There are nearby locations that lie within functional floodplain along the Congresbury Yeo and River Kenn, as well as an informal flood storage area ('Gang Wall') for over- spilling from the Congresbury Yeo. There are also large areas at risk from surface water flooding at Yatton and Claverham, south of the railway, in the Stowey Rhyne catchment and also south of Yatton in the valley of the Congresbury Yeo. The area mostly falls within 1km grid squares with 25% of their area susceptible to groundwater flooding. Part of Congresbury and a small area of Yatton would be at risk of flooding if Blagdon Lake failed. Also, there have been 16 sewer flooding events recorded within Yatton between 2005 and 2015, almost all of them being cases of external flooding. More than 50 sewer flooding events have been recorded in Wrington during the same period."

7.16 The site has been identified within the SFRA as lying within the tidal flood zone 3a, with the north eastern boundary of the site being within a 'Historic waterlogged area'. Development Management Recommendations for sites within Flood Zone 3a within the SFRA state:

"Opportunities should be sought: to reduce overall level of flood risk in the area through layout and form of development and appropriate application of SuDS; to relocate existing inappropriate development to land with lower probability of flooding; and to create space for flooding to occur. All existing 'solid buildings' are considered to be within Zone 3a for planning purposes, together with any other land prevented from flooding in a 5% (1 in 20) annual chance event by the presence of solid buildings and existing infrastructure, unless designed to allow the passage of water (even if in Zone 3b on flood map). Sequential Test required."

Level 2 Strategic Flood Risk Assessment

7.17 The site is within Area 4 – Land around Yatton and Congresbury. The summary table for the area suggests that in terms of flood risk *'flooding is extensive but shallow, though risk is relatively high due to low return period of onset' and in terms of the hazard rating 'Low for land between Yatton and Congresbury. Moderate to the west of Congresbury.'*

North Somerset Local Plan

7.18 It is understood that North Somerset is in the process of preparing a new Local Plan to take the place of the Core Strategy and Sites and Policies Plan called Local Plan 2038. However, this is not anticipated to be submitted for examination until Autumn 2023, therefore the current guidance at this time is the Core Strategy and Sites and Policies Plan.

Core Strategy

7.19 North Somerset Council Core Strategy (2017) was fully readopted in 2017. Within the Core Strategy Yatton has been identified as a Service Village which states:

Vision 6 Service Villages Vision

"By 2026 the Service Villages will become thriving rural communities and a focal point for local housing needs, services and community facilities. They will become more self-contained in terms of providing jobs and serving the local and surrounding community for all their day-to-day needs, whilst protecting their individual character."

7.20 Policies relating to flood risk include:

7.21 Policy *CS3: Environmental Impacts and Flood Risk Assessment*

Development that, on its own or cumulatively, would result in air, water or other environmental pollution or harm to amenity, health or safety will only be permitted if the potential adverse effects would be mitigated to an acceptable level by other control regimes, or by measures included in the proposals, by the imposition of planning conditions or through a planning obligation.

Development in zones 2 and 3 of the Environment Agency Flood Map will only be permitted where it is demonstrated that it complies with the sequential test set out in the National Planning Policy Framework and associated technical guidance and, where applicable, the Exception Test, unless it is:

- *development of a category for which National Planning Policy Framework and associated technical guidance makes specific alternative provision; or*
- *development of the same or a similar character and scale as that for which the site is allocated, subject to demonstrating that it will be safe from flooding, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.*

7.22 For *the purposes of the Sequential Test:*

7.23 The *area of search for alternative sites will be North Somerset-wide unless:*

a. *It can be demonstrated with evidence that there is a specific need within a specific area; or*
b. *The site is located within the settlement boundaries of Weston (including the new development areas), Clevedon, Nailsea and Portishead, where the area of search will be limited to the town within which the site is located. Other Local Development Documents may define more specific requirements.*

7.24 A *site is considered to be 'reasonably available' if all of the following criteria are met:*

a. *The site is within the agreed area of search.*
b. *The site can accommodate the requirements of the proposed development.*
c. *The site is either: a) owned by the applicant; b) for sale at a fair market value; or c) is publicly- owned land that has been formally declared to be surplus and available for purchase by private treaty.*
d. *Sites are excluded where they have a valid planning permission for development of a similar character and scale and which is likely to be implemented.*

North Somerset Council: Sites and Policies Plan Part 1. Development Management Policies

7.25 The Sites and Policies Plan brings forward the detailed development plan policies which complement the strategic context set out in the Core Strategy, and was formally adopted in 2015.

7.26 The relevant policy in relation to flood risk is DM1, which states:

DM1: Flooding and Drainage

All *development must consider its vulnerability to flooding, taking account of all sources of flood risk and the impacts of climate change, up to 100 years ahead on residential or mixed-use sites and 60 years ahead on non-residential sites. Exceptions to national policy on flood risk (as elaborated in national technical guidance and in Policy CS3 of the North Somerset Core Strategy) will not be permitted.*

All development that would increase the rate of discharge of surface water from the site must consider its implications for the wider area, including revised or amended proposals. Sustainable drainage systems are expected; alternatives will only be permitted where sustainable drainage is impractical and the alternative does not conflict with national or local planning policy. If discharge of surface water to a public sewer is proposed, the applicant must demonstrate that capacity exists, otherwise, how excess surface water will be managed into the long-term. Essential flood prevention and drainage works for developments that include new housing must be completed prior to first residential occupation, except in the case of phased developments where alternative arrangements are agreed.

O*pen areas, including highways, within developments must be designed to optimise drainage and reduce run-off, while protecting groundwater resources and quality.*

Land *is safeguarded for a strategic flood solution at the former Weston Airfield and to the south of the Cross Rhyne, and for flood management infrastructure along the River Banwell as shown on the Proposals Map.*

Yatton Neighbourhood Plan (2017-2026)

7.27 The Yatton Neighbourhood Plan was developed under the NPPF to reflect the needs and priorities of the community. The relevant policy in relation to flood risk is HO 2, which states:

7.28 HO *2. To avoid any increase in the risk of flooding in Yatton as a result of new house developments*

Sequential Test

7.29 The NPPF Sequential Test requires that a sequential approach is followed to steer new development to areas with the lowest probability of flooding (i.e., Flood Zone 1, then 2, then 3).

7.30 This assessment has demonstrated that the site is currently on land designated as Flood Zone 2 and 3a by the EA's Flood Zone Mapping. The assessment has also shown the site to benefit from significant flood defences however it is not classified by the EA as being 'defended' on their mapping. As such, and based on this assessment, the site is considered for the purpose of this assessment as entirely within Flood Zone 3a.

7.31 Whilst the modelling identifies the site to be impacted by the 3.3% AEP (1 in 30-year) event (FZ3b) in the undefended scenario, the site is not predicted to be impacted by any tidal flooding up to and including the 0.5 % AEP (1 in 200-year) event due to the presence of defences (when considered). Whilst the LLFA has requested that an undefended scenario be unertaken it is considered this is to inform suitable management to adopt a design for exceedance approach. It should be noted that within the SFRA, North Somerset Council delineates Flood Zone 3b "…where the risk of flooding is predicted to be 1 in 20 (5%) AEP or greater, taking into account the presence of defences.". In line with this, the site is concluded as being within Flood Zone 3a due to 3b being defended both present day and development design life.

7.32 With the inclusion of climate change based on the latest EA sea level rise allowances, the 1 in 200- year event (FZ3a) up to 2122 for the developments design life shows the entire site would be within Flood Zone 3a as a result.

7.33 The specific site is not allocated within the local plan, however Yatton (including the site) has been identified within the North Somerset Council Core Strategy (2017) as a Service Village which states: Vision 6 Service Villages Vision - "By 2026 the Service Villages will become thriving rural communities and a focal point for local housing needs, services and community facilities. They will become more self-contained in terms of providing jobs and serving the local and surrounding community for all their day-to-day needs, whilst protecting their individual character."

7.34 In line with NPPF, NPPG and Local Policy CS3 from the North Somerset Core Strategy (2017) development in Flood Zones 2 and 3a must demonstrate that it complies with the Sequential Test as set out in the NPPF. As such, it is recommended the Planning Consultant undertake the Sequential Test in anticipation of the planning submission to confirm site suitability but the current allocation should add weight to the acceptability of residential development in this location..

8 Conclusions and Recommendations

Conclusions

8.1 This Flood Risk Assessment (FRA) report has been prepared by Hydrock on behalf of Persimmon Homes Severn Valley to support a planning application for a proposed residential development of Rectory Farm (North) , Yatton.

8.2 A detailed assessment of flood risk has identified that the site is located within the present-day Flood Zone 1, 2 and 3a (Low, Medium and High Risk) with tidal sources being the dominant risk to the site. The site was also shown to be at 'low' or 'negligible' risk of flooding from surface water, groundwater, and artificial infrastructure sources. Although it is recommended groundwater monitoring be undertaken as part of the ground investigation works, which are yet to start, to assess the level of groundwater on site.

8.3 At a pre-app meeting with the LLFA, Hydrock were instructed to use the “Woodspring Bay 2020” hydraulic model created by JBA to assess the risk of tidal flooding to the site. The hydraulic model was updated to include climate change uplifts and additional structures on site which were not present in the original JBA model. Hydraulic modelling confirmed the site to be at high risk of flooding in the present day 1 in 200-year extreme tidal event but benefits from significant flood defences along the Woodspring Bay frontage and along the Congresbury Yeo. With the impacts of climate change, the existing defences are predicted to be overwhelmed as such, and for the purposes of this report this 1 in 200 year plus climate change defended scenario is to be used as the design event and this provides a predicted flood level of 6.28m AOD within the site and it is this that has been used to inform mitigation measures for the proposals.

8.4 In the undefended 2122 0.5% AEP (1 in 200-year) plus Higher Central climate change allowance design event, the site is predicted to be completely inundated with flood waters with a maximum flood level of 7.88m AOD. In order to address the LLFA’s request, this increased and ‘residual’ flood level has been used to inform management measures for the site to ensure that in the event of a complete failure of the flood defences procedures are in place to ensure the risk to occupants is managed and low. This would be secured through a FEMP and given suitable warning times (in excess of 15hours from first ‘breach’ of the flood defence to inundation at the site, this is considered achievable and acceptable.

8.5 The proposed residential led development is classified as 'more vulnerable' in accordance with the NPPG and on the basis that the site is indicated to be within Flood Zone 3a in the present day and in the future, it is recommended a Sequential Test be undertaken by the Planning Consultant to confirm site suitability.

8.6 Following this, an Exception Test should also be carried out, with this report satisfying part ‘b’ of the Exception Test, providing recommended mitigation to ensure the site will be safe from flooding across its design life.

8.7 Given the predicted impacts of climate change it is recommended that building FFLs be raised as high as practically possible but based on the agreed design event these should be set to a minimum level of 6.68m AOD (600mm freeboard above the 2122 0.5% AEP (1 in 200-year) Higher Central tidal level), to ensure a significant freeboard above any potential flooding and a safe refuge area is provided. This approach is in line with both local and national policy.

8.8 The proposed site access roads are shown to be at risk of flooding from tidal sources in the future. As such, a

Flood Warning and Evacuation Plan is recommended to highlight the flood risk to visitors and details the procedures to follow in the event of a Flood Warning from the EA being issued for the area.

8.9 Given the dominant source of flooding to the site is tidal, raising the ground is less likely to impact on maximum water levels from tidal sea flooding. As such, flood compensation storage is not deemed necessary.

8.10 This report therefore demonstrates that, in respect of flood risk the residential development of the site:

- Is suitable in the location proposed.
- Will be adequately flood resistant and resilient.
- Will not place additional persons at risk of flooding, and will offer a safe means of access and egress or provide a Flood Evacuation plan where applicable.
- Will not increase flood risk elsewhere as a result of the proposed development through the loss of floodplain storage or impedance of flood flows.
- Will put in place measures to ensure surface water is appropriately managed.

8.11 As such, the development would meet the flood risk requirements of the NPPF and other relevant planning requirement

9 Disclaimer

9.1 The conclusions and recommendations contained herein are limited to those given the general availability of background information and the planned usage of the site.

9.2 Third party information has been used in the preparation of this report, which Brookbanks, by necessity assumes is correct at the time of writing. While all reasonable checks have been made on data sources and the accuracy of data, Brookbanks accepts no liability for same.

9.3 The benefits of this report are provided solely to Persimmon Homes Severn valley for the proposed development Land at Rectory Farm only.

9.4 Brookbanks excludes third party rights for the information contained in the report.

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Email from the EA dated October 2023

From:	Simon Mirams
To:	Bull, Richard; Archer, Sam; Sustainable Places, NWX
Cc:	Plaw, Marcus; MacDougall, Dominic
Subject:	RE: Land at Rectory Farm (North), Yatton
Date:	25 October 2023 10:41:19
Attachments:	image001.png image121844.png image984652.png image555221.png image257072.png

Hi Richard,

I understand that you spoke with Marcus last week and that you were due to catch up with Sam this week about the below email and was just wondering if you have had a chance to do this at all?

As I am sure you can appreciate we are keen to get this wrapped up as soon as possible and hopefully before you leave the Agency so any update would be very much appreciated.

Thanks,

Kind Regards

Simon Mirams
Director of Hydrology

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E: Simon.Mirams@brookbanks.com
W: www.brookbanks.com

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From: Simon Mirams
Sent: Wednesday, October 18, 2023 10:42 AM

To: Bull, Richard <richard.bull@environment-agency.gov.uk>; Archer, Sam <sam.archer@environment-agency.gov.uk>; Sustainable Places, NWX <nwx.sp@environment-agency.gov.uk>
Cc: Plaw, Marcus <marcus.plaw@persimmonhomes.com>; MacDougall, Dominic <dominic.macdougall@persimmonhomes.com>
Subject: RE: Land at Rectory Farm (North), Yatton

Hi Both,

Hope you are well. Sorry to chase but would you be able to provide you/any thoughts on the below email please. Hopefully, you/E&R team are happy with the below such that you can agree, on this occasion, a higher than standard tolerance given the below evidence.

Should you need anything further from me please let me know.

Thanks,
Simon

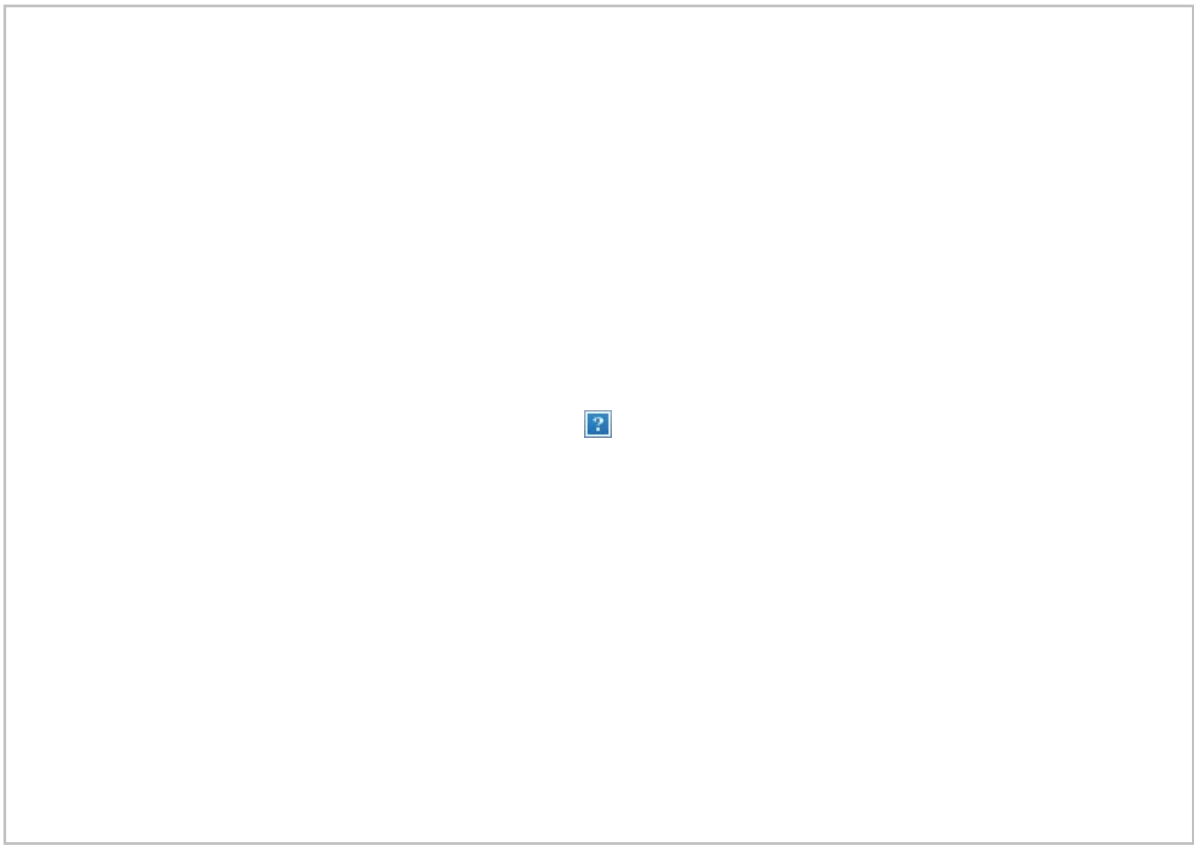
From: Simon Mirams
Sent: Monday, October 9, 2023 5:12 PM
To: Bull, Richard <richard.bull@environment-agency.gov.uk>; Archer, Sam <sam.archer@environment-agency.gov.uk>
Cc: Plaw, Marcus <marcus.plaw@persimmonhomes.com>; MacDougall, Dominic <dominic.macdougall@persimmonhomes.com>; Alejandro Marcotegui <Alejandro.Marcotegui@brookbanks.com>
Subject: Land at Rectory Farm (North), Yatton

Hi Both,

Hope you are well and not long now Richard….got your tee time booked for 1st November?!

Further to our call a few weeks ago we have gone back through the modelling, and we are down to an increase of around 15mm now. However, I was in a meeting recently with someone from JBA and raised the subject of modelling tolerances and specifically on tidal models. It turns out this individual worked on the Woodspring Bay model and said that the tolerances within that model would be significantly greater than 10mm and referred to an EA document in which the coastal flood boundaries are discussed. This document (downloadable from here) discusses the confidence in coastal boundary values throughout the UK and provides discussion on the confidence of these values. Whilst this is separate to the Woodspring Bay model it should be noted that the boundaries being discussed are those that were input to and scaled for determining the flood outputs within the Woodpsring Bay model and therefore flood risk to the site and surrounding area.

Within the document is a lot of discussion around the confidence of the modelling. Whilst this doesn't state 'tolerance of XXXmm' it does refer to a 95% or 97.5% confidence which the person from JBA I spoke to said he would expect this to be in the region of 300mm tolerance owing to uncertainties and scaling of regional gauges. This is inferred by the below graph which shows a significant variance for the Avonmouth gauge (obviously not far from the application site).



Given the document, the conversation I had with JBA, and the above graph would this alter the EA's position on model tolerance for the Woodspring Bay model at all? Whilst I recognise the 'rule of thumb' of plus or minus 10mm I would maintain (and supported by JBA) that this may not be entirely relevant for this model given the complexities and tidal boundaries. As such it is felt that whilst our 15mm increase is outside the 'general' value (**I have looked by cant find this in policy, guidance or TUFLOW manual, would you be able to provide a link/reference for future use please?**) it is considered to fall well within the model and regional specific modelling tolerance which is existing as being more like 300mm given uncertainty of the boundaries. The closest I have been able to find is the follow extract taken from the Hydraulic Modelling: Best Practice website

A well-calibrated model should match reliable recorded peak data (typically to within ±0.15 metres) and provide a good representation of hydrograph timing and shape.

Would you be happy to accept this as justification for the proposed 15mm increase?

To hopefully add weight to the above it should also be noted that in Scotland they acknowledge the variance for coastal boundaries and have a standard 150mm tolerance for areas that are at tidally dominated flooding. Given our offsite increase is 15mm this would only be 10% of what they deem acceptable. For ease I have included a link to a copy of their guidance.

I trust this makes sense and hopefully provides would with sufficient evidence to confirm that there is suitable guidance documentation (both nationally and locally) which indicates that tolerance for this complex coastal model should be, at minimum, 150mm rather than the more common 10mm for smaller scale fluvial models. Welcome your comments and hopefully positive outcome!

If easier to discuss, please feel free to give me a call.

Thanks,
Simon

Rapport Note dated 2 February 2024

Land to North of Rectory Farm, Yatton

Persimmon Severn Valley

Flood Risk Technical Note

January 2024

Document Control

Job No.	24-0161	
Project Name	Land to North of Rectory Farm, Yatton	
Document Title	Flood Risk Technical Note	
Status	First Issue	
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1 Introduction

1.1 This Technical Note has been prepared in response to the submitted Flood Risk Assessment (Ref:23257-HYD-XX-XX-RP-FR-0002, prepared by Hydrock Consultants Limited on 20th March 2023) and comments received from both the Environment Agency (EA) and North Somerset Council (NSC) in their roles as a statutory consultee to the submitted planning application (Ref 23/P/0664/OUT).This document was superseded by an updated Flood Risk Assessment (Ref 11069_FRA_Rv0, prepared by Brookbanks on 12th September 2023).

1.2 The EA (Ref: WX/2023/137123/01-L01, dated 10th May 2023) and NSC (Ref:23/0664/OUT, dated 15th May 2023) have provided separate consultation comments based on the submitted documents that have been prepared by Hydrock. Further to the received comments, a response was prepared by Brookbanks (Ref: Land to North of Rectory Farm, Yatton – Flood Risk- Consultation Response Rv2, dated 2nd August 2023). Following this response, discussions with the EA have been ongoing related to the points raised within the original letter.

1.3 It should be noted that no formal response from either the EA or NSC has been received to any documents other than the originally submitted Hydrock FRA. Despite this, discussions have been ongoing with key points and dates summarised below.

a) 13th September 2023 – email sent from Brookbanks to EA to set out key points for discussion at a meeting to be held on 14th September with Richard Bull and Sam Archer. Key points for discussion included model version being used, flood levels and the approach in managing the risk – i.e. proposed finished floor levels.

b) 27th September 2023 – Summary email of the points discussed within the meeting on 14th September were circulated.

c) 9th October 2023 – Email sent from Brookbanks to EA. This email focussed on providing further justification/evidence to the EA on the tolerances of tidal models and particularly the Woodspring Bay model. This was based on readily available documents (both national and Woodspring Bay specific). Within this email, several questions were asked of the EA to confirm certain elements of what is considered acceptable, but this email provided evidence to state that a 150-300mm tolerance would be considered more reasonable for tidal model – which significantly exceeds the modelled 17mm experience.

d) 11th January 2024 – EA email to Rappor with confirmation that internal discussion (in response to email dated 9th October 2023) has been concluded and dates for a follow up meeting provided.

e) 16th January – Meeting (virtual) with Will Thomas and Sam Archer to discuss latest comments.

1.4 It should be noted that in November 2023, Rappor were appointed by Persimmons Homes Severn Valley to undertake a review of the previously undertaken work (by Hydrock and Brookbanks), continue discussions with the EA (most notably the meeting held on 16th

January 2024) and prepare a technical response with supporting evidence to address the consultee comments but also all discussions held since this date. The structure of this note is as follows:

a) Summary of submitted Flood Risk Assessment (and Brookbanks' document)
b) Summary of Initial Response to EA/NSC (by Brookbanks)
c) Further Response to outstanding comments following discussions.

2 Summary of submitted Flood Risk Assessment

2.1 As stated above, two Flood Risk Assessment documents have been submitted in support of this application:

a) Flood risk Assessment prepared by Hydrock Consultants (Ref:23257-HYD-XX-XX-RP-FR-0002, on 20th March 2023)
b) Flood Risk Assessment prepared by Brookbanks (11069_FRA_Rv0, on 12th September 2023)

2.2 Both documents were prepared to provide a detailed assessment of flood risk to the site. These assessments were undertaken in line with National Planning Policy Framework requirements and looked at fluvial, tidal, surface water, groundwater, and reservoir sources of flooding to the site. To assess the level of risk (and impacts of the development on said risk) several different sources of information have been used. These are consistent across both reports and are as follows:

a) Fluvial Flood Risk – Flood Map for Planning
b) Tidal Flood Risk – Woodspring Bay 2020 tidal model. Focus has been on the 1 in 200 years plus climate change (2118 to be consistent with provided data) return period event for both the defended and undefended scenarios. This has been to meet required design events in line with policy and EA requirements.
c) Surface Water Flooding – The Hydrock report has been based on the available flooding mapping, but the Brookbanks report has utilised site-specific direct runoff modelling that has been undertaken for the site. This specific modelling was undertaken for both the present day and post-development scenario at the request of the LLFA in some of their comments.
d) Reservoirs and Groundwater Flooding – No site-specific assessments for either of these has been undertaken and readily available information (SFRA, mapping etc) was used to assess the risk from these sources.

2.3 It should be noted that both reports have used the Woodspring Bay model to assess the potential impacts of the proposed development on the surrounding area through including proposed ground levels within a 'Post Development' scenario. This, and the outputs from this, are discussed elsewhere in this note.

2.4 Both reports have provided the same conclusions for each assessed source of risk, and these are summarised as follows:

a) Fluvial Flood Risk – The site is concluded as being at 'low' risk from fluvial flooding and outside all predicted flood extents from approved fluvial only models.
b) Tidal Flood Risk – This site is located within Flood Zone 3 and at 'high risk' from tidal flooding. A review of the Woodspring Bay model has shown that the existing coastal defences provided protection up to the 1 in 200year event. However, when making an allowance for climate change over the development's design life, the defences (as they are now) are exceeded and flooding at the site (and surrounding area occurs). The site also lies within the Undefended 1 in 200 year and 1 in 200year plus climate change flood extents.
c) Surface Water Flooding – Detailed site-specific modelling has confirmed that the majority of the site is at 'low' risk from this source. The only areas where an

increased risk is predicted is consistent with the existing ditch network within the site and localised areas of lower elevated land.

d) Reservoirs – The site is located within the 'Maximum Extent of Flooding' associated with a reservoir failure. This would be in the event of a catastrophic failure of the Blagdon Lake, which is around 10km from the site. Given the monitoring and maintenance requirements for such reservoirs under the Reservoirs Act 1975 in England, which requires reservoir owners to regularly inspect and maintain the reservoirs, the risk of such an occurrence is very low and would be considered a 'residual' risk.

e) Groundwater – It has been concluded that given the identified Historic Waterlogged Area in the northeast of the site and the identified clayey soils from Soilscapes mapping, there is potential for high groundwater (subject to confirmation) and therefore potential for groundwater emergence in the waterlogged areas.

2.5 Within both reports and owing to the level of risk being identified with respect to tidal flooding, mitigation measures have been proposed. The principles are consistent across both reports and included recommended the raising of ground levels. The Hydrock report proposed raising ground levels above the 1 in 200 years plus climate change tidal flood level (7.88m AOD) with finished floor levels then being 600mm above this and at a level of 8.48m AOD. However, the later Brookbanks report (which followed discussions and meetings with the EA) proposed to use the defended flood levels rather than the more 'worst case' undefended levels within the Hydrock report.

2.6 This revised approach was also in line with another application within near proximity to the site which received no EA objection. On this basis and using the precedent set-in terms of flood risk management, it would propose to set finished floor levels above the 1 in 200 year plus climate change flood level from the defended scenario and a lower level of 6.28m AOD. Again, finished floor levels would be proposed to be 600mm above this and at a level of 6.68m AOD.

3 Summary of Initial Response to EA/NSC (by Brookbanks)

3.1 The EA (Ref: WX/2023/137123/01-L01, dated 10th May 2023) and NSC (Ref:23/0664/OUT, dated 15th May 2023) have provided separate consultation comments based on the submitted Flood Risk Assessment by Hydrock. Whilst it is understood that the updated Flood Risk Assessment and the Technical Note (prepared by Brookbanks on 12th September and 2nd August respectively) were submitted, no formal response has been received from either party at the time of writing this response.

3.2 There were parallels within the comments received by both parties and these are summarised as follows:

a) EA Comment – Further investigations are needed as to the loss of floodplain storage because of the proposed ground raising. This would be for the defended scenario for a 1 in 200 year plus climate change tidal event.
b) EA Comment – Need for further discussion around fluvial risk to the site owing to modelling that supported a neighbouring application that was also prepared by Hydrock.
c) NSC Comment – Further justification as to the 'dominant' source of risk and also consideration for residual risks and ensuring the development is safe for its lifetime.
d) NSC Comment – confirmation of the scenario being mitigated for is required as defended/undefended scenarios require different measures.
e) NSC Comment – Any land raising should not be detrimental to other types of flood risk and the modelling should be used to demonstrate flood risk is not increased elsewhere.
f) NSC Comment – Confirmation as to the potential impact the proposed land raising has on surface water flow routes currently predicted.
g) Other comments have been provided (6no. in total) but these relate to the surface water drainage elements of the application, and these are being deal with by Hydrock and therefore will be addressed via a separate response and do not form part of this note.

3.3 The technical note prepared by Brookbanks (Land to North of Rectory Farm, Yatton, dated 2nd August 2023) provided a response to each of the above comments. These responses are also reflected within the updated Flood Risk Assessment Document (dated 13th September 2023) that have been produced and submitted. As outlined above, no formal response to either of these documents have been provided but further discussions have taken place in the form of emails (those highlighted in Para 1.3) and a follow-up meeting on 16th January 2024.

3.4 As a summary, the responses provided by Brookbanks identified that the assessment undertaken by Hydrock was based on the Undefended scenario to adopt a conservative approach in assessing risk but more importantly, in terms of mitigating any resultant risks to the proposed development. This approach differs from that within neighbouring applications (most notably the Mead Development application at Ebdon) where the defended scenario has been used to determine mitigation and this has been accepted by the EA without the need to assess the impacts of the proposed development on 3rd party land – such as the comments raised formally by the EA and NSC. To ensure consistency with approved planning applications, Brookbanks undertook a further modelling

assessment based on the defended scenario and ran this for both the baseline and proposed scenarios to determine the level of risk, and any impact on third party land.

3.5 The modelling exercise undertaken by Brookbanks (and detailed in the submitted technical note, dated 2nd August 2023) identifies that there is a significant reduction in flood volumes within the model domain when comparing the undefended (4.2million wet cells) and the defended scenario (1.3m million wet cells). In addition, the inclusion of the defences also significantly alters the timings of flooding at the site and surrounding area with flooding in the defended scenario being slower to impact the site than that of the undefended scenario.

3.6 The Brookbanks note continues to state that whilst the impact to third party land was raised by the EA, it was confirmed in a telephone conversation, that this was not to look at provision of compensation storage and more to understand what, if any, impact the proposed ground raising had on the surrounding area. The provided note identifies that a review of the pre and post development scenario flood outlines has been undertaken and a localised increase in flood depths was shown. This was limited to the area immediately around the site and most notable around the northern and eastern site boundaries. The Brookbanks note identifies that these increases were in the order of 30mm-50mm. However, Rappor have reviewed the provided model outputs (those provided to the EA on 17th January 2024) and this confirms that the increase is up to 17mm when using the most recent proposed site levels and much reduced compared to the values quoted. This is discussed further within Section 4 of this document and following subsequent meetings with the EA about this issue.

3.7 In relation to the EA's comments on fluvial flooding, Brookbanks have addressed this by stating that whilst a model was undertaken by Hydrock for the site to the immediate south of the Rectory Farm (North) site, these files are not publicly available as were prepared / provided to support a specific planning application and applicant. On this basis they are not available to Persimmon and are unable to be obtained and reviewed to understand their acceptability. Additionally, a review of the submitted flood risk assessment / modelling report for the neighbour site (and modelling referred to by the EA) has confirmed that this does not follow EA guidelines for fluvial modelling as is a combination of tidal and surface water modelling – see paras 2.19 – 2.21 of the Brookbanks documents.

3.8 Brookbanks therefore concluded that this modelling was, if anything, overly conservative and a more appropriate approach would be to use the publicly available and approved Congresbury Yeo 2015 model to determine the fluvial risk to the site. This modelling confirmed that the site is outside all provided fluvial outlines.

3.9 In response to the NSC comments the provided Brookbanks note acknowledges the NSC comments about mitigation measures being different between the defended and undefended scenarios and this is addressed further within the updated 'Brookbanks' FRA document.

3.10 With respect to the comments referring to 'other types of flooding' it would be noted that risks from tidal and fluvial flooding would be considered as being within the EA's remit owing to the main river nature of the Congresbury Yeo. As such, and given the raised comments, it is considered that NSC are referring to surface water flooding as this fall is the responsibility of Lead Local Flood Authorities. The Brookbanks Technical note details how a surface water runoff modelling exercise was undertaken both to confirm the existing level of risk (which matched the EA's mapping) but also to understand what, if any, impact the proposed mitigation measures have on the pluvial flood risk. Brookbanks have undertaken a review and confirmed that the inclusion of the (worst case) mitigation measures (i.e. raising ground level above the undefended 1 in 200 years plus climate change tidal flood

levels) results in no detrimental impact to third party land and, if anything, the proposals provide additional storage within the Rhyne/ditch network through the proposed ground raising and required embanking to meet the requirements of the Lower Severn Internal Drainage Board (LSIDB). Therefore, and for the conservative approach, the development has no impact on the surface water flooding regime.

4 Outstanding Comments - EA

4.1 As outlined within Section 3, a detailed technical note, further modelling works, and an updated FRA has been prepared to address the comments received from both the EA and NSC to the original application. However, and despite best efforts of the applicant, no formal response to these documents has been received. That said and owing to the outstanding points primarily being related to the tidal risk, discussions (as outlined in Para 1.3) with the EA have been ongoing.

4.2 The pluvial modelling confirmed no increase in risk as a result of the development, and that fluvial flooding is based on main river flooding in the absence of suitable modelling elsewhere, no further discussions have been held with NSC as it is understood that once the EA are accepting of the latest approaches/response that this would also meet the remaining outstanding NSC comments which relate to confirmation of the proposed mitigation measures. This position was confirmed with the EA (at the 16th January meeting) who would, on acceptance of the approach, liaise with NSC to confirm the outstanding tidal elements were now acceptable.

4.3 Following the meeting held with the EA on 16th January, the outstanding comments were discussed and confirmed. These comments have been further narrowed down since the formal consultation response and are now focussed around the following key areas:

a) Modelling Tolerance – i.e. variations caused during the numerical calculations within the modelling process. This is widely accepted through model reviews and levels that fall within these tolerances are discounted as ‘modelling oscillations’ rather than a definitive impact.
b) Third Party Increase – linked to the ‘Model Tolerance’ point but a standalone point.
c) Mitigation Measures – proposed measures to ensure requirements are met.

4.4 On review of the modelling works undertaken, the proposed ground raising at the site results in all of the proposed development being above the modelled 1 in 200 year plus climate change tidal flood depths, but a comparison of the pre and post development grids has shown that flood depths within the immediately surrounding area do have a variance of a fairly consistent 17mm, see below figure.

4.5 The modelling shows flood level variances around the perimeter of the site that affects only a very localised area with no increases being predicted west of the Strawberry Line. On review of the increases, those to the north and south of the site are within farmland areas but those to the east of the site are shown to impact existing properties, and it is this that the EA have commented on.

4.6 In terms of the oscillations in hydraulic modelling studies, a tolerance is always provided owing to these being a computerised representation of reality and therefore a tolerance is provided for either discrepancies within the input data or because of the calculations the software runs during the simulation – referred to as oscillations within the calculation process. Whilst the EA nationally adopt a typical +/- 10mm tolerance (i.e. any variances within this limit being acceptable and considered as numerical oscillations) this is not detailed within any policy or guidance document. The model tolerance being policy/guidance was queried with the EA via email on 9th October with a request for this guidance/policy to be shared, but to date nothing has been received.

4.7 Whilst it is noted that there is a general 'rule of thumb' applied to model tolerances, it is considered, and widely accepted, that any agreed tolerance should be agreed on a model-by-model basis owing to the very individual nature of each study. Each model is very different in terms of complexity and data availability and as such is noted within the EA's national model review documents, the 'confidence' of a model (and hydrology) is reviewed and specific to each model. A review of publicly available documents on model tolerances, and specifically tidal models, was undertaken and a summary provided within the email from Brookbanks to the EA on the 9th October which makes reference to tolerances and modelling uncertainties detailed within an EA Report titled 'Coastal flood boundary conditions for the UK: updated 2018: Technical Summary Report (Ref: SC060064/TR6). Whilst this document is separate to the Woodspring Bay model, it should be noted that the

boundaries being discussed within the report are those that formed some of the input tidal levels within the provided modelling and used to generate the outputs for all events and all scenarios.

4.8 Within the document are extensive discussions around the confidence of modelling and specifically around tidal modelling and dataset at various regions around the UK. The report quotes a confidence of 95%. Whilst a specific tolerance value is not quoted, discussions with the wider modelling community have stated that for this model, and more generally for tidal models, this confidence would result in a tolerance 'in the region of 300mm' owing to the uncertainties and scaling of regional gauge data – i.e. gauged data may be several km from study site, and this would impact levels. This value is therefore well more than the 17mm increase shown in the modelling exercise undertaken to data.

4.9 This point was discussed with the EA and at the meeting on 16th January, the EA confirmed that a 150mm tolerance is 'more reasonable' for the Woodspring Bay model. This tolerance having been discussed and agreed with the Evidence and Review Team. Given the current modelling comparison shows a difference of 17mm this falls well within the 'more reasonable' tolerance and therefore should be considered acceptable and a result of modelling oscillations. However, the EA (at the meeting) continued to state that whilst the tolerance is considered as being more reasonable at 150mm, they would not accept this, nor the 17mm increase, as part of their planning consultation. The EA explained that due to a comparison of pre and post development having been undertaken any tolerance would be consistent between these and therefore the 150mm would not be applicable. In response, discussions were had around why, and how, the EA could therefore justify the more typical +/- 10mm tolerance and why model specific reviews (as is included in their standard model review documents) could not be applied. The EA said that in terms of planning they would be set at the 'standard' tolerance and would not be accepting of a 17mm difference despite confirming a 'more reasonable' tolerance for the Woodspring Bay model of 150mm and acceptance that numerical oscillations would occur, and more likely for large scale and tidal models.

4.10 Given the EA's position on the tolerance, and with a view of working to an acceptable position, the nature of the increases was confirmed and specifically around the potential change of risk and the consequence this 17mm difference would have on the third-party land.

4.11 On review, and as shown on Figure 1, the increases because of the development only impact a localised area around the site boundary impact <10 existing properties. From the available mapping it is unclear whether the buildings themselves are affected or if it is just the gardens. However, and to adopt a conservative approach, it is assumed that the 'properties' are affected.

4.12 Whilst there is an increase in the tidal flood level being predicted, it should be noted that the properties are already shown as being located within Flood Zone 3 on the Flood Map for Planning – though the site and surrounding area is shown to be defended against the 1 in 200 year present day tidal event.

4.13 As a result of the development, the extent of flooding (see below) does not increase and therefore no new properties are 'at risk'. Additionally, the properties where the 17mm fluctuations are predicted are at no 'change of risk' as remain as being Flood Zone 3. It should also be noted that the flood depths within the baseline assessment to these properties (and surrounding farmland) vary from 0.4m to 1.3m within the baseline assessment. These depths are for the defended 1 in 200 year plus climate change event

and on the basis that no upgrades to the defences are undertaken up until the year 2118 (i.e. the extent of the development design life used in the modelling). Whilst there are no formal plans available for North Somerset or the EA's proposals for upgrading the flood defences, owing to the number of properties shows as being at risk when making allowance for the impacts of climate change, it is considered reasonable that the defences would be upgraded to ensure a 'live' 200year standard of protection is maintained (i.e. upgrading works to keep pace with sea live rise through climate change). This approach, i.e. ongoing upgrading works, is outlined for neighbouring areas and set out within the Weston-Super-Mare Strategic Flood Risk Assessment.

4.14 With respect to the impact of climate change and potential for upgrading of flood defences, the Silverthorne Lane application is particularly relevant as within the Secretary of State's report it concluded that (para 455), that strategic flood defences would come forward given the 'clear and present danger of flooding to Bristol City Centre'. This therefore identifies that whilst (at the time of decision) no formal plans were 'in place' it is reasonable to assume that measures will be taken to manage the danger. It is therefore assumed that the same would be sensible for North Somerset.

4.15 This approach to the upgrading of the flood defences was discussed at the meeting with the EA on 16th January and it was agreed that despite formal plans not being available this was considered a 'logical' assumption. On this basis, and given the modelling is for the limit of the sea level rises through climate change it is considered that the increase in flood depth is not only based on a conservative approach (100year climate change on 200year tidal event with no upgrading works to the defences) but it is noted that the consequences of a worst case 17mm variance is considered as being 'low to negligible' on the basis of pre-development flood depth to these areas being circa 2m – therefore such a variance equates to a less than 1% increase – and no change in risk or increase in Flood Zone 3 extent.

4.16 Whilst it is agreed that third party increases in flood risk should be avoided where at all possible, it is considered that the nature of this assessment, and the more reasonable tolerances of the modelling would result in the 17mm increase being acceptable based on the arguments outlined above. However, it would also be important to highlight that as part of the works since the original EA response, a series of options for the site, and specifically the amount of ground raising, has been undertaken to, where possible minimise or remove the increases to third party land.

4.17 The key element reviewed for this relates to the amount of ground raising. Initially, the ground raised was set to a level above the undefended 1 in 200 year plus climate change tidal event. This was chosen to adopt a conservative approach whilst ensuring all proposals remained 'dry' during the extreme events. However, and noting the consultation comments from both the EA and NSC both stated that mitigation during the defended scenario would be considered acceptable (refer to the Mead Realisations application, ref 20/P/1579/OUT). When using the defended scenario, the flood levels, and therefore ground raising required are reduced by from a recommended level of 7.88m AOD (from Hydrock report based on the undefended scenario) to a much-reduced level of 6.28m AOD (para 4.57 of the Brookbanks report) when using the defended scenario.

4.18 The revised mitigation approach (i.e. using the defended scenario) has been discussed and agreed with the EA as appropriate. It is this reduced level (i.e. 6.28m AOD) that reduced the third party increase from the quotes 30mm in the Brookbanks report, to the latest value of 17mm (as per submitted modelling files).

4.19 The option to further reduce the ground levels was suggested by the EA with a view of reducing the off-site risk to be in accordance with the 'standard' model tolerance of 10mm and was considered. However, when reviewing this with the wider design team there were other constraints that meant a further lowering of ground levels was not possible. The key driver for this was in relation to ensuring the proposed surface water drainage could achieve a connection via gravity into the existing on-site ditches. This element of the scheme is being undertaken by Hydrock and they confirmed that any lowering would result in outfalls being too low to connect into the Rhynes and or avoid a 'permanently surcharged outfall'. This is not an acceptable, workable approach and the 6.28m AOD ground raising now being proposed is considered (by Hydrock) as the lowest acceptable level to meet LLFA and LSIDB requirements. In addition, there is a drop in levels from the neighbouring highway into the site and an element of raising is also required to ensure design standard for highways and access is also met. This is a further consideration that meant lowering ground levels beyond 6.28m AOD was not acceptable.

4.20 On this basis, and despite the best efforts, the revised ground level of 6.28m AOD is the lowest feasible levels that would not impact constraints from other disciplines. These constraints along with the fact that a conservative approach (i.e. looking at the full extent of climate change for the development design life with no increase in climate change) has been adopted and the resultant variance in flood risk to third party land has been confirmed as resulting in no change of risk, a negligible consequence as the events modelling as considered unlikely to 'actually' occur and therefore the variances are considered acceptable. This is also basing it on the standard tolerances for modelling and not of 150mm as agreed with the EA and documents within their report. This approach has been discussed with the EA and, as a conservative approach, they agreed that is presented a 'worst case'. It was also agreed with them that should suitable justification be provided within this document reflecting the matters discussed then their objection may be withdrawn.

Rappor Consultants Ltd

www.rappor.co.uk

Cheltenham
Bristol
London
Bedford
Exeter
Cirencester

Note of meeting with the EA 16 January 2024

From:	Simon Mirams
To:	Thomas, Will; Burt, Katherine
Cc:	Plaw, Marcus; MacDougall, Dominic; Archer, Sam; Sustainable Places, NWX
Subject:	RE: Land at Rectory Farm (North), Yatton
Attachments:	image001.png image002.png

All,

Once again thanks for your time on the call yesterday. As agreed, I have put together the below summary of the key points that were discussed and then highlighted the actions that were agreed. I have also included the timeframes that were discussed – noting that our client is keen to expedite this if possible. I trust that this accurately reflects our discussion and is definitive on the Actions set out sufficient, if accepted, for the EA to withdraw its objection.

Key Points:

- EA agreed that a 150mm tolerance is more reasonable for the Woodspring Bay model but would not accept this as a tolerance being applied with respect to off-site increases through planning process.
- The EA's position on tolerance is that the there are several ways to look at tolerances; one for the input data and the second being for the modelling elements. The EA explained any tolerance related variation in levels would be consistent between baseline and proposed scenarios and therefore whilst variances in the model are agreed to be model specific it forms the benchmark for planning. The EA would therefore be in a position where tolerances for any proposed application would be +/- 0.1m.
- It was discussed that the tolerance value and EA's position wouldn't change.
- Rappor explained the nature of the increases being localised (only affecting a small number of existing units) and around 15-18mm increase. This increase was explained as being in areas that are already categorised on the flood map as being flood zone 3 and the Woodspring Bay models shows depths of 1.8 – 2.1m. As such there is no change to risk to the existing properties.
- Rappor explained that the consequences of the increase are negligible – a 0.018m increase on depths of up to 2.1m.
- The increase in flooding was also noted as being for the 1 in 200 years plus climate change defended event. It was agreed that in the 'present day' scenario the site is defended and 'free' from flooding. As such, the negligible increase only occurs at a point in the future (circa from 2080) and if no upgrading of the existing defences is undertaken.
- The timing of the predicted flooding was also discussed. The site is located away from the defences and therefore suitable flood warnings are available for the 200yr plus CC scenario when no upgrading works are undertaken. POST MEEETING NOTE – this is at least 16hours from first breach.
- Rappor also explained that lowering ground levels further were not an option due to external constraints (ensuring drainage connection, level access etc). However, ground levels have been reviewed and lowered as much as practicable.
- EA understood the position and requested additional evidence (in the form of technical notes) be provided to outline the position and provide justification for the current position.

Actions:

- EA to provide a sharefile link for Rappor to upload model outputs grids (200yr and 200yr+CC for pre and post development scenarios)
- Rappor to provide, via hard drive, the modelling files used to generate the above files.
- Rappor to prepare a Technical Note/Addendum document to the previously submitted FRA outlining (with evidence) the justification for why the 15-18mm increase is considered acceptable.
- Rappor to prepare and submit a modelling technical note. This will be prepared to aid Evidence and Review to focus their review on the elements that have changed (only post dev)
- EA to speak with LLFA to explain the approach that has been discussed and agreed with Rappor in seeking to resolve the objection.

Timeframes:

- Rappor to provide Output Modelling Files – 17th Jan.
- Rappor to send full model to EA via hard drive – with EA by 19th Jan.
- Rappor to prepare Technical Note / Addendum document – with EA by 22nd Jan.
- Rappor to prepare modelling note - with EA by 19th Jan.
- EA to review Model – Evidence and Review Team – 4 weeks timeframes for date of submission.
- EA to review provided Technical Note – initial review by 23rd Jan, detailed review – 4 weeks from date of submission.

Thanks,

Simon Mirams MCIWEM, CSci, CEnv
Director – Water Environment

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a CTP House, Knapp Road, Cheltenham, Gloucestershire, GL50 3QQ

From: Simon Mirams
Sent: Monday, January 15, 2024 3:14 PM
To: Thomas, Will <William.Thomas@environment-agency.gov.uk>; Burt, Katherine <katherine.burt@environment-agency.gov.uk>
Cc: Plaw, Marcus <marcus.plaw@persimmonhomes.com>; MacDougall, Dominic

<dominic.macdougall@persimmonhomes.com>; Archer, Sam <sam.archer@environment-agency.gov.uk>; Sustainable Places, NWX <nwx.sp@environment-agency.gov.uk>
Subject: RE: Land at Rectory Farm (North), Yatton

Hi Will,

Just following up on the below email and whether you had everything you needed from other departments ahead of our call tomorrow.

Looking forward to speaking with you all tomorrow – presume no last minute issues with attendance?

Thanks,

Simon Mirams MCIWEM, CSci, CEnv
Director – Water Environment

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From: Simon Mirams
Sent: Thursday, January 11, 2024 4:15 PM
To: Thomas, Will <William.Thomas@environment-agency.gov.uk>; Burt, Katherine <katherine.burt@environment-agency.gov.uk>
Cc: Plaw, Marcus <marcus.plaw@persimmonhomes.com>; MacDougall, Dominic <dominic.macdougall@persimmonhomes.com>; Archer, Sam <sam.archer@environment-agency.gov.uk>; Sustainable Places, NWX <nwx.sp@environment-agency.gov.uk>
Subject: RE: Land at Rectory Farm (North), Yatton

Hi Will,

Thanks for coming back, can we book in 4pm on Tuesday 16th please, ill send a teams link through.

Can I presume that you have now received everything you needed from colleagues, modellers, National Waves and Estuaries team etc? Obviously keen for this meeting to be as useful as possible for all of us.

Thanks,

Simon Mirams MCIWEM, CSci, CEnv
Director – Water Environment

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From: Thomas, Will <William.Thomas@environment-agency.gov.uk>
Sent: Thursday, January 11, 2024 12:46 PM
To: Simon Mirams <Simon.Mirams@rappor.co.uk>; Burt, Katherine <katherine.burt@environment-agency.gov.uk>
Cc: Plaw, Marcus <marcus.plaw@persimmonhomes.com>; MacDougall, Dominic <dominic.macdougall@persimmonhomes.com>; Archer, Sam <sam.archer@environment-agency.gov.uk>; Sustainable Places, NWX <nwx.sp@environment-agency.gov.uk>
Subject: RE: Land at Rectory Farm (North), Yatton

Good afternoon all,

Apologies it has taken us a little while to get back to you.

Sam and I are both free at the following times next week:

Tues 16th 4PM
Thurs 18th after 3.30PM

Do either of those slots work?

Kind regards,

Will Thomas
Flood & Coastal Risk Management Advisor
Data & Evidence | Wessex
Environment Agency | Rivers House, East Quay, Bridgwater, TA6 4YS
Mob: +447717440854 | Int: 29319 | Ext: + 442084749319
william.thomas@environment-agency.gov.uk

Please note my usual working days are Monday - Thursday.

From: Simon Mirams <Simon.Mirams@rappor.co.uk>
Sent: Monday, January 8, 2024 12:23 PM
To: Thomas, Will <William.Thomas@environment-agency.gov.uk>; Burt, Katherine <katherine.burt@environment-agency.gov.uk>
Cc: Plaw, Marcus <marcus.plaw@persimmonhomes.com>; MacDougall, Dominic <dominic.macdougall@persimmonhomes.com>; Archer, Sam <sam.archer@environment-agency.gov.uk>; Sustainable Places, NWX <nwx.sp@environment-agency.gov.uk>
Subject: RE: Land at Rectory Farm (North), Yatton

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Hi Will,

Happy New Year.

Today is my first day back so I thought I would pick up the below in the event you had tried to arrange a date whilst I was off, do any of the below dates work for you?

If it helps, I am currently experiencing COVID so my availability has suddenly opened up given I am not likely to be WFH all week so please let me know if there are other dates that work better with you.

Look forward to hearing from you.

Thanks,

Simon Mirams MCIWEM, CSci, CEnv
Director – Water Environment

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Christmas Office Closure: Monday 25th December to Tuesday 2nd January inclusive

From: Simon Mirams
Sent: Friday, December 22, 2023 11:06 AM
To: Thomas, Will <William.Thomas@environment-agency.gov.uk>; Burt, Katherine <katherine.burt@environment-agency.gov.uk>
Cc: Plaw, Marcus <marcus.plaw@persimmonhomes.com>; MacDougall, Dominic <dominic.macdougall@persimmonhomes.com>; Archer, Sam <sam.archer@environment-agency.gov.uk>; Sustainable Places, NWX <nwx.sp@environment-agency.gov.uk>
Subject: RE: Land at Rectory Farm (North), Yatton

Hi Will,

Thanks for coming back to us with the below.

I note the points below and agree that a meeting to discuss sounds a very sensible plan. Would be good to talk through the tolerances, etc and try and see if there is a route forward that can be agreed between us.

I am finishing today until the 8th Jan so have provided my availability for w/c 8th in the hope we can get something in the diary for this week. If you can confirm which dates work I will send a teams invite through in the New Year (unless you would prefer face-to-face?).

Tues 9th – After 1pm
11th – Up until 12.30pm
12th – All Day

If we don't speak before the end of today I hope all you have a great Christmas and New Year, and look forward to speak in the New Year.

Thanks,

Simon Mirams MCIWEM, CSci, CEnv
Director – Water Environment

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Christmas Office Closure: Monday 25th December to Tuesday 2nd January inclusive

From: Thomas, Will <William.Thomas@environment-agency.gov.uk>
Sent: Tuesday, December 19, 2023 9:26 AM
To: Simon Mirams <Simon.Mirams@rappor.co.uk>; Burt, Katherine <katherine.burt@environment-agency.gov.uk>
Cc: Plaw, Marcus <marcus.plaw@persimmonhomes.com>; MacDougall, Dominic <dominic.macdougall@persimmonhomes.com>; Archer, Sam <sam.archer@environment-agency.gov.uk>; Sustainable Places, NWX <nwx.sp@environment-agency.gov.uk>
Subject: RE: Land at Rectory Farm (North), Yatton

Hi Simon / all,

After discussing this query with our coastal modelling team, we have been advised that +/- 150mm is usually considered a reasonable estimate for the accuracy of coastal models, however they have challenged that this can be used to justify an apparent increase in flood risk within the range of this interval. Any uncertainty around the accuracy of the CFB inputs would be expected to apply equally to both baseline and post-development scenarios, so while we acknowledge the uncertainty in the absolute accuracy of the predicted water levels, this does not necessarily mean that the prediction of an increase or decrease in flood risk is any less valid.

As mentioned in my previous email, we are still awaiting some further information from the national Waves and Estuaries team, we will of course share this once we have it but we do not expect that it will change the position on using the uncertainty in input data to justify a larger acceptable difference between baseline and post-development scenarios.

With regards the Rectory Farm (North) site, we suggest it would be useful for us to have a meeting to discuss the modelling outputs in more detail in the New Year.

Kind regards,

Will Thomas
Flood & Coastal Risk Management Advisor
Data & Evidence | Wessex
Environment Agency | Rivers House, East Quay, Bridgwater, TA6 4YS
Mob: +447717440854 | Int: 29319 | Ext: + 442084749319
william.thomas@environment-agency.gov.uk

Please note my usual working days are Monday - Thursday.

From: Simon Mirams <Simon.Mirams@rappor.co.uk>
Sent: Friday, December 15, 2023 9:25 AM
To: Burt, Katherine <katherine.burt@environment-agency.gov.uk>
Cc: Plaw, Marcus <marcus.plaw@persimmonhomes.com>; MacDougall, Dominic <dominic.macdougall@persimmonhomes.com>; Archer, Sam <sam.archer@environment-agency.gov.uk>; Thomas, Will <William.Thomas@environment-agency.gov.uk>; Sustainable Places, NWX <nwx.sp@environment-agency.gov.uk>
Subject: RE: Land at Rectory Farm (North), Yatton

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Hi Kath,

Could I ask for an update by close of play today please? Have the D&E team had the conversation with the modellers?

Thanks,

Simon Mirams MCIWEM, CSci, CEnv
Director – Water Environment

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From: Simon Mirams
Sent: Friday, December 8, 2023 2:12 PM
To: Burt, Katherine <katherine.burt@environment-agency.gov.uk>
Cc: Plaw, Marcus <marcus.plaw@persimmonhomes.com>; MacDougall, Dominic <dominic.macdougall@persimmonhomes.com>; Archer, Sam <sam.archer@environment-agency.gov.uk>; Thomas, Will <William.Thomas@environment-agency.gov.uk>
Subject: RE: Land at Rectory Farm (North), Yatton

Hi Kath,

Thanks for coming back to me and providing an update, I appreciate all your (and Sam's) efforts in trying to get this discussed and sorted.

Hopefully speak next week.

Thanks,

Simon Mirams MCIWEM, CSci, CEnv
Director – Water Environment

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Christmas Office Closure: Monday 25th December to Tuesday 2nd January inclusive

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From: Burt, Katherine <katherine.burt@environment-agency.gov.uk>
Sent: Friday, December 8, 2023 1:59 PM
To: Simon Mirams <Simon.Mirams@rappor.co.uk>
Cc: Plaw, Marcus <marcus.plaw@persimmonhomes.com>; MacDougall, Dominic <dominic.macdougall@persimmonhomes.com>; Archer, Sam <sam.archer@environment-agency.gov.uk>; Thomas, Will <William.Thomas@environment-agency.gov.uk>
Subject: RE: Land at Rectory Farm (North), Yatton

Hi Simon,

My apologies for the delay in getting back to you. Sam was off most of last week sick, and we have only just been able to catch up yesterday with the Data and Evidence team (D&E).
The current position is that our D&E team will be speaking with the modelling team early next week to chase up an answer to your modelling query. I do not know at this stage, if we will then be able to give you a response on this next week, but I am chasing up to get this sorted ASAP.

Kind regards

Kath

Katherine Burt
Sustainable Places Team Leader
Wessex Area, Environment Agency

✉ Rivers House, Sunrise Business Park, Higher Shaftesbury Road, Blandford Forum, Dorset DT11 8ST
✉ Email: katherine.burt@environment-agency.gov.uk
☎ External: 020302 59339. Internal: 59339. Mobile: 07810 052991.

From: Simon Mirams <Simon.Mirams@rappor.co.uk>
Sent: Friday, December 8, 2023 1:43 PM
To: Burt, Katherine <katherine.burt@environment-agency.gov.uk>
Cc: Plaw, Marcus <marcus.plaw@persimmonhomes.com>; MacDougall, Dominic

<dominic.macdougall@persimmonhomes.com>; Archer, Sam <sam.archer@environment-agency.gov.uk>
Subject: RE: Land at Rectory Farm (North), Yatton

> Some people who received this message don't often get email from simon.mirams@rappor.co.uk. Learn why this is important

Hi Both,

Are you able to provide an update and/or response to the below email please?

Thanks,

Simon Mirams MCIWEM, CSci, CEnv
Director – Water Environment

A picture containing graphical user interface Description automatically generated

t 01242 523696 • **w** rappor.co.uk
a CTP House, Knapp Road, Cheltenham, Gloucestershire, GL50 3QQ
Christmas Office Closure: Monday 25th December to Tuesday 2nd January inclusive

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From: Simon Mirams
Sent: Monday, December 4, 2023 3:54 PM
To: 'Burt, Katherine' <katherine.burt@environment-agency.gov.uk>
Cc: 'Plaw, Marcus' <marcus.plaw@persimmonhomes.com>; 'MacDougall, Dominic' <dominic.macdougall@persimmonhomes.com>; 'Archer, Sam' <sam.archer@environment-agency.gov.uk>
Subject: RE: Land at Rectory Farm (North), Yatton

Hi Kath and Sam,

Sorry to keep emailing you on this but are you able to provide any updates following your meetings/calls last week please?

Thanks,

Simon Mirams MCIWEM, CSci, CEnv
Director – Water Environment

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From: Simon Mirams
Sent: Friday, December 1, 2023 3:58 PM
To: Burt, Katherine <katherine.burt@environment-agency.gov.uk>
Cc: Plaw, Marcus <marcus.plaw@persimmonhomes.com>; MacDougall, Dominic <dominic.macdougall@persimmonhomes.com>; Archer, Sam <sam.archer@environment-agency.gov.uk>
Subject: RE: Land at Rectory Farm (North), Yatton

Hi Kath,

I tried to call earlier but must have missed you. Are you able to provide any further update on your/Sam's meetings this week on the Yatton scheme please? Hopefully, the modellers agreed with the additional response/email…..

Thanks,

Simon Mirams MCIWEM, CSci, CEnv
Director – Water Environment

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From: Burt, Katherine <katherine.burt@environment-agency.gov.uk>

Sent: Tuesday, November 28, 2023 6:03 PM
To: Simon Mirams <Simon.Mirams@rappor.co.uk>
Cc: Plaw, Marcus <marcus.plaw@persimmonhomes.com>; MacDougall, Dominic <dominic.macdougall@persimmonhomes.com>; Archer, Sam <sam.archer@environment-agency.gov.uk>
Subject: RE: Land at Rectory Farm (North), Yatton

Hi Simon,

I'm so sorry we haven't got back to your calls and emails.

In terms of an update, we are still chasing up the requested information from our modelling team. However, I believe Sam has another meeting with them later this week, so we hope to get another update from them then. I completely understand that you would like a response from us ASAP, and we will again emphasise the urgency with the modelling team to get this sorted.

At the moment, I don't have anything else to update you on, so I don't believe a meeting would be beneficial this week. However, please come back to me if there is anything you still wish to discuss.

Our apologies for the delay. We will get back to you as soon as we can.

Kind regards

Kath

Katherine Burt
Sustainable Places Team Leader
Wessex Area, Environment Agency

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✉ Email: katherine.burt@environment-agency.gov.uk
☎ External: 020302 59339. Internal: 59339. Mobile: 07810 052991.

From: Simon Mirams <Simon.Mirams@rappor.co.uk>
Sent: Tuesday, November 28, 2023 5:29 PM
To: Burt, Katherine <katherine.burt@environment-agency.gov.uk>; Archer, Sam <sam.archer@environment-agency.gov.uk>
Cc: Plaw, Marcus <marcus.plaw@persimmonhomes.com>; MacDougall, Dominic <dominic.macdougall@persimmonhomes.com>
Subject: RE: Land at Rectory Farm (North), Yatton

Hi Both,

I have tried calling again as I have not received a response. Could you confirm my emails are

being received please?

Likewise, could I ask for a quick 30min teams call this week please so we can discuss the current position of the above scheme and where we are in terms of timeframes for receiving a response to my email (from different account) about modelling tolerances please?

In terms of availability how are you fixed for 2pm Wednesday, 10am Thursday or Friday AM (up until 1pm).

Look forward to hearing from you.

Thanks,

Simon Mirams MCIWEM, CSci, CEnv
Director – Water Environment

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From: Simon Mirams
Sent: Monday, November 27, 2023 11:31 AM
To: katherine.burt@environment-agency.gov.uk
Cc: Plaw, Marcus <marcus.plaw@persimmonhomes.com>
Subject: Land at Rectory Farm (North), Yatton

Hi Kath,

I am just following up on a voicemail I left for you last week on the above site and hoping to have a chat with you as conscious you are picking this up at the last few stages.

If it would help to have a quick teams call to run through anything please let me know.

Thanks,

Simon Mirams MCIWEM, CSci, CEnv
Director – Water Environment

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Technical note of May 2024

Land to North of Rectory Farm, Yatton

Persimmon Severn Valley

Flood Risk Technical Note

May 2024

Document Control

Job No.	24-0161	
Project Name	Land to North of Rectory Farm, Yatton	
Document Title	Flood Risk Technical Note	
Status	First Issue	
Client	Persimmon Severn Valley	
	Name	Date
Prepared By	S. Mirams	20.05.2024
Checked By	B. Fleming	20.05.2024
Approved By	S. Mirams	20.05.2024

Record of Revisions

Revision	Date	Details	Made By
First Issue	20.05.24	First Issue	SM

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1 Introduction

1.1 This Technical Note has been prepared in response to the submitted Flood Risk Assessment (Ref:23257-HYD-XX-XX-RP-FR-0002, prepared by Hydrock Consultants Limited on 20th March 2023) and comments received from both the Environment Agency (EA) and North Somerset Council (NSC) in their roles as a statutory consultee to the submitted planning application (Ref 23/P/0664/OUT). This document was superseded by an updated Flood Risk Assessment (Ref 11069_FRA_Rv0, prepared by Brookbanks on 12th September 2023).

1.2 The EA (Ref: WX/2023/137123/01-L01, dated 10th May 2023) and NSC (Ref:23/0664/OUT, dated 15th May 2023) have provided separate consultation comments based on the submitted documents that have been prepared by Hydrock. Further to the received comments, a response was prepared by Brookbanks (Ref: Land to North of Rectory Farm, Yatton – Flood Risk- Consultation Response Rv2, dated 2nd August 2023). Following this response, discussions with the EA have been ongoing related to the points raised within the original letter.

1.3 Further to the above documents, a meeting was held with the EA on 28th February to further discuss the comments provided from the EA and specifically around the modelling outputs. During this meeting it was agreed that all the previously raised comments (i.e. fluvial, surface water etc) were accepted except for questions around the modelling outputs implying an increase in flood depths (which were issued to the EA in advance of this meeting). Following the meeting, and on the premise that the identified increased depths are a product of modelling oscillations and could therefore be considered acceptable a further technical note (Ref: 24-0161 – Land to North of Rectory Farm, Yatton v2, dated 28th February 2024) was prepared and submitted which provided a summary of the discussions and justification for the 17mm increase. Further to this note, the content of which was discussed and agreed in the meeting, an objection was received on 17th April 2024 (Ref: WX/2023/137123/02-L01). No supporting technical information was provided within the letter and as such two subsequent meetings have been held with the EA to better understand their latest position; these were held on and 1st and 16th May 2024.

1.4 This note aims to provide a summary of the meetings held with the EA since their objection and then provide technical information in relation to a specific point that was raised during these calls. This evidence was centred around the increases in flood risk being a product of the oscillations in the modelling and not an ‘actual’ risk.

2 Summary of Meeting – 16th May 2024

2.1 The purpose of this meeting was to discuss the EA position and specifically the submitted modelling files and the identified 'off-site increase of 17-18mm' around the development site. This area extends across a wider area and extends beyond the Strawberry Line to both the south and west and as such the EA consider that this matter is unresolved.

2.2 During the call the EA provided a summary of their position and why their objection is being maintained. On further review of the modelling files (and not raised previously during the calls or following reviews) the EA highlighted an increase in flood depth of 35-40mm around 1500m to the southeast of the site. This was beyond several hydraulic controls (existing raised areas of land (Strawberry Line, Gang Wall Rhyne, Flood Attenuation Storage feature), existing rhynes, and a strategic EA flood attenuation area) and exceeded the 10mm tolerance that the EA have stated would be required.

2.3 It was explained to the EA that the outputs being reviewed were different to that of the EA's original baseline scenario for the Woodspring Bay model as an additional four culverts were included under the Strawberry Line in the post development scenario. These are not included within the EA's approved model but were added following a site walkover to ensure all potential flow mechanisms (that could increase flood risk to the site) were included.

2.4 The inclusion of these culverts was something that North Somerset Council had requested were included in works undertaken for a previously consented planning application at Rectory Farm South (of which the EA are aware). This was discussed and the EA agreed that their model was 'strategic' and therefore was not to the level of detail to include all these culverts. This is despite the rhynes / watercourse that flow through these identified culverts feeding the EA's flood alleviation scheme. The EA agreed that the baseline modelling did not include these culverts and given that the post development scenario did, this may have resulted in an additional increase in the area to the southeast as it is not a like-for-like comparison but stated they needed evidence to confirm this. The evidence requested is to update the Woodspring Bay baseline model to include these culverts, but the EA accepted that this would be a large undertaking and may result in a detailed review of the updated modelling files being required.

2.5 The other element discussed around these areas of increased flood depths (i.e. 35-40mm) was that this area was also linked to the Congresbury Yeo and therefore the increase may have been because of the interaction between the tidal flooding combining with the more fluvially drive mechanism from the watercourse. The potential for fluvial risk to the application site is something that has been discussed and agreed with the EA as not being relevant and, as such, any fluvial interactions in this area would be separated from the site given this position. This again just highlights that the Woodspring Bay floodplain is complex with many differing mechanisms and flood cells in operation that whilst connected may not be the only impact on flows (i.e. the site scale is unlikely to impact an area where tidal/fluvial mechanisms are at play).

2.6 The EA agreed that there are inherent inaccuracies with the Woodspring Bay model owing to the more strategic nature of the modelling and reiterated that this is why the modelling report states a minimum 150mm tolerance, and likely to be higher if reality (Ref: Woodspring

Bay and Severn House Farm Flood Modelling and Mapping Report, produced by JBA, Dated Sept 2020) – which is separate to the 10mm tolerance required by the EA in terms of the planning submission. This position around technical model tolerance (i.e. a minimum of 150mm) has been discussed and (verbally) agreed with JBA as the modellers but also the EA.

2.7 Following discussion around the above point, the EA maintained their position of a policy objection on the basis that the modelling shows an increase in flood depth. The basis for this policy objection is around the depths of increased flooding exceeding 10mm – evidence of this 10mm increase was requested (as it have been previously from the EA back in October 2023) and the EA took this away as an action to provide an update.

2.8 Whilst the EA's position was noted and accepted, the EA were happy to review where off-site increase had been approved through planning as accepted much of this did come down to interpretation of the policy but also that modelling can result in 'oddities' that whilst they show an increase these are theoretical and not actual. Two such examples discussed were those on Silverthone Lane Plot 6 and Bedminster Green, Plot 1. Both are where proposed development results in an increase in off-site flood risk but received consent on the grounds of the areas of increase not being in hydraulic connectivity to the site (i.e. as per the areas of 35-40mm increase to the south east of the site), or the consequence of this increase was considered acceptable so as to not affect new areas / properties and where increases o occur these don't result in properties internally flooding post development that didn't previously (i.e. as per the properties surrounding the application site).

2.9 It was also discussed that the events being considered, and the increases in flood depth, were from the 200year plus climate change tidal event assuming no upgrading works to the existing defences takes places between now and the year 2125 – which is not considered as being the case owing to the strategic nature of the existing defences and the area, they provide benefit to. This was also discussed as has been used, and agreed, by Secretary of State during a recent (2021) planning appeal decision within the Centre of Bristol – i.e. unreasonable to rely on no upgrading works being undertaken on strategic defences. This was something the EA, as with para 2.9, were going to review and discuss internally.

2.10 Whilst the above provides a summary of the EA's position and the discussion around these points, the EA were accepting to receive volumetric calculations of the net developable area set against the area of flooding to assess implications and to ensure that the comparison depths (and increased volume) are consistent with the volumes being displaced. Any difference in this volume comparison (i.e. pre and post development) would indicate that the modelling (or comparison process) may be artificially affected numbers through a misalignment of grids, rounding errors, shift of GIS input files though the modelling processes, or inaccuracies in underlying topographical data.

2.11 Following the call this exercise has been undertaken using a conservative assessment to maintain this approach that has been adopted through all calculations. To achieve this, the assessment looked only at where the proposed development levels resulted in a loss of storage and now allowance for the additional volume being provided in the rhine network because of the proposed levels has been allowed for. Therefore, the area shown in red below is the area calculated as being 'lost' and provided a volume of **105,357m^3**

2.12 To accurately calculate the additional volume from the comparison grid (calculated through Baseline grid minus the proposed grid) the exercise was undertaken to ensure values greater than 0.00m were assessed. Had this not been set within the software, the areas where post development flood depth decrease would have reduced the volume. On running this calculation, the comparison grid provided a 'displaced' volume of **136,834m^3** and therefore an approx. 30% increase on the volume generate because of the development. This therefore indicates that additional factors are at play in resulting in this number. This could provide evidence to confirm that separate flood cells within the wider Woodspring Bay model existing and operate, thus highlighting a complex set of flow mechanisms and processes within the site. These would be areas of isolated hydraulic connectivity that operated separately, and unconnected from one another (i.e. no link from the site to the area to the southeast) or confirm that oscillations / oddities are being generated within the modelling and this would again lean to why a tolerance of 150mm (or higher) is considered more realistic for the Woodspring Bay model. linked to areas of hydraulic connectivity.

3 Conclusion

3.1 Following the meeting, the EA maintained their position of having a policy objection due to use of a strategic model and model interpretation the increased flood depths shown when comparing the pre and post development flood depths. However, the EA agreed that they would review precedent from other planning applications where increases in flood depths have been consented on the ground of no hydraulic connectivity to the wider area, no increase in extent, and no new internal flooding.

3.2 In addition, the EA were also going to review a recent Secretary of State decision in which it was stated that due to the uncertainty around the future of upgrading works to existing flood defences, that is would be unreasonable to use this as the design event and a more realistic view of the strategic defences meeting the climate change requirements would, be more reasonable.

3.3 The EA were also going to provide confirmation as to where, in policy / guidance the 10mm tolerance is. This was originally requested in October 2023 and to date the EA have not provided confirmation of where this requirement can be found. This is also further to searching being undertaken by the applicant team and the only reference found relates to a minimum tolerance of the Woodspring Bay model of 150mm.

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July 2024 EA response to Mr Miram's technical note

Mr Simon Mirams
Rappor
CTP House
Knapp Road
Cheltenham
Gloucestershire
GL50 3QQ

Our ref: WX/2023/137576/03-L01
Your ref: 23/P/0664/OUT

Date: 10 July 2024

Dear Mr Mirams

OUTLINE PLANNING APPLICATION FOR THE DEVELOPMENT OF UP TO 190NO. HOMES (INCLUDING 50% AFFORDABLE HOMES.

LAND TO NORTH OF RECTORY FARM, CHESCOMBE ROAD, YATTON

Thank you for submitting the Flood Risk Technical Note by Rappor (Dated: 20 May 2024, Ref: 24-0161) to the Environment Agency for review.

We are providing the following comments in relation to the Woodspring Bay model, modelling tolerances, volumetric calculations you have provided, and other applications mentioned in the report.

Woodspring Bay model & modelling tolerances

The Woodspring Bay model is a large tidal model. Part of the input data to the tidal model is the Coastal Flood Boundary Dataset (CFB), this dataset predicts peak tidal levels around the coastline for a range of annual exceedance probabilities (AEP), also known as return periods.

The CFB data itself has its own confidence intervals associated with the data – as shown below in Figure 2. For modelling, we apply the CFB levels (the blue line), but the data comes with upper and lower confidence limits. As the graph shows, uncertainty increases with increasing return periods. Up to about the 20-year event, confidence is very high, with <10cm difference between the range of possible levels, but by the larger events there are >50cm differences between the possible levels.

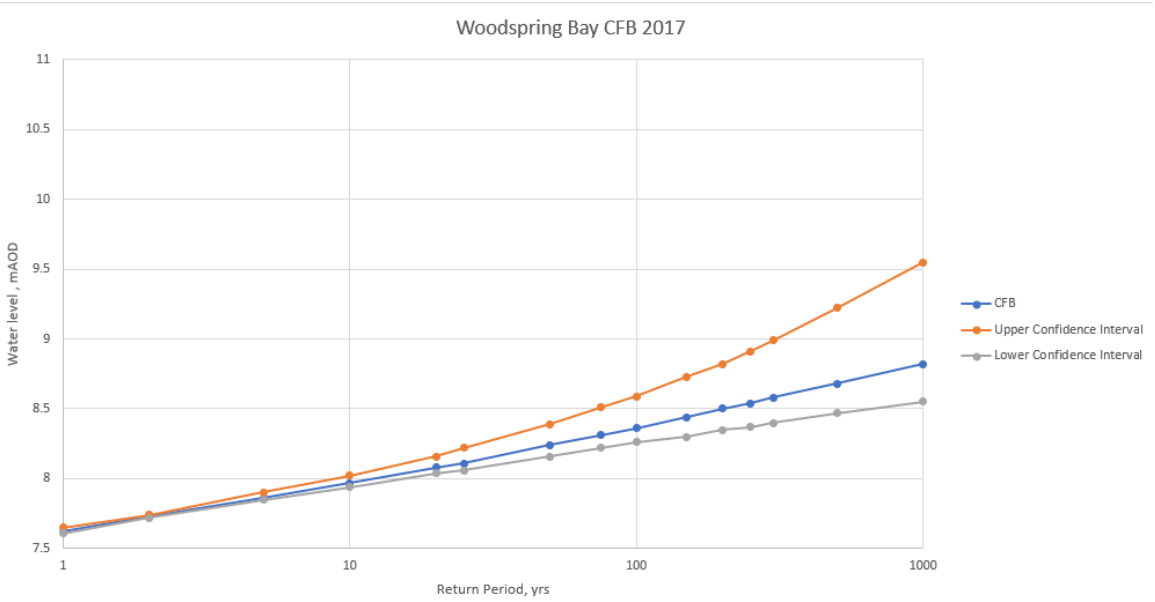

Figure 1. Coastal Flood Boundary Dataset confidence intervals for the Woodspring Bay 2020 model.

This uncertainty or tolerance relates to the absolute flood levels associated with each return period. When comparing pre and post-development scenarios, as both use the same input CFB derived data, the inherent uncertainty in the absolute levels has no bearing on the relative difference between the two scenarios. If changes to the hydraulic model (i.e. through representation of land raising) result in a change in water levels then this cannot be attributed to the uncertainty in input data as this would apply equally to both scenarios.

However, we do accept that a tolerance relating to model calculation can potentially apply. The iterative calculation that the model software performs can sometimes give slightly different results dependent on some of the advanced parameters which can affect how many iterations the software performs before it converges on a solution. There is currently no absolute value given in existing guidance on what is an acceptable model tolerance as this will vary between models and locations. A figure of /- 10mm is often considered a reasonable "rule-of-thumb" for a calculation tolerance but the uniform application of this value is not supported by any evidence and likely has its origin in the default htol (stage tolerance) value in the Flood Modeller Pro software package.

This is an area that is currently being considered for more detailed guidance by our Evidence & Risk Strategic Delivery Team in consultation with Natural Resources Wales (NRW) and the Scottish Environment Protection Agency (SEPA). However, the below guidance is stated on our Using modelling for flood risk assessments - GOV.UK (www.gov.uk) guidance *"You should carry out this analysis using raw results, without including any allowance for model calculation error ('modelling tolerance'). If you identify any change in flood risk as part of the model calculation error, you'll need to provide robust technical analysis and reporting to support this. You must demonstrate that your development will not increase flood risk elsewhere*."

Volumetric calculation and comparison

The volumetric calculations provided in the revised technical note (Land to North of Rectory Farm, Yatton. Persimmon Severn Valley. Flood Risk Technical Note. May 2024) indicates that the land raising associated with the development has a displacement volume of 105,357m3.

Cont/d..

This has been compared to a calculation of the additional volume shown by the increased flood depths in the maximum 2D grids of 136,834m3. The fact that the model output grids show a greater additional volume than the land raising calculation has been used as evidence that the water level increases cannot be attributed to the land raising. However, as the maximum water level values contained within the 2D grid are not achieved simultaneously, it would be expected that this methodology would overestimate volume. We do not accept this as robust evidence that there must other factors contributing to the observed off-site water level increases other than the land raising.

Other planning applications

With the report (Section 2.8 and 2.9), the interpretation of planning is discussed and refers to other sites where off-site increases have been approved in planning. The planning applications within the adjacent Bristol City Council's area, Silverthorne Lane Plot 6 and Bedminster Green Plot 1, each have a different set of flood risk circumstances to Rectory Farm and are therefore not comparable.

Silverthorne Lane is at both tidal and fluvial flood risk.

Bedminster Green is affected by only fluvial flood risk. However, once the river restoration scheme on the River Malago is completed, it will provide a flood risk betterment to the area, including plots 1-5, please see our letter to this application dated 09 May 2024 (Ref: WX/2023/137063/03).

Whilst we acknowledge the outcome of the Secretary of State Decision for Silverthorne Lane, and the Bristol Avon Flood Strategy (BAFS), the site at Rectory Farm is covered by coastal strategic defences, which may not get upgraded over the lifetime of the development.

The Shoreline Management Plan (SMP) Policy (KIN1) is currently 'Managed Realignment' for the nearest section of coastline at Kingston Seymour. The area to the West of Woodspring Bay (KIN2) is currently 'No Active Intervention'.

Yours sincerely

Mr Harry Hembery
Sustainable Places - Planning Advisor

Direct dial 02030 252016
Direct e-mail wx.sp@environment-agency.gov.uk

End