Land to North of Rectory Farm, Yatton

Technical Note 1: Consultee Response

2nd August 2023

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1 Introduction

1.1 This Technical Note has been prepared in response to consultation comments received from both the Environment Agency (EA) and North Somerset Council (NSC) in response to a Flood Risk Assessment document (Ref: 23257-HYD-XX-XX-RP-FR-0002, prepared by Hydrock Consultants Limited on 20 03 2023) that was submitted as part of the Planning Submission (Ref:23/P/0664/OUT).

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 consultations comments based on the submitted documents that have been prepared by Hydrock. Further to this Persimmon Homes Severn Valley has appointed Brookbanks to undertake a review of the works previously undertaken (by Hydrock) and prepare a technical response with support evidence to both sets of comments provided.

1.3 Owing to the similarities in the comments, and in order to have an open dialogue with both consultees, this document provides a response to both comments. For ease the provided comments have been included below (in bold) with a response to each laid out below. A copy of the each response is also included within the appendix to this note.

2 EA Comments – Ref: WX/2023/137123/01-L01, Dated 10th May 2023.

EA Comment: The design flood scenario proposed in the FRA and agreed with the LLFA is an 'undefended' scenario, where extreme still water levels are able to act directly along the coastal frontage inundating the floodplain as indicated by the Flood Zones and

representing a worse-case 'residual risk' of flooding to the site. However, with climate change and allowing for the impact of existing defences, the equivalent defended 1 in 200 (0.5%) 2118 scenario in our existing Woodspring Bay Model also results in flooding impacting the site. As a result of the impact of flood defences preventing overtopping for part of the tidal curve, however, the total volume entering the floodplain is less and the impact of floodplain features such as road/rail embankments is greater. Flooding is shown in this event to extend to nearby existing residential properties adjacent to the site. The land raising proposed to elevate the site above the undefended design event reduces space for floodwater and could increase flood risk to these properties and others. Although the FRA notes that the PPG states in para. 049 that "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", we would emphasise the phrase "less likely" in this quotation. The PPG does not mean that the loss of floodplain storage can be ignored arbitrarily in areas affected by tidal flooding. In this instance, 5km from the coastal frontage and within an area partly surrounded by raised embankments and existing property, further investigation of the impacts of land raising is warranted and is not unreasonable since modelling has already been undertaken and given the scale and nature of the development and the likely required land raising suggested. The defended model should be re-run for a 1 in 200 (0.5%) plus climate change event with an appropriate representation of the intended land raising, to demonstrate the assertion in the FRA that flood risk will not be increased elsewhere.

2.1 Prior to submission of the Flood Risk Assessment it is understood that Hydrock held a Pre-Application meeting with NSC and during this the available modelling was discussed in detail along with the potential impacts of the site and how the more recent modelling (Woodspring Bay) differed from that previously available from the Congresbury Yeo 2015 model. Whilst Brookbanks were not involved in the meeting it is understood that agreement was reached on the Undefended 200year plus climate change event being the design event of the basis that this would be the 'worst case' assessment.

2.2 The comment above refers to climate change event up to 2118 but as part of the assessment it was considered that uplifting the tidal allowance to cover the anticipated full design life of the development at the time of planning submission would be more appropriate given current policy and guidance requirements. In order to achieve this Brookbanks have taken the Woodspring Bay model and updated the tidal values for the climate change event through creation of a 'new event' within the input files. This results in an uplift of 52.4mm for the Higher Central climate adjusted event and 73.6mm for the Upper End scenario. Both of these values are based on 4 years' worth of increase as taken from Table 1 from the Flood Risk Assessment: Climate Change Allowances guidance on the .GOV.UK website. The assessment of both the Higher Central and Upper End events were agreed with NSC as being acceptable.

2.3 As is outlined within the EA's response, the Flood Risk Assessment submitted focussed on assessing the risk to the site and surrounding areas for the Undefended Scenario on the basis this would provide a conservative and worst case assessment, as was agreed with NSC, both for the present day risk but also when assessing the development design life. However, and following received comments, Brookbanks have undertaken an exercise to determine the level of risk posed to the development during a Defended Scenario.

2.4 It should be noted that the standard of protection from the tidal flood defences is stated within the North Somerset Strategic Flood Risk Assessment as being up to a 1 in 200 year event and this is corroborated by the outputs from the EA's Woodspring Bay model. As such, the focus of the assessment to address this comment from the EA has been to understand the risks to the site for a defended scenario when making an allowance for

climate change; again both the higher central and upper end scenarios and up to 2122 to cover a 100year design life (at the point of submission). As such no other events have been assessed on the basis that the defences would be sufficient to remove any risk to the site from these defended scenarios.

2.5 The outputs from the defended and undefended modelling have been reviewed and compared to better understand the difference between the scenarios. For the Undefended scenario that first tidal peak is shown as peaking slightly later than the defended scenario (54hr 45mins) and at 56hr 45mins into the model simulation. Within 2 hours of this flood volumes and wet cells in the model are shown to be similar to the peak and no obvious decrease as shown in the defended scenario (which decreases by around 20% over the same 2 hour period). This therefore demonstrates that the flows remain within the floodplain for the undefended scenario and highlight impact of the defences and how they reduces flood volumes, and therefore risk both at the site and to the surrounding area.

2.6 Whilst it is accepted that the 1st peak is not the 'critical' one within the model it provides a good insight as to how the defences affect the timings and mechanisms of the floodplain. However to emphasise this point the 3rd tidal peak is shown as being the highest within the model and the wet cells were reviewed for both the defended and undefended scenarios. For comparison the peak wet cells shown for the Undefended scenario was around 4.2million wet cells whereas the maximum wet cells for the 3rd peak in the defended scenario were significantly lower at 1.3million cells – which again demonstrates just how much less volume enters the floodplain and therefore affects the site.

2.7 In terms of the site, and as outlined in the EA's response, the Higher Central and Upper End events do result in inundation of the site but given the decreased volume in the floodplain due to the defences the predicted levels are lower than those stated within the submitted Flood Risk Assessment and those used to define the level of ground raising. As such this confirms that the proposed mitigation would remain as being worst case and adopting a design for exceedance event for the potential complete failure of the existing defences.

2.8 Within the response reference is made to the potential impact of the proposed development on flood risk to third party land. The above is something that was discussed via telephone conversation with the EA in June and it was agreed that this point was not raised in relation to providing floodplain compensation and was more to understand any potential impact and specially to the existing properties. As such, a comparison was undertaken and shared with the EA based on the undefended scenario. This was based on building a model scenario for the proposed site ground levels and comparing these output flood levels to the baseline scenario. In order to maintain a consistency with the design event and assessment of difference between defended and undefended this was undertaken for the 1 in200 year 2122 High Central event – i.e. the agreed design event. T exercise showed that the inclusion of the proposed ground raising resulted in no change to the flood extent and no new areas being shown to now be at risk where they weren't before.

2.9 On review of the outputs there was almost a patchwork of areas throughout the model domain, and specifically around the site, where areas of both increased and decreased flood extents are predicted with much of these being considered as being a result of the alignment of the pre and post development grids as many are a considerable distance (1km plus) from the site and separate hydraulic controls such as raised railway lines and roads. Additionally the majority of this increases (and decreases) are shown as being 'shallow' and not exceeding 0.01m increase of decrease and therefore can be discounted.

2.10 Specific to the proposed development site and its immediate surrounding area, the raising of the site is shown to result in both increases and decreased in flood depth. With respect to increases these are primarily to the north of the site as this is the location of the lowest point along the Strawberry Line and the main mechanism of flooding that affects the site in the climate change event. This area is currently undeveloped and is shown to have a slight increase in flood levels as a result of the raising of the development. On interrogation of the

results this depth is typically shown as being between 0.03-0.05m increase – which on the predicted maximum depths at the peak of the event are considered as being an inconsequential increase. There are some areas where depths increase up to around 0.2m but on closer review of the modelling data these are consistent with the location of the existing Rhyne network and therefore are considered as representative of in-channel flood levels.

2.11 Some increases in flood depth are also predicted to impact existing residential properties to the north east of the site. These are shown to impact an existing lower elevated section of land and as with the undeveloped land to the north the increases are shown as being low and not exceeding 0.05m. It should be noted that throughout this area the general pattern is an increase followed by a decrease. This pattern of increase/decrease continues throughout much of this area. As such to better understand what is happening in these locations a comparison of the raw data has been undertaken and this removes much of the increase followed by decrease and confirmed that whilst there are localised areas of increase these are typically around 0.03m. Again owing to the predicted flood depths within the baseline scenario this represents a negligible increase and therefore negligible impact. Additionally, and specific to these properties, they would already experience internal flooding during the baseline scenario and the increased depth wouldn't make any operational impact. As stated previously no new areas of flooding are precited.

2.12 Whilst the outputs have shown some areas where minor increases in flood depth are predicted the outputs have shown areas along the eastern site boundary where flood depths are shown to reduce from the pre-development conditions and this extends to existing properties along Shiners Elms and Lodge Close with circa 12-15 properties being shown to benefit from decreases in predicted flood depths of up to 480mm. Again some of this decrease in flood depth is shown as being very shallow and/or due to slight discrepancies in grid alignments and in order to maintain consistency in approach these have been discounted.

2.13 In order to be fully transparent a copy of the outputs grids for the pre and post development scenarios for both the defended and undefended scenarios will be submitted alongside the other modelling files for EA review.

EA Comments: While we do not disagree that, in terms of setting appropriate FFLs and considering safe access/egress, tidal flooding risk poses the predominant risk to the site, this does not mean that fluvial flooding can be ignored when assessing impacts on flood risk elsewhere. The impact of existing coastal defences indeed makes fluvial flooding more likely to occur at the site over its lifetime compared to the precautionary tidal event used to inform FFLs. The applicant's consultant's own hydraulic modelling in support of adjacent application 21/P/0236/OUT indicated that a 1 in 100 (1%) flood event including climate change results in fluvial flooding north of Rectory Farm, affecting parts of the site where dwellings (and hence land raising) are proposed. It is our view that the impacts of proposed land raising on fluvial flooding from the Congresbury Yeo and local Rhyne network should be considered in a similar manner to application 21/P/0236/OUT to ensure flood risk is not made worse elsewhere.

2.14 On review of the submitted Flood Risk Assessment it is considered that the level of fluvial risk to the development site has been adequately discussed with an assessment being made based on data that was provided to Hydrock as part of a Freedom for Information Data request. This was in the form of the Congrebury Yeo 2015 model which has fluvial only scenarios modelling, which the Woodspring Bay model does not have.

2.15 On review of the Congresbury Yeo modelled outputs this has shown that for all modelled fluvial events (30yr, 100yr, 100year plus climate change, and 1,000year) no fluvial flooding is predicted to impact the proposed development site. On this basis, and following confirmation from NSC that the dominant source of flooding to

the site would be from tidal flooding in the climate change events (which exceed the defences) it is this event that was used as the design event for mitigation and assessment. However the FRA did confirm this was the case.

2.16 For the avoidance of doubt, the Congrebury Yeo model files which include the relevant climate change events (as these are different from that at the time of the model being constructed) will be provided to the EA and NSC for their review and approval.

2.17 The Flood Risk Assessment has been prepared based on publicly available information in the form of accepted and approved EA models as this is in line with standard practise and approaches. However reference has been made to a neighbouring application where further modelling was undertaken by Hydrock. Whilst this application site is known and the reporting is available via the planning portal the modelling files themselves are not available as these are not in the public domain and are not the property of the applicant and therefore reliance, or indeed the accuracy of the data, is not able to be commented on.

2.18 Whilst this is the case a detailed review of the available information (i.e. the reporting and outputs) has been undertaken. On review of this the above comments are correct and outlines are shown as affecting the site but it should be noted that this modelling does not follow the EA guidance on fluvial modelling and is a combination of tidal and surface water modelling and considered as being an overly conservative assessment of risk. Therefore it would not be representative or suitable to assess the level of risk to the proposed development site.

2.19 The modelling for the land to the south is based on inflows being provided from the tidal elements of the Congresbury Yeo model flowing through the existing culverts under the Strawberry Line and then affecting the development site and extending into the land to north of Rectory Farm site. What is not shown however is the wider mechanism for flooding and timing of flood movements and that the mechanism of flooding that impacts the development site is after flows overtop the Strawberry Line to the north west of the site. The flows from land to the south is a second mechanisms and tidally driven (which is all within the Woodspring Bay model).

2.20 The available reports indicate that there are no 'traditional' fluvial flows within the model. Instead the inflows at the upstream network are based on surface water flows owing to the nature of the watercourses in this area being Rhynes. These surface water flows have been applied within the model to coincide with the peak tidal levels entering the site via the culverts under the Strawberry Line. As such the model represents the outlines for a combined peak of tidal and surface water flows for the 200year and 100year events both with climate change and, from what is available via the planning portal, it is not clear which source of flooding impacts both sites but it is considered that the domain source would be from the tidal flows entering the site via the inclusion of the culverts.

2.21 From conversations with Hydrock this approach was discussed and agreed with North Somerset Council at the time of application as being suitable and the model was constructed, and approved on this basis. From a review of available documentation it would appear that the EA did not undertake a detailed review of this modelling and therefore confirmation from the EA is sought as to the acceptability of this modelling and whether they have provided a detailed review and acceptance of this. If they have not, and prior to it being used to assess the risk to the site, and in line with standard approaches, this would be considered as being required. As outlined above these modelling files are specific to a different application and client.

2.22 Given the above it is considered that the Flood Risk Assessment has assessed the level of fluvial flood risk as best as possible given the information available – i.e. Congresbury Yeo model and surface water mapping. Whilst reference has been made to available modelling a review of what is publicly available also indicates that this is not a fluvial model and rather a conservative/worst case assessment of tidal and surface water sources

and therefore shouldn't be used in assessing fluvial risk to the proposed development site.

2.23 In order to sense check this conclusion, a review of the surface water mapping (via .gov.uk website) has been undertaken for both sites. This has shown that whilst surface water flooding is predicted (outside the route of the existing watercourses) this is limited to the northern limit of the neighbouring site and is not shown to extend into the Application Site. Therefore, and in the absence of any clear or confirmed fluvial modelling, the surface water mapping is considered a suitable alternative to indicate the risk and this confirms the flooding predicted within the land to the south does not extend beyond Biddle Street/Chescombe Road and enter the site. This mapping, as detailed within the submitted FRA, also confirms that any surface water flows within the application site are contained within the Rhyne network with the exception of some small areas of localised flooding which will be addressed by the proposals.

3 NSC Comments – Ref: 23/P/0664/OUT, Dated 15th May 2023.

NSC Comment: There appears to have been a misunderstanding that has arisen from a pre-application meeting that was held. The undefended tidal extents associated with the Woodspring Bay model provide the greatest extent of flood risk that should inform both the sequential and exception test if the exception test is passed. However, there was no intention to suggest that should be at the expense of other sources of flood risk or that it was the 'dominant' source of flood risk. It is suggested that the approach to residual risk and making the site safe for the lifetime of the development is discussed and agreed with both the Environment Agency and the LLFA.

3.1 This comment is similar to those raised by the EA and therefore the response would be similar to those above. However in summary, a detailed assessment of available sources of flooding has been undertaken both as part of the Hydrock FRA but also as part of the review undertaken by Brookbanks. Whilst it is agreed that a defended and undefended scenario would be required, and has now been undertaken, this has only confirmed the findings of the Fra in that the dominant, and most severe, source of risk to the site is from tidal sources. In the Defended Scenario the flood defences are shown to significant reduce the volumes of the floodplain but both result in inundation of the proposed development site. Whilst this is the case for the assessed event (200yr plus climate change up until 2122) the proposed mitigation for the development (i.e. site raising) has been based on the Undefended event which remains as the worst case level of flooding to impact the site and this demonstrates a suitable approach has been adopted.

3.2 With respect to surface water flooding the EA's surface water mapping has shown that whilst there are some areas predicted to be at increased risks these are either consistent with the Rhyne network and therefore representative of flows within this system, or are isolated areas with no connectivity to the wider area and therefore are more representative of lower lying areas within the site. 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. When the post development scenario was modelling this has confirmed that there is no adverse impacts either within the site or to third party land and the Rhyne network, and its connections to the wider area, remain unchanged from the existing scenario. If anything, and again as a result of the land raising within the application site, additional capacity and conveyance routes have been provided through the ground raising respecting the Internal Drainage Board requirements for access, and design, of Rhyne banks – i.e. gradients etc. On this basis the proposals are shown to have a negligible difference to existing conditions with respect to

surface water flows.

3.3 For fluvial sources of risk this is detailed above in response to the EA's second point. In summary, 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.

3.4 The EA have 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.

3.5 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.

NSC Comment: The undefended and defended scenarios would warrant a different level of mitigation based on the relative risk of each. The defended risk warrants land raised to above the design flood event plus climate change and the undefended residual risk managed through a combination of evacuation, internal safe refuges and dry access (if possible).

3.6 This comments is noted. It is agreed that there is a difference in predicted flood depths between the defended and undefended scenarios and this impacts the site. However, the site is shown to be inundated during both events and mitigation measures are required. On review, and given the extent of flooding to the wider area, it was considered best to adopt a design for exceedance approach and 'make safe' the development for its design life for all events and therefore the ground raising was proposed to the 1 in 200year plus climate change undefended levels with finished floor levels then be raised to achieve a freeboard above this level.

NSC Comment: Any land raising should not be detrimental to other types of flood risk and the modelling should be used to demonstrate that flood risk is not increased overall. The extent of any areas of compensation should be agreed with the Environment Agency.

3.7 Ait is assumed that the wording here of 'other types of flooding' discounts any need to compensate tidal flooding as is widely accepted nationally.

3.8 Therefore, and based on what is discussed in this note and within the Hydrock Flood Risk Assessment, the only other source of flooding shown to impact the proposed development site is surface water flooding. In order to assess this and the impacts of the development on this, a direct runoff model was created for both scenarios. This modelling will be provided along side the Woodspring Bay and updated Congresbury Yeo model for EA and NSC review and comment. However this data provides outlines that closely match the existing surface water mapping for the baseline assessment and the proposed land raising is not shown to have an detrimental impact to the wider area as the main drainage routes (i.e. the Rhynes) are maintaining with additional capacity being provided. The modelling therefore confirms that the proposals have no detrimental impact on surface water flooding.

3.9 As outlined above, the site is not considered to be at risk of fluvial flooding with any flows being generated considered as having suitable capacity within the Rhyne network and as has been shown within the surface water modelling. The modelling available for the neighbouring site is not considered as being an acceptable 'fluvial' flood model and therefore reference to these outlines being used is not considered as suitable but further discussions on this if necessary.

NSC Comment: There are concerns regarding the overall land raising that is proposed and the impact that would have on surface water flow routes from the urban extents of Yatton and how that will then impact on the Rhyne network, accessibility for maintenance (access down to the Rhyne maintenance strip level requires suitable slopes and ramps) and Wessex Water's surface water drainage outfalls and also the impact on Wessex Water's foul drainage network that crosses the site.

3.10 As outlined above a direct runoff model was created for both scenarios. This modelling will be provided along side the Woodspring Bay and updated Congresbury Yeo model for EA and NSC review and comment. However this data provides outline that closely match the existing surface water mapping for the baseline assessment and the proposed land raising is not shown to have an detrimental impact to the wider area as the main drainage routes (i.e. the Rhynes) are maintaining with additional capacity being provided. The modelling therefore confirms that the proposals have no detrimental impact on surface water flooding.

3.11 With respect to maintenance and Wessex Water's outfalls this is to be addressed / covered by Hydrock who are working on the drainage strategy elements of the scheme and also looking into levels. However, it is known that discussions have been held with the IDB as to their requirements for maintenance access etc and accommodated where possible – Hydrock to advise further on this.

NSC Comment: A plan should be provided that shows the proposed land raising. The height and scale parameter plans should also include a relationship to the existing ground levels.

3.12 This is to be addressed by Hydrock as they are progressing this element of the work.

NSC Comment: There are no issues with the overall discharge rate, however Wessex Water may not adopt a flow control structure below 5 l/s. This may impact the basin arrangements. Agreement on the discharge rate should be between the IDB and the adopting authority. Agreement in writing is required to be provided.

3.13 This is to be addressed by Hydrock as they are progressing this element of the work.

NSC Comment: The water quality approach is supported, provided the basins are designed to effectively manage water quality. This would require a wetland base to be provided.

3.14 This is to be addressed by Hydrock as they are progressing this element of the work.

NSC Comment: The design of the headwalls should be sympathetic to the landscape proposed, especially because of the potential number of pre-cast in close proximity. A bespoke approach is required.

3.15 This is to be addressed by Hydrock as they are progressing this element of the work.

NSC Comment: Although maintenance access strips have been provided, they have not considered the raising of the land and safe slopes that are to be provided. The maintenance access strips should be at existing ground level to ensure that the watercourses can be maintained and that the base can be reached without a specialist machine.

3.16 This is to be addressed by Hydrock as they are progressing this element of the work.

NSC Comment: A typical Rhyne cross-section should be included.

3.17 This is to be addressed by Hydrock as they are progressing this element of the work.