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Our ref: UT/2009/106364/SF-
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Your ref:
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Dear Mr Dittman

NORTH WARWICKSHIRE SITE SPECIFIC FLOOD RISK TECHNICAL NOTE

The Environment Agency received the Draft North Warwickshire Site Specific Flood Risk Technical Note (project number PR-360400, issue date 29/03/2019) on Monday 01 April 2019 and have now reviewed this document and have the following comments to make;

Within the introduction, it refers to the Level 1 SFRA, dated 2008 and Level 1 SFRA Update, dated in 2013 which were both completed for the site allocations as they emerged. This text should be expanded to clarify that by their nature, these Level 1 assessment do not contain the level of detail required to support detailed allocations within the floodplain. In addition to this, it should be noted that they are out of date and do not reflect current climate change allowances which were introduced in February 2016.

The introduction also states that *'the Environment Agency has requested a more robust assessment of fluvial flood risks at five of the proposed strategic allocation sites'*. This section should also be expanded to provide clearly provide context on the publication of this report, in that we advised a detailed Level 2 SFRA was required to be carried out for these sites to demonstrate that these allocations can be delivered without posing a risk of flooding to the developments themselves or to third party land. It should be highlighted that this report is a Technical Note which considers how the site allocations are likely to be deliverable in respect of future climate change, but without detailed hydraulic modelling of the ordinary watercourses to provide re-define the flood extents across the site allocations.

As advised in December 2018 when discussing the scope of this work, the JFLOW data which this assessment is partly based upon is classified as generalised broad scale modelling. Modelled fluvial flood depth data was created for the 1% annual chance of flooding situations and was produced as a by-product from the 2004 generalised

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modelling project. The purpose of the generalised modelling project was to fill the gaps where there was no detailed local modelled data in 2004, in order to define the extents of Flood Zones for spatial planning. Since 2004, local detailed hydraulic modelling has been used to replace this generalised modelling in many areas to define the extents of Flood Zones. However this depth dataset has not been updated. As stated on our website, *'this data is not suitable for identifying whether an individual property will flood, for detailed decision making or for use in site specific Flood Risk or Strategic Flood Risk Assessments. Where this data is used for anything other than broad catchment or Shoreline Management Plan scale further evidence, verification and studies should be undertaken.'* However, we understand that due to time constraints, the detailed assessment we requested to support these allocations is not possible and this report has been primarily based on analysis of JFLOW data.

In light of this, we advised that should this approach be used, site-specific justification and detailed reasoning should be provided for each site to help explain why the approach may be appropriate in the circumstances, and should include but not be limited to, the location of the site within the catchment, analysis as to whether the JFLOW extents reflect the Surface Water mapping, the percentage of the site which falls within each Flood Zone, the size of the site, the proposed developable area, the flexibility in housing numbers etc.

This has largely been undertaken within the assessment, however what is crucially missing is the analysis of the flexibility of the housing numbers and consequently, whether or not the allocations as proposed are deliverable once flood risk has been taken into account.

Page 13 states that *'further hydraulic modelling will be required as part of a detailed FRA to support planning applications on any of these five sites.'* Whilst this is standard practice for planning applications with a potential flood risk from un-modelled watercourses, or those with indicative JFLOW mapping only, we normally require this to be carried out prior to allocation in order to provide clarity on the developable parcel of land. As this detailed modelling is proposed to be undertaken at a later date, the assessment as it stands has a certain level of uncertainty with regards to particular sites. As the assessment does not include consideration of the flexibility of housing numbers, uncertainty remains as to the deliverability of the proposals within the plan. Should this not be able to be considered within the report, it will be for the council to advise the inspector as to whether there is sufficient flexibility within the housing numbers to accommodate the uncertainty in relation to flood extents and the land available for built development.

Page 14 states that *'should developers later decide to submit new or further updated proposals to occupy land within the floodplain within the redline boundaries, these policies will also require them to undertake hydraulic modelling as part of a detailed Level 3 FRA...'* This should be reworded to state that detailed hydraulic modelling would also be required for land outside or adjacent to the JFLOW flood extent, as flooding may also extend beyond this zone.

Figure 1-2 on page 4 – within the figure title it says *'(for definitions of Areas A & B, see Section X)'* however there are no Areas A & B on this figure, and we query whether this comment should be attached to 1-1 which does include Areas A & B. Further to this, Appendix X does not appear to be part of the assessment, and as such it is unclear as to how the 'developable areas' have been defined. Reference to the mapping in Appendices B & C indicates for Sites H2, E1 and H3 it relates to land in Flood Zone 1,

however the Area A for Site H1 appears to differ. Clarification should therefore be provided as to how this has been defined.

Strategic Site H1

The Technical Note has taken hydraulic modelling undertaken in 2015 by Brookbanks. This detailed modelling has been re-run with the new climate change allowances and this has shown that approximately 80% of the site is located outside of the 100 year plus 50% climate change extent, except along the watercourse corridors.

We recommend the following changes are made within Table 3.1:

- It is stated that *'the appropriateness of the development was considered prior to this assessment and it was concluded that the site should be separated into Area A and Area B based on its risk of flooding.'* However, it should be noted that the Environment Agency have previously advised that development should not be separated into Areas A & B as fixed areas and instead the development areas should be identified as *'land outside of Flood Zones 2 and 3'*.
- *Rivers (Fluvial)* -The table mentions that the *'Innage Brook flows through a culvert under Holly Lane/Rowland Way into the site'*. It should be highlighted within the report how this would require a blockage assessment to be carried out as part of any detailed hydraulic modelling to determine whether there is an increased flood risk due to blockage of this culvert.
- *Recommendations and Policies* -
 - First bullet point - the table references H3 rather than H1.
 - Third bullet point – Warwickshire CC are the statutory consultee for Surface Water and have also produced advice for developers in relation to surface water drainage.
 - Fourth bullet point – an 8m easement is required from the top of bank of the River Anker to any proposed development. An appropriate easement to the Ordinary Watercourse should be agreed with Warwickshire CC.

Whilst we accept the updated climate change extents and modelling work carried out with regards to site H1, no consideration has been provided within the report to demonstrate that the number of proposed houses can be accommodated within Flood Zone 1. In the event the inspector considers this site appropriate to be formalised within the Local Plan, we recommend the following changes are made to the existing policies:

Paragraph 14.19 Additional point: **Approximately half of this site is shown to lie within the medium risk Flood Zone 2 with some land also falling within the high risk Flood Zone 3. The Site Specific Flood Risk Technical Note identifies land available for development and provides guidance on how flood risk should be managed on this site, including how climate change should be considered.**

Policy H1: additional point: **All built development shall be restricted to land outside the 100 year plus climate change flood extent, and the 1000 year flood extent (Flood Zone 1 only). A site specific Flood Risk Assessment shall be undertaken which shall include detailed hydraulic modelling of the River Anker and its associated tributaries to ascertain the extent of flooding up the site, including the impact of climate change.**

Strategic Site H2

The Technical Note has taken hydraulic modelling undertaken in 2015 by Brookbanks. This detailed modelling has been re-run with the new climate change allowances.

In addition to the River Anker and Merevale Brook there are also three un-named tributaries of the River Anker which are all within the boundary of site allocation H2. There are currently no flood extents associated with these watercourses as the nationalised JFLOW modelling was only carried out for watercourses with a catchment greater than 3km², however this does not mean there is no flood risk associated with these watercourses. As part of this Technical Note, the flood risk associated with these watercourses has not been modelled or investigated further. Therefore, the proposed impact this will have on site allocation H2 is unknown and may impact of deliverability of the housing numbers proposed. Figure 1-1 also shows that these watercourses, as well as the Coventry Canal, fall within H2A, the area proposed for development.

We recommend the following points are clarified within Table 4.1:

- It is stated that *'the appropriateness of the development was considered prior to this assessment and it was concluded that the site should be separated into Area A and Area B based on its risk of flooding.'* However, it should be noted that the Environment Agency have previously advised that development should not be separated into Areas A & B as fixed areas and instead the development areas should be identified as *'land outside of Flood Zones 2 and 3'*.
- *Rivers (Fluvial):* The first bullet point states that *'three un-named Ordinary Watercourse tributaries of the River Anker flow north-westwards through the northern region of the site'*. There has been no assessment of flood risk associated with these watercourses within this Technical Note and therefore the flood extents have not been determined.
- The fourth bullet point goes on to say that *'Area A of site H2 has been designated as the area of the site located entirely within Flood Zone 1.'* Whilst this may be the case based on the Flood Map for Planning, as mentioned above, there has been no assessment of the flood risk to the watercourses crossing the site and therefore it is not certain that all of this area is entirely Flood Zone 1 as stated.
- This is picked up within the sixth bullet point, however to inform the site allocation this modelling needs to be undertaken.
- *Land (Pluvial):* There are areas at risk of surface water flooding along the un-named watercourses which cross the site and this is shown on Figure B-2A. This suggests that there may also be fluvial flooding associated with these watercourses as the Surface Water mapping correlates somewhat with the JFLOW flood extents.
- *Artificial sources:* The site is considered to be potentially at risk of flooding from overtopping of the Coventry Canal as it runs through the site. There has been no assessment of this risk and there does not appear to be an easement shown from the Canal as it is also incorporated within the developed area H2A.
- *Recommendations and polices:*
 - First bullet point - the table references H3 rather than H2.
 - Second bullet point – refers to the Innage Brook which is not relevant for this site. The Merevale Brook runs alongside the Eastern boundary of H2.
 - Fourth bullet point – the Canal and Rivers Trust will need to be consulted to determine an appropriate easement from the Canal. This may affect the land available for development across the site.

Whilst we accept the updated climate change extents and modelling work carried out with regards to site H2, no consideration has been given to the additional land take associated with the presence of the Canal and minor watercourses crossing the site. The report has not provided any clarification that the number of proposed houses can be accommodated within Flood Zone 1. In the event the inspector considers this site appropriate to be formalised within the Local Plan, we recommend the following changes are made to the existing policies:

14.23 additional point: **the site is bounded by the high risk Flood Zone 3 from the River Anker to the north, with medium Risk Flood Zone 2 affecting the north and eastern parts of the site. The site is also crossed by the canal and a number of minor watercourses. The Site Specific Flood Risk Technical Note identifies land available for development and provides guidance on how flood risk should be managed on this site, including how climate change should be considered.**

Policy H2 additional point 8: **All built development shall be restricted to land outside the 100 year plus climate change flood extent, and the 1000 year flood extent (Flood Zone 1 only). A site specific Flood Risk Assessment shall be undertaken which shall include detailed hydraulic modelling of the River Anker and its associated tributaries to ascertain the extent of flooding up the site, including the impact of climate change.**

Strategic Site H3

The assessment shows approximately 50% of the site affected by both medium and high risk Flood Zones 2 and 3. This is based on indicative JFLOW modelling. Of all the sites this is the one where we have least confidence in the flood outlines that have been produced.

As such, at a meeting with NWBC and their consultants in February 2019 we agreed that due to this uncertainty, this site would be allocated as a Reserve site only, and that no indicative housing numbers would be attached to the allocation. However, we note within the assessment it is stated within the '*proposed use and vulnerability classification*' that there are potentially 53 new homes proposed for this site.

We recommend the following points are clarified within Table 5.1:

- It is stated that '*the appropriateness of the development was considered prior to this assessment and it was concluded that the site should be separated into Area A and Area B based on its risk of flooding.*' However, it should be noted that the Environment Agency have previously advised that development should not be separated into Areas A & B as fixed areas and instead the development areas should be identified as '*land outside of Flood Zones 2 and 3*'.
- *Rivers (Fluvial)*: The fourth bullet point states that 'if more detailed modelling was undertaken, and it was to demonstrate water levels increases of, for example only 0.5m during a <1%AP to >=0.1%AP event, there is the potential for floodwater to spread further out across the central region of the site due to the shallow gradient here.' As a result, due to the watercourse not being hydraulically modelled in this location, it still remains unclear as to the extent of flooding across the site.
- The fifth bullet point recommends that the JFLOW Flood Zone 2 outline be used as the 100 year plus climate change extent in the absence of detailed modelling, however this JFLOW extent is still deemed indicative and not definitive and should not be used to set development areas.

- *Recommendations and policies:*
 - First bullet point states that the proposed number and density is expected to be small, however as mentioned above the Environment Agency understood that there was to be no housing numbers associated with this site in order to satisfy flood risk in terms of deliverability.
 - Second bullet point – there is the potential that the flood extents may increase across the site as a result of detailed modelling as stated in the ‘Rivers (fluvial)’ section of the table.
 - Third bullet point - refers to the Merevale Brook which is not relevant for this site. The Innage Brook is adjacent to the site.
 - The fourth bullet point states that ‘there is the potential for redistribution of ground levels within the site’ however there has been no assessment of how this may alter the flooding mechanisms on site and to third parties.

Given the uncertainty with regards to this site, we have concerns as to any housing numbers being committed to for development on this land, as it may be completely undeliverable.

In the event the inspector considers this site appropriate to be formalised within the Local Plan, we recommend the following changes are made to the existing policies:

Additional Point 14.25: **Approximately 50% of the site affected by both medium and high risk Flood Zones 2 and 3. This is based on indicative JFLOW modelling, and as such requires refining. The Site Specific Flood Risk Technical Note identifies land available for development and provides guidance on how flood risk should be managed on this site, including how climate change should be considered.**

Policy H3: **All built development shall be restricted to land outside the 100 year plus climate change flood extent, and the 1000 year flood extent (Flood Zone 1 only). A site specific Flood Risk Assessment shall be undertaken which shall include detailed hydraulic modelling to ascertain the extent of flooding up the site, including the impact of climate change.**

Assessment of Strategic Site E1

The assessment shows approximately 30% of the site affected by medium and high risk Flood Zones 2 and 3.

We recommend the following points are clarified within Table 6.1:

- *Rivers (Fluvial):* The third bullet point states that ‘*if more detailed modelling was undertaken, and it was to demonstrate water levels increases of, for example only 0.5m during a <1%AP to >=0.1%AP event, there is the potential for floodwater to spread slightly further out eastwards across the far eastern region of the Site due to the shallow gradient here.*’ As a result, due to the watercourse not being hydraulically modelled in this location, it still remains unclear as to the extent of flooding across the site.
- The fifth bullet point recommends that the JFLOW Flood Zone 2 outline be used as the 100 year plus climate change extent in the absence of detailed modelling, however this JFLOW extent is still deemed indicative and not definitive and should not be used to set development areas.
- *Recommendations and policies:*
 - First bullet point - the table references H3 rather than E1.

- Sixth bullet point – recommends an 8m easement from the watercourse, has this been taken into account as part of the development land?
- *Site Specific FRA Guidance:* Bullet point three states More Vulnerable development, however this allocation is for employment land, therefore should refer to Less Vulnerable development.

In the event the inspector considers this site appropriate to be formalised within the Local Plan, we recommend the following changes are made to the existing policies:

Revision to 14.25: *The site lies partially within Flood Zones 2 and 3 to the eastern end of the site. A site specific Flood Risk Assessment will therefore be necessary to accurately assess this risk and propose suitable mitigation. The Site Specific Flood Risk Technical Note identifies land available for development and provides guidance on how flood risk should be managed on this site, including how climate change should be considered.*

Policy E1 rewording: *All built development shall be restricted to land outside the 100 year plus climate change flood extent, and the 1000 year flood extent (Flood Zone 1 only). A site specific Flood Risk Assessment shall be undertaken which shall include detailed hydraulic modelling to ascertain the extent of flooding up the site, including the impact of climate change. In addition, the Innage Brook will be protected and enhanced by a 10m semi-natural buffer between any development and the bank of the brook*

Strategic Site H14

The assessment shows medium and high risk Flood Zones 2 and 3 creeping into the western margins of the site. We consider the minor flood risk on this site can be managed by setting back development from the watercourse.

We recommend the following points are clarified within Table 7.1:

- *Rivers (Fluvial):* The third bullet point states that *‘if more detailed modelling was undertaken, and it was to demonstrate water levels increases of, for example only 0.5m during a <1%AP to >=0.1%AP event, there is the potential for floodwater to spread slightly further out south-eastwards across the far northern region of the site due to the shallow gradient here.’* However this contradicts the sentence within the Existing Land Use and Topography section which states that *‘the gradient of the site rises sharply from 96mAOD away from the watercourse to the south east’*.
- The third bullet point also refers to the Innage Brook which is not relevant and this site allocation is at risk from the Lindridge/Langley Brook.
- The fifth bullet point recommends that the JFLOW Flood Zone 2 outline be used as the 100 year plus climate change extent in the absence of detailed modelling, however this JFLOW extent is still deemed indicative and not definitive and should not be used to set development areas.
- *Artificial sources:* The second bullet point does not have an ending. It states that site H14 is not at risk of reservoir flooding but ends with *‘however...’*
- *Recommendations and polices:*
 - The first bullet point states that the site is currently in Flood Zone 1, however *‘once detailed modelling is completed, should the Flood Zones be found the extent further into the site than currently mapped’*. This does not provide confidence that the Flood extents will not increase beyond the

JFLOW extents and there is no consideration as to whether the housing numbers can be accommodated within the site, if the flood extents were to increase.

- The second bullet point says *that 'no land raising or built development is permitted inside the combined modelled Flood Zone 2'* however the rest of the document refers to no land raising or built development within the 100 year plus 50% climate change allowance.

In the event the inspector considers this site appropriate to be formalised within the Local Plan, we recommend the following changes are made to the existing policies:

Additional Point 14.55: **The Langley Brook flows along the north-eastern boundary, and the associated floodplain is shown to lie just outside the site boundary. This floodplain is indicative only therefore further assessment will be required as part of any detailed planning application to further refine this and ensure the development is safe from flooding. The Site Specific Flood Risk Technical Note provides guidance on how flood risk should be managed on this site, including how climate change should be considered.**

Policy H14: **All built development shall be restricted to land outside the 100 year plus climate change flood extent, and the 1000 year flood extent (Flood Zone 1 only). A site specific Flood Risk Assessment shall be undertaken which shall include detailed hydraulic modelling to ascertain the extent of flooding up the site, including the impact of climate change.**

Summary

The summary of the report states that the Environment Agency have requested a more robust assessment of all sources of flood risk at the sites to provide confidence that the proposed land uses are likely to be deliverable, in respect to climate change. However, as outlined earlier, this was not our only requirement. The Environment Agency have requested, throughout all of our consultation responses, that a robust assessment of all sources of flood risk be carried out in the form of a Level 2 SFRA to more accurately define the extent of flooding to the site allocations, including the climate change extents, to inform deliverability.

Whilst the Technical Note has demonstrated, by looking at the proposed flows, that the 30% and 50% climate change allowances are unlikely to increase beyond the Flood Zone 2 extents, it still remains unclear around the accuracy of the existing JFLOW extents and the implications this may have upon delivery of the proposed housing numbers for each site allocation.

Appendix A – Hydrological & Hydraulic Analysis

Unfortunately, we have not been able to have this appendix reviewed by our Modelling and Forecasting team due to the limited time scales available for review. However we do have the following comments to make;

The report states that the model network and hydrological inflow file were provided by Brookbanks Consulting Ltd in 2016 for peer review and have been used as the basis for this Technical Note. The report goes on to say that AECOM's peer review provided several additional recommendations to improve the quality of the model. Clarification should be provided as to whether this was the final copy of the model which was approved by the Environment Agency and subsequently used to update the Flood Map for Planning. In addition, it should be confirmed as to whether the recommendations

used to update the model were submitted as part of the planning application and therefore approved.

For site H2, the Technical Note states that within the Brookbanks 2015 modelling report, inflows from 3 additional un-named tributaries contributing to the River Anker were included as constant peak flows into the model, however these are not contained within the model file held by AECOM so it is not clear how and if these inflows were accounted for in the model.

For sites H3, E1 and H14, flow estimates were used to establish the difference between the climate change flows and the 1000 year flows to determine whether the 100 year plus climate change events would be likely to extend further across the site than the JFLOW derived Flood Zone 2 outlines if they were to be modelled. The difficulty which remains is that the JFLOW extents are indicative and not definitive and therefore, whilst establishing that the flows in the climate change events may not be greater than the 1000 year event, it is still unclear how much of the site is affected by flooding.

Yours sincerely

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