Flood Risk Assessment of Site IP034 578 Wherstead Road (Former Bourne Nurseries)

The site was put forward into the Local Plan process by the landowner through the Local Plan call for sites exercise in 2017.

To support its consideration as a potential development site through the Council's Strategic Housing and Employment Land Availability Assessment, the landowner submitted a site specific Flood Risk Assessment.

The Council commissioned consultants Aecom to undertake an update of the Ipswich Strategic Flood Risk Assessment in August 2019. As part of this commission, Aecom made an independent assessment of the site specific Flood Risk Assessment for site IP034. This is appended to this report as Appendix 1.

The assessment concluded as follows:

Concluding comments

The applicant has considered the risks in detail and how to design the development to mitigate flood risk from all sources.

The applicant discusses detailed conversations with the fire brigade although no formal correspondence with them has been obtained. The comments indicate that the fire brigade 'were generally positive' despite the access roads being potentially inundated to impassable levels during a flood event for up to 6 hours. It is recommended that formal consultation with the fire brigade be sought to confirm this.

Numerous correspondence with the Environment Agency have been included and addressed. It is noted that the applicant has not included the following requesting they be conditioned to detailed design stage

- Emergency flood plan

- Detail of flood resilience measures

- Detailed design of flood compensation storage

Although commentary has been provided to suggest all these things could be feasible. IBC should decide whether they feel it acceptable to condition these elements in consideration of their Local Policy.

The applicant has provided an independent modelling report which indicates depth, velocity and hazard in a range of flood return periods and a breach scenario, which further demonstrates inundation of access routes.

In conclusion

- The applicant has demonstrated the residential dwellings can be safe from flooding and safe refuge can be provided on site.

- It is recommended that the fire brigade and emergency planning teams are consulted with regards to the length of time access routes may be inundated

- It is recommended that full details of flood resilient design and flood compensation storage are provided before full planning permission is granted

- A flood evacuation plan has not been provided. This may be required to satisfy The Environment Agency at outline planning stage.

In response to these conclusions, the Council sought views from the Suffolk Fire and Rescue Service. They responded as follows:

SUFFOLK FIRE AND RESCUE SERVICE (SFRS) GENERIC ADVICE FOR PROPOSED DEVELOPMENTS IN FLOOD ZONES

When a developer proposes development in flood zones 2 and 3 (as determined by the local Strategic Flood Risk Assessment and the developer's Flood Risk Assessment (FRA) supports invacuation[1] of occupants in the event of flooding, the FRA needs to suitably detail the provision of a flood emergency kit for however long occupants would be expected to remain invacuated. This kit should include information warning of the dangers of using portable heaters and candles etc during potential utility failures.

If access roads to the development may be inundated the following advice should be considered by planners and developers:

1. Standard modern Fire and Rescue Service (FRS) vehicle design and crew safety considerations has resulted in SFRS fire appliances being unable to operate in or drive through water any deeper than 20cm.

2. In any event where working in water is required the Crew/Incident Commander must carry out a dynamic risk assessment to confirm the situational risk vs benefit before adopting tactics involving working in water.

3. Whilst every effort will always be made by SFRS to respond to fires and rescues, due to the nature and scale of significant flood events a dynamic risk assessment may determine that FRS resources are unable to respond normally along flooded routes where the depth of flood water at any point is greater than 20cm. This may prevent or delay emergency response. Strategic and tactical risk assessments and resource limitations may also cause response times to vary significantly from normal operating procedures.

4. One consideration compounding the water safety issues for emergency responders would be the fact that fire hydrants in the area may also be rendered unserviceable due to inundation.

5. It is noted that the issues of potentially flooded access routes may be an existing situation for existing properties in the flood zone areas(s) being developed. Notwithstanding this, any new development proposals should actively consider the provision of a suitable and appropriately installed fire sprinkler system(s) (designed to be resilient and operate in flood conditions) in order to:

a. Significantly enhance occupant safety by mitigating effects of any fire occurring during flood events which may result in occupant invacuation and restrict the normal capabilities of the Fire and Rescue Service response.

[1] Invacuation is the removal of people to an indoor place of safety when there is an emergency outside.

b. (This would actually have the beneficial effect of enhancing the fire safety of building occupants at all times);

c. Significantly limit fire damage and environmental impact of any fire in the new property; and

d. Reduce additional burden of risk for emergency responders attempting to use best efforts responding to the new property for life critical incidents.

Conclusion

The Council has considered the detailed evidence on flood risk submitted by the landowner to support the site's allocation.

The site lies close to the Orwell Estuary which does not benefit from flood defences that would aid the residents of this site.

Whilst safe refuge and appropriate floor levels could be achieved on the site, safe access/egress in the event of a flood could not, with access routes blocked by deep and, in places, fast flowing water. The land owner's site specific Flood Risk Assessment indicates that escape routes off site have been investigated but water would reach a depth greater than 20cm (and up to 2m in places).

The Suffolk Fire and Rescue Service has confirmed that 20cm is the maximum depth that could be considered suitable for emergency vehicles. Furthermore, flooding of any depth may require dynamic risk assessments and may render fire hydrants inactive which would delay and/or put at risk future site occupants.

Therefore, the Council has concluded that currently the development of this site would not be safe and it should not be allocated at this stage. The National Planning Policy Framework requires that development should be made safe for its lifetime without increasing flood risk elsewhere. Adopted and emerging Ipswich Borough Council Local Plan policy reflects this requirement through policy DM4. Safety is defined through the Development and Flood Risk Supplementary Planning Document 2016 based on the Ipswich Strategic Flood Risk Assessment.

Should the situation change – for example, through a safe escape route being identified – then this position could be reviewed.

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Technical Note

Project name	Flood Risk Asssessment Review – Bourne Nurseries	**AECOM project no.**	60612179
Client	Ipswich Borough Council	**Date:**	23 September 2019

Prepared by Miguel Headley
Checked by Amy Ruocco
Approved Emily Craven

Introduction	
This assessment has been carried out with reference to the following; - Ipswich Borough Council Flood Risk SPD (2014) - Environment Agency Standing Advice on Flood Risk Assessments - National Planning Policy Framework (NPPF), and, - Planning Practice Guidance (PPG)	
NPPF Development classification:	
Essential Infrastructure Highly Vulnerable More Vulnerable Less Vulnerable Water compatible	☐ ☐ ☒ ☐ ☐
Flood Risk documents submitted for Review with planning application • Bourne Nurseries, Wherstead Road, Ipswich, Ip2 8LS, Proposed Residential Scheme (Paul Snape Consulting, July 2018);	

Section A: Initial Assessment of Flood Risk to the Site		
Fluvial		
1	Is the site in an Environment Agency flood zone?	Yes FZ3 ☒ Yes FZ2 ☐ No ☐
2	Is the site within 250m of a Main River?	Yes ☒ No ☐
3	Is the Site within 250m of an ordinary watercourse?	Yes ☐ No ☒
4	Where the answer to 3 is **yes**, considering local topography, is there a potential for fluvial risk from an ordinary watercourse?	Yes ☐ No ☐ uncertain ☐
5	Are there any known historic floods from a main river or ordinary watercourse within 250m of the site?	Yes ☒ No ☐ uncertain ☐
6	Is the proposed development located in a 'Dry Island'?	Yes ☐ No ☒ uncertain ☐

Surface Water		
7	Risk of flooding from surface water (approximate)	High [ ]% Low [10]% Medium [ ]% Very low [90]%
8	If site is at risk, how deep is the highest risk flooding predicted to be?	Over 900mm ☐ Below 300mm ☒ 300-900mm ☐ N/A ☐
9	Are there any known historic floods from surface water within 250m of the site?	Yes ☐ No ☐ uncertain ☒
10	Is the site in an area of critical Drainage (Environment Agency)	Yes ☐ No ☐ uncertain ☒
Groundwater		
11	According to the SFRA, what is the potential for Groundwater flooding?	<25% ☐ 25-50% ☒ 50-75% ☐ 75-100% ☐
12	Are there any known historic floods from groundwater within 250m of the site?	Yes ☐ No ☒ uncertain ☐
Sewers		
13	Are there any known historic floods from sewers within 250m of the site?	Yes ☐ No ☐ uncertain ☒
14	Are there any planned sewer upgrades which may influence the site?	Yes ☐ No ☐ uncertain ☒
Artificial sources		
15	According to Environment Agency mapping, is there any flood risk from reservoirs?	Yes ☐ No ☒ uncertain ☐

Comments

Surface Water Flood Risk

The Environment Agency (EA) Flood Risk from Surface Water mapping, shows a small section of the eastern part of the site to be located in an area of low flood risk of surface water flooding. The remainder of the site is located in the very low risk < 0.1% (AEP) of flooding from surface water.

Fluvial Flood Risk

The Environment Agency Flood Map for planning shows the site to be Flood Zone 3. Section 3.6.5 of the Flood Risk Assessment mentions the most recent (i.e. *2015 – at the time of writing*) modelling tidal levels from the EA (*i.e. 5.53m AOD defended, 5.57m AOD undefended – 0.1% AEP +CC)* was used to determine the proposed site levels. It is acknowledged that the hydraulic modelling report for Site 34 was published in 2012 (*Document Ref: AMA 231 Rev 0)* and sets out a summary of the flood durations for the 1 in 200 year + CC event. However, the most recent modelling information from the EA (i.e. the product 4 information in Appendix E) was used to determine the proposed site levels (i.e. 5.7 mAOD).

A breakdown of the proposed levels across the site is as follows:

- The FRA proposes to set Finish Floor Levels at 5.7m AOD which is the above the minimum required in the Ipswich Borough Council SPD (*i.e. 5.6m AOD*).
- The FRA proposes to also set the safe refuge area to 5.7m AOD which is above the predicted flood levels for the 0.1% + CC event.
- To address EA comments in Document Ref: *PSC-092-FRA-L1*, the FRA proposes to incorporate flood resilient and construction measures up to the proposed level of 5.7m

AOD.

Appendix E of the FRA provides a summary of the product 4 information for the 2015 Belstead Brook model. The fluvial floodplain for the Belstead Brook show flood levels to the 4.38m AOD from the 1 in 100 year + CC event and 1 in 100 year + CC event.

The EA correspondence (Document Ref: AE/2017/122169/03-L01) has asked the applicant to verify if the proposed levels for the site (i.e. 5.7m AOD) would result in water being displaced in Flood Zone 3. Section 3.7.18 of the FRA mentions "*compensatory storage would be provided for any loss of volume within the fluvial floodplain and the actual flood volume is likely to increase*". Paragraph 3.7.15 discusses a review of the volume of storage which would be available within the underground car parking and concludes that level for level storage is possible. Appendix H indicates an increase in storage volume but it cannot be clearly determined whether this is level for level compensation.

Other comments - 2011 hydraulic 1D and 2D modelling

1D Model

- Section 2.1 of the modelling report indicates ground levels were taken from Environment Agency 50cm LIDAR DTM (June 2008). The 1 in 200 year + CC AEP Hazard Map + CC show Site 34 to be located in a region characterised as "*Hazard to all*".

- The **Safe access / escape routes for building users**' Section in the 2011 SFRA quotes "*if development is proposed close to defences where breaches have not been considered… then a development SFRA will need to infer hazard ratings*". The 1D hydraulic model of Site 34 considers a "*50m wide breach in the flood embankment between cells 1and 2*". It is not clear if this represents an area without flood defences / where a flood breach was not modelled in the 2011 SFRA.

- In the Environment Agency letter (Ref: AE/2012/114629/03-L01) to the application further clarification was requested in relation to this modelling scenario, however, no subsequent response was provided. Furthermore, the modelling study mentions the results in Table 5 of the modelling report are meant to represent the "*50m wide breach in the flood embankment*" modelling scenario, however the text in Table 5 appear to represent another scenario (*i.e. 1:200 year CC with culvert blockage*) which is not explored in the report.

2D Model

- The tide levels boundary conditions for Cell1 (*Modelling report, Appendix A - Map 01*) were set using the 1D model output stage time data conditions, and the south east boundary condition was configured in the model by applying "various levels taken from the 1D model in Cell 2a". It is assumed the shortcomings associated with the uncertainties in the 1D were inherited by the 2D model (e.g. 50m wide breach in the flood embankment between cells 1and 2").

- The hazard mapping results in the modelling report show the velocity of the flow along the escape route (*Modelling Report, Appendix A - Map 05*) from the safe refuge to Wherstead Road to be greatest towards the east and south of the site, and the maximum depth to be at least 3.9m (map 04) in the southern part of the site along Corporation Avenue. Most of the Eastern part of the site is modelled to have depths of around 2.25m in a 1 in 200 + CC event.

Section B: Environment Agency standing advice checklist for developments in Flood Zone 2 & 3		Comments
1. Development site and location		
Is the site location provided? (address/grid ref)	Yes ☒ No ☐ Partial ☐	
Is the current use stated?	Yes ☒ No ☐ Partial ☐	
Is the correct flood zone stated? (in line with Section A)	Yes ☒ No ☐ Partial ☐	
2. Development proposals		
Are development proposals stated including any change of use?	Yes ☒ No ☐ Partial ☐	
Is vulnerability classification stated and correct?	Yes ☒ No ☐ Partial ☐	
Stated lifetime of development	Assumed 100Years	
3. Climate Change		
Does the FRA consider impacts of climate change?	Yes ☒ No ☐ Partial ☐	
Has the appropriate climate change impact range been considered for fluvial risk?	Yes ☐ No ☒ Partial ☐	Product 4 information from the 2015 Belstead Brook Model has been used, which includes a 20% uplift. In accordance with EA guidance since 2016, climate change range from 35% - 65% uplift should be considered for this development. Applicant has provided reasonable justification for not carrying out this analysis in para 3.7.17
Has the appropriate climate change impact range been considered for surface water risk?	Yes ☐ No ☐ Partial ☒	30% climate change has been considered. Guidance recommends considering a range up to 40%
4. Site specific flood risk		

Have the main flood risks to the site been fully and accurately described (in line with section A)	Yes ☒ No ☐ Partial ☐	
Is the expected depth and level for the design flood specified in metres above Ordnance Datum?	Yes ☒ No ☐	*5.53m AOD defended, 5.57m AOD undefended – 0.1% AEP +CC*
Are properties expected to flood internally in the design flood and to what depth? (Internal flood depths should be provided in metres)	Yes ☐ No ☒ N/A ☐	Proposed Finished Floor Level is 5.7m AOD - above the undefended flood level
Does FRA state how the development will be made safe from flooding and the impacts of climate change (mitigation)?	Yes ☒ No ☐ Partial ☐	Safe Refuge provided at 5.7m AOD
Does the FRA cover how the development and any flood protection measures will not cause increase in flood risk elsewhere over lifetime of development?	Yes ☐ No ☐ Partial ☒	Section 3.7.15 discusses how compensation storage will be provided but more design detail is required to support this.
Has the FRA identified opportunities to reduce causes and impacts of flooding through the development (if relevant)?	Yes ☐ No ☐ Partial ☐N/A ☒	
5. Surface water management		
Are the existing surface water drainage arrangements described?	Yes ☒ No ☐ Partial ☐	Discharge to the existing combined sewer in Wherstead Road.
Are the existing rates and volumes of surface water run-off generated by the site stated?	Yes ☐ No ☒ Partial ☐	
Are proposals for managing and discharging surface water from the site described?	Yes ☒ No ☐ Partial ☐	The drainage hierarchy is demonstrated in Table 1 - Section 6.7.
Where development is major or site is in an area at risk of flooding have SuDS been proposed?	Yes ☒ No ☐	The results of the desk study in Section 6.3 show the site to be underlain by Chalk. The FRA quotes infiltration testing for the site to be 1.8 x 10m-^{5}m. The drainage strategy proposes a combination of permeable paving

		and swales.
Does the FRA describe how run-off from the development will be prevented from causing an impact elsewhere?	Yes ☒ No ☐ Partial ☐	
If relevant , is there an operation and/or maintenance plan for the proposed SuDS	Yes ☐ No ☒ Partial ☐	The drainage strategy indicates that the landowner will be responsible for the maintenance of SuDS. No maintenance plan has been provided.
6. Occupants and users of the development		
Does the FRA cover details of number of occupants of proposed development and changes from present?	Yes ☐ No ☐ Partial ☒	
Will the proposals change the nature or times of occupation or use, such that it may affect the degree of flood risk to these people? If this is the case, is the extent of change described?	Yes ☒ No ☐ N/A ☐	Current use is a plant nursery. Site proposals for 113 residential units.
Where appropriate, is it demonstrated how the occupants and users that may be more vulnerable to the impact of flooding (e.g. residents who will sleep in the building; people with health or mobility issues etc.) will be located primarily in the parts of the building and site that are at lowest risk of flooding? If not, are there any overriding reasons why this approach is not being followed?	Yes ☒ No ☒ N/A ☐	All residential floors will be above the design flood with access to alternative safe refuge.
7. Exception test (if required)		
Would the proposed development provide wider sustainability benefits to the community? If so, could these benefits be considered to outweigh the flood risk to and from the proposed development?	Yes ☐ No ☐ N/A ☐	This part of the Exception test has not been addressed.

How can it be demonstrated that the proposed development will remain safe over its lifetime without increasing flood risk elsewhere?	Yes ☒ No ☐ N/A ☐	
Will it be possible for the development to reduce flood risk overall (e.g. through the provision of improved drainage)?	Yes ☒ No ☐ N/A ☐	
8. Residual risk		
Does the FRA adequately describe flood risks remaining after flood risk management measures and mitigation have been implemented?	Yes ☒ No ☐ Partial ☐	
Does the FRA describe how and by whom these risks will be managed over the lifetime of the development?	Yes ☐ No ☒ Partial ☐	An emergency flood plan has not been completed. Applicant states this would be provided at the detailed design stage
A.1 Proximity to main rivers or ordinary watercourses		
Is the development within 20m of a main river, flood defence structure or culvert?	Yes ☐ No ☒ Unknown ☐	
Does the development propose to alter, place structures within or discharge to an ordinary watercourse	Yes ☐ No ☒ Unknown ☐	
If either of the above questions answer 'Yes' have the appropriate permits or consents been sought or acknowledged within the FRA?	Yes ☐ No ☐ Partial ☐ N/A ☒	

Concluding comments

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The applicant discusses detailed conversations with the fire brigade although no formal correspondence with them has been obtained. The comments indicate that the fire brigade 'were generally positive' despite the access roads being potentially inundated to impassable levels during a flood event for up to 6 hours. It is recommended that formal consultation with the fire brigade be sought to confirm this.

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