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Bicester Gateway, Bicester

Flood Risk Assessment – Phases 1A & 1B

Executive Summary

- Hamill Davies Limited were commissioned by Bloombridge LLP in July 2016 to carry out a Flood Risk Assessment (FRA) for the Bicester Gateway Development – Phases 1A & 1B (3.80 ha).
- The Flood Risk Assessment consists of a desk study, consultation with regulatory agencies and provision of a drainage strategy and is completed in accordance with the National Planning Policy Framework Section 10.
- The site is not located within a floodplain; however it is of a size that requires a FRA to demonstrate that the development will not create future flood risk.
- The site is currently a greenfield site with an approximate area of 3.8 ha. The site falls from a high point at the northern boundary to the south and east.
- No significant flood risks for the site were identified.
- A detailed geotechnical site investigation will be required ahead of detailed design to provide the necessary information and advice to enable detailed design of the surface water drainage (and other aspects of the development).
- In order to maintain the current level of flood risk to the development and the surrounding area, the Surface Water Drainage Strategy proposes mitigation measures to control the site surface water drainage up to the 1 in 100 year probability event plus 30% climate change.
- The attenuation volume required will be provided in the porous sub base below permeable paving prior to discharge into the existing ditch with a headwall at the southeastern corner of the Phase 1A site.
- Safe egress and access routes are available to and from the development and to the local and wider highway networks.
- The development proposals comply with the requirements of the EA and the National Planning Policy Framework (NPPF).

1.0 Appointment and Brief

- 1.1 Hamill Davies Limited were commissioned by Bloombridge LLP in July 2016 to carry out a Flood Risk Assessment (FRA) for a proposed development on land at Bicester Gateway, Bicester (OS Reference SP5721SW). See location plan in Appendix A.
- 1.2 This report was commissioned to identify any flooding related constraints associated with the site, propose appropriate mitigation and set out an outline surface water drainage strategy.
- 1.3 The report takes the form of a formal FRA in accordance with the National Planning Policy Framework (NPPF), Planning Practice Guidance (PPG), and the Environment Agency Guidance Note 1 relating to developments greater than 1.0 hectare in Flood Zone 1 (Appendix C).
- 1.4 This report includes an outline drainage strategy for the site that manages the surface water run-off from the development to avoid potential negative impacts elsewhere.

2.0 Objective of the Study

- 2.1 The objective of the study is to undertake a FRA in accordance with the NPPF, Section 10 – ‘Meeting the challenge of climate change, flooding and coastal change’.
- 2.2 The study assesses flood risk to:-
 - The site and the proposed development and
 - Any impact on flood risk to other land as a result of the development proposals.
- 2.3 Where required, flood risk mitigation measures have been proposed. The report also provides an outline drainage strategy for the surface water flows from the proposed development.
- 2.4 The report has been prepared for use as support documentation for a Planning Application.

3.0 Study Methodology

- 3.1 The appraisal process consisted of a desk study, data research and consultation with regulatory bodies and third parties. The available topographical survey together with Ordnance Survey mapping was used to assess the general topography of the area and to identify any potential flood risk features that could affect the site.

- 3.2 This is an assessment of potential flooding from all possible sources, including fluvial, tidal, surface run-off, overland flows, groundwater, sewers and man-made infrastructure. The assessment also identifies and examines the residual flood risk to the proposed development.
- 3.3 Whilst completing the assessment consideration has been given to the NPPF, issued in March 2012 and the accompanying Planning Practice Guidance (March 2014). The assessment has been undertaken in accordance with CIRIA C624, 'Development and Flood Risk - Guidance for the Construction Industry' (2004) and Flood Risk Assessment Guidance for New Development, Phase 2, R & D Technical Report FD2320/TR2 (2005).

4.0 Proposed Development

- 4.1 The Bicester Gateway site (Phases 1A & 1B) consists of 5.25 ha of existing green field (refer to topographical survey in Appendix C). Proposals are for a development of the site for Office & Hotel Use (Refer to Masterplan in Appendix D).
- 4.2 The site is proposed to be accessed via the existing highway.

5.0 Government Policy

- 5.1 The Government's sustainable development strategy makes it a requirement to assess appropriate forms of development for areas at risk of flooding. This is to avoid an unnecessary increase in the requirement for flood defences.
- 5.2 A requirement of the NPPF is that developers making planning applications on sites that are potentially at risk from flooding or are at a size (>1 ha) which will impact on catchment hydrology, produce a Site Specific Flood Risk Assessment (FRA) for their proposals. The FRA should include strategic advice on the surface water drainage for the site.
- 5.3 The EA has published Flood Maps, which show areas potentially at risk from flood events of a 1% annual probability for rivers and 0.5% annual probability for tidal/coastal areas and areas at risk from flood events of a 0.1% annual probability for both fluvial and tidal flooding. Refer to Appendix A.
- 5.4 The EA's flood map (refer to Appendix A) shows that the Site is in Flood Zone 1, with an annual probability of fluvial flooding of less than 0.1%.
- 5.5 However, as the site covers an area greater than one hectare and has the potential to increase flood risk to people and property in the surrounding area, a FRA is required in accordance with the NPPF.

6.0 Flood and Water Management Act (2010)

- 6.1 The Flood and Water Management Act (2010) sets out powers for the Lead Local Flood Authority to approve and adopt Sustainable Drainage Systems (SuDS) infrastructure as a SuDS Approval Body (SAB) however this has not yet been implemented. At the time of writing, consultation on how best to approve and maintain SuDS is ongoing.

7.0 Existing Site

- 7.1 The site is located to the south west of Bicester in Oxfordshire as shown by the EA Map included within Appendix A. The site is bounded to the North West by the A41 and by Wendlebury Farm to the South East.
- 7.2 The site is currently a greenfield site.
- 7.3 An existing surface water culvert traverses the Phase 1 land.

8.0 Site Topography and Existing Watercourses

- 8.1 A full topographical survey of the site has been undertaken by Target Surveys Limited and is included within Appendix C. The Phase 1A development site consists of 1.04 ha of flat open field varying in level from 100.99m AOD to the north of the site and 99.25m AOD at the south of the site.
- 8.2 The site is located to the east of the River Ray catchment. There is one existing water course that receives surface water drainage flows from the site.
- 8.3 Proposals are to develop approximately 1.04 ha of the northern part of the site (Phase 1A) and 2.76 ha of the southern part of the site (Phase 1B). The existing site drainage is shown on the topographical survey and in general forms one catchment that falls from north to south to the ditch on the eastern boundary of the site. The run-off from the site flows to the existing ditch.
- 8.4 It may be necessary to apply for Ordinary Watercourse Consent in order to discharge flows directly into the existing ditch to the south at a single point.
- 8.5 The ditch to the south of the Phase 1A site runs in a west – east direction towards the tributary of the River Ray.

9.0 Groundwater Levels

- 9.1 No detailed site investigation works have been taken on the site to date. A preliminary investigation of the soils at shallow depth, together with soakaway testing, has been undertaken and the results of the investigation are included in Appendix E.
- 9.2 Ground water levels were recorded showing standing water at 0.8m below existing ground level. A fully detailed site investigation report will be required ahead of detailed design to give detail on site geology and groundwater levels.

10.0 Geology and Hydrogeology

- 10.1 The geotechnical site investigation, included within Appendix E, has revealed Topsoil over River Terrace Deposits over Kellaways Clay Member over Kellaways Sand Member.
- 10.2 The site is not within a Source Protection Zone and does not overlay any primary aquifer.

11.0 Surrounding Sewer Networks

- 11.1 The Bicester Sewerage Treatment Plant is located to the east of the site and connecting sewers are located within the adjacent highways.

12.0 Existing Flood Defences

- 12.1 There are no known formal flood defences maintained by the EA or local authority within the vicinity of the site.

13.0 Flood Risk Assessment

- 13.1 The flood risk assessment section identifies all sources of flooding and where the likelihood of the risk of flooding is noted as possible, further explanation follows. If noted as insignificant, no explanation is given.

14.0 Flood Risk Summary

SOURCE	LIKELIHOOD – Very Likely, Possible, Insignificant
Fluvial	Insignificant – approx. 200m from nearest FZ 2 /3
Coastal - Sea	Insignificant – Inland
Coastal - Estuarine	Insignificant – Inland
Overland Surface Water	Possible
Sewer - SWS, FWS, CS, CSO	Possible
Groundwater	Refer to section 9.1 & 9.2
Dam breach	Insignificant - (Based on EA Risk of Flooding from Reservoirs mapping), which shows no areas of risk in the vicinity of the site.
Canal	Insignificant - no canals in vicinity of site.
Major Water Main	Insignificant – no major water mains in the vicinity of the development.
Other sources	-

15.0 Site Flood Zone Designation

- 15.1 The EA's Flood Map (Appendix A) shows the site to be located within Flood Zone 1, which is assessed in Table 1 of the PPG as having a less than 1 in 1000 (<0.1%) annual probability of river or sea flooding.
- 15.2 A tributary of the River Ray would be the closest source of fluvial flooding if this were to occur.
- 15.3 Consultation with the EA has confirmed that the site is located within Flood Zone 1.

16.0 Overland (Surface Water) Flooding

- 16.1 An initial assessment of overland flood flow routes has been carried out based on contours from the topographical survey, Geographical Information System (GIS) information and upstream catchment areas. No overland flows are expected to reach the development from these areas. The drainage

strategy for the development will capture rainfall at source and attenuate prior to discharge to the nearby watercourse. Finished floor levels will be set a minimum of 150mm above adjacent ground to provide resilience in the event of localised surface water flooding.

17.0 Groundwater Flooding

- 17.1 The geotechnical site investigation, included within Appendix E, has revealed Topsoil over River Terrace Deposits over Kellaways Clay Member over Kellaways Sand Member.
- 17.2 Ground water levels were recorded showing standing water at 0.8m below existing ground level. A fully detailed site investigation report will be required ahead of detailed design to give detail on site geology and groundwater levels.

18.0 Coastal

- 18.1 The site is located inland and thus the site is not considered at risk from coastal flooding.

19.0 Major Water Main

- 19.1 Water record plans indicate that water mains do not pose a significant risk to the development.

20.0 Safe Site Access

- 20.1 The proposed site is shown to be in Flood Zone 1 (refer to flood map in Appendix A) and will allow safe access off the site.

21.0 Sequential Test

- 21.1 The EA's Flood Map (Appendix D) shows the site to be located within Flood Zone 1, which is assessed in Table 1 of the Planning Practice Guidance (PPG) (Appendix C) as having a less than 1 in 1000 (<0.1%) annual probability of river flooding. The PPG Table 2 classifies the proposed residential development as "More Vulnerable" in terms of flood risk and in accordance with Table 3 is appropriate for development within Flood Zone 1. The site is also not at significant risk for other forms of flooding and the proposed development therefore passes the Sequential Test. The Exception Test is not required.

22.0 Climate Change

Impact of Climate Change

- 22.1 In accordance with the PPG in developing the outline drainage strategy, rainfall rates for the 1 in 100 year probability event have been increased by 30% to allow for climate change to the year 2114. Surface Water storage facilities will be designed to accommodate a 1 in 100 year +30% climate change probability event.
- 22.2 Analysis of the surface water drainage system will be carried out in order to assess the potential effects of climate change. The provision of attenuation areas will accommodate the additional flood volumes associated with climate change up to the 1 in 100 year plus climate change event; as shown by the calculations within Appendix B.
- 22.3 Overland flow routes have been reviewed in the event of extreme rainfall events in excess of those analysed above.

23.0 Drainage Strategy

- 23.1 The Code of Practice for Sustainable Drainage Systems provides a flexible approach to drainage systems with a wide range of components and includes a hierarchy of techniques. These are:-

Prevention - The use of good site design and housekeeping measures on site to prevent run-off and pollution:-

- 1. Source Control - Control of run off at or very near to its source.
 - 2. Site Control - Management of water from several sub catchment areas.
 - 3. Regional Control - Management of run off from several sites, typically in a detention pond or wetland.
- 23.2 With the above in mind surface water disposal will respect the hierarchy of techniques outlined above.
- 23.3 Prevention will be at the forefront of the development of the site with the site set out to maximise the areas of soft landscaping.

23.4 Source control forms the basis of the surface water drainage strategy and will be introduced in the following ways:-

- Shallow groundwater depths, as recorded by the site investigation report in Appendix E, show that traditional soakaways are impractical.
- The attached HDL drawing nos. 16-2625-900 P2 & 901 P2, included within Appendix B, show that the impermeable area of roofs and hardstanding prior to development will be significantly increased as a result of the proposed development.
- Formpave paving with a minimum 500mm depth of porous sub base, as shown by HDL drawing no. 16-2625-500 P2, 501 P2 & 502 P1, is to be adopted to store the 1 in 100 year storm with 30% climate allowance prior to attenuation via a hydrobreak with a controlled flow of 4.6 l/s (Phase 1A) and 12.2 l/s (Phase 1B) to ensure that surface water run off is no greater than that prior to development as required by the Environment Agency / Planning Authority.

Surface water will therefore be discharged to the existing surface water drainage ditch in a controlled manner using Formpave paving and a hydrobreak.

23.5 Rainfall within soft landscaped areas which are minimal will be allowed to permeate through the ground in order to mimic as closely as possible the natural drainage from the site before development.

24.0 Foul Water

24.1 Foul water disposal is not within the scope of this study. However it is noted that the Bicester Sewerage Treatment plant is in close vicinity to the site. Foul drainage will be constructed to Sewers for Adoption 7th Edition standards.

25.0 Residual Risks

Residual Risk Management

25.1 Any attenuation systems will either be managed and maintained privately by a management company. The risks identified are associated with continued maintenance required by these facilities which should include the following:-

Permeable Paving

- The surface blocks have a design life equivalent to standard block paving.
- All paved surfaces will require occasional cleaning. In normal circumstances regular sweeping will be sufficient. Cleaning should be carried out in the Spring and after leaf fall in Autumn.
- Lighter coloured blocks may exhibit tyre marks and may require more cleaning and maintenance.
- Following routine maintenance it may be necessary to redress the surface with 2 – 4mm clean gritstone.
- Ultimately after 25 years or more areas of the laying course may become filled with silts and toxins. If this occurs the surface blocks should be uplifted and the affected areas of laying course material and geotextile disposed of. The existing sub base can be left insitu. Fresh geotextile and laying course stone should be installed and the existing surface blocks re-laid.

- 25.2 Surface SuDS have been proposed where feasible. The visibility of these means that maintenance issues can be more readily identified and addressed.
- 25.3 The longevity of the proposed SuDS systems prior to significant maintenance will be extended with the use of catch pits to minimise sediment transport and suitable inspection and maintenance access.
- 25.4 Finish floor levels will be set a minimum of 150mm above the external ground levels to provide resilience from overland flows caused by extreme events.

26.0 Conclusions

- 26.1 The site is located in Flood Zone 1, which has a less than 1 in 1000 (<0.1%) annual probability of river or sea flooding; however, it is of a size that requires a FRA to demonstrate that the development will not increase flood risk.
- 26.2 The site is at negligible risk from flooding. In order to maintain the current level of flood risk to the development and the surrounding area, the Surface Water Drainage Strategy proposes mitigation

measures to control the site surface water drainage up to the 1 in 100 year probability event plus 30% climate change.

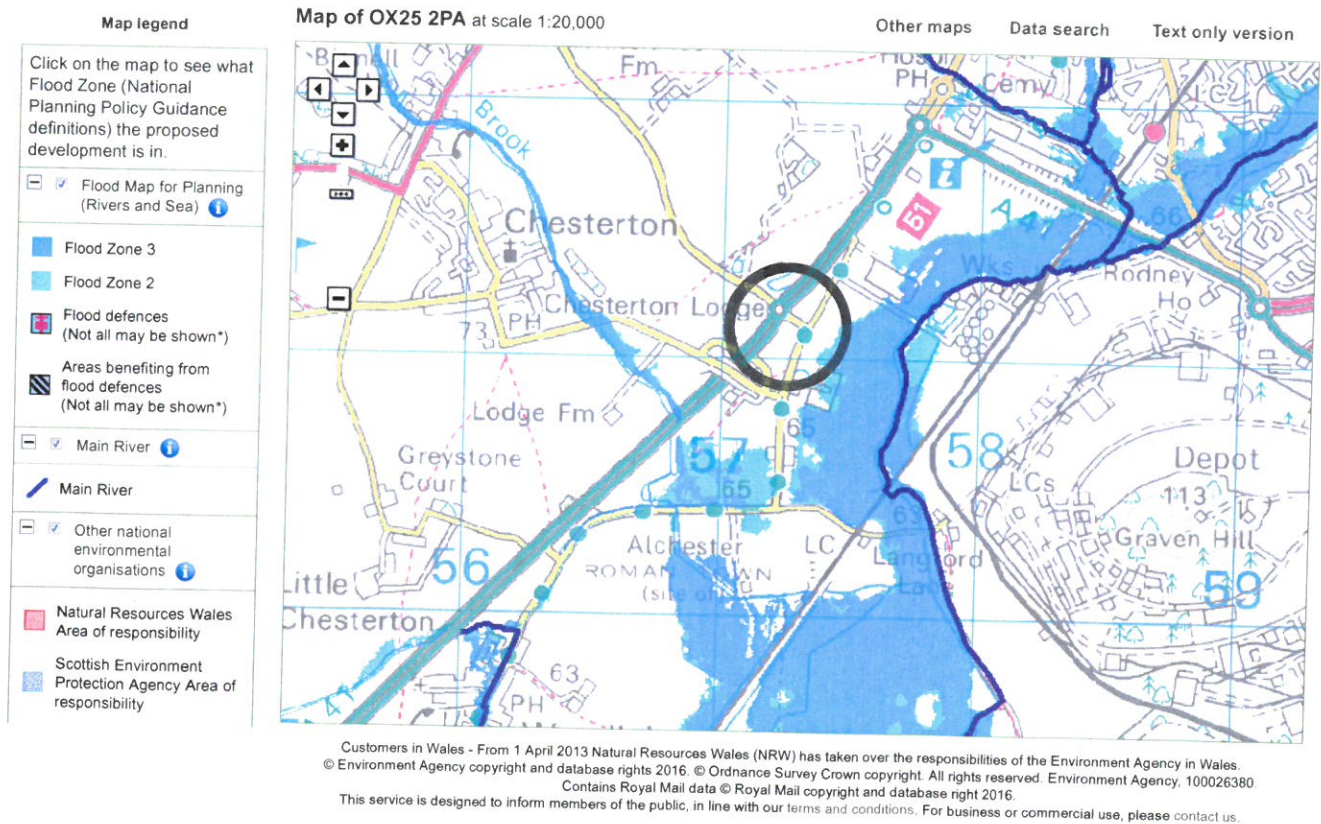
- 26.3 A geotechnical site investigation will be required ahead of detailed design to confirm the site geology and provide information necessary for design of the foundations and the development.
- 26.4 The proposed mitigation measures will manage the residual flood risk to an acceptable level. Finished floor levels should be set a minimum of 150mm above the external ground levels to provide resilience from overland flows caused by extreme events.
- 26.5 Safe egress and access routes are available to and from the development and to the local and wider highway networks.
- 26.6 Downstream flood risk will not be increased as Sustainable Drainage Systems (SuDS) will intercept surface water flows at source, and maintain the peak discharge of surface water off site to green field run-off rates.

Appendix A

EA Flood Map

Appendix A

EA Flood Map



Appendix B

HDL Drawings & Calculations