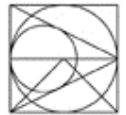




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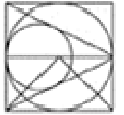
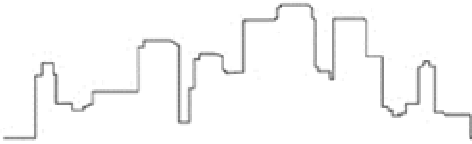
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Flood Risk Assessment Compliance

**For
Camp Road, Upper Heyford
Parcels B4a and B4b**

Rev -

April 2017

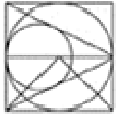
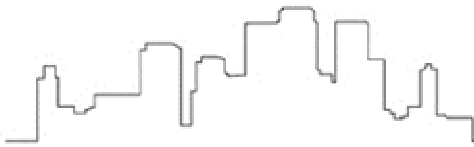


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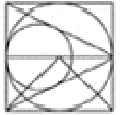
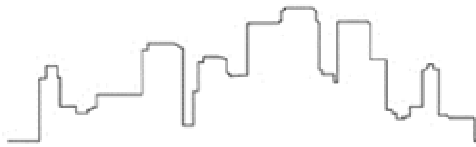
Appendices

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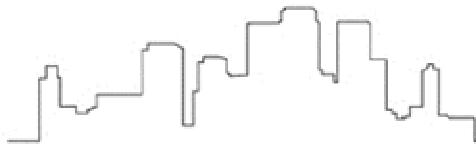
1.0 **Introduction**

- 1.1 This Flood Risk Assessment Compliance report has been prepared on behalf of the Bovis Homes in support of their Reserved Matters application for the new dwellings on Parcel B4a and Parcel B4b located to the north of Camp Road, Upper Heyford.
- 1.2 The purpose of this report is to demonstrate that the proposed drainage design complies with the approved Flood Risk Assessment (FRA) carried out by Waterman dated October 2010 (Ref C11234 ES 001).
- 1.3 Refer to the Site Residential Parcel Plan given in **Appendix A**.
- 1.4 This report is intended to assist in the discharge of any planning conditions that requires the developer to demonstrate compliance with the approved FRA.



2.0 Overview of Approved FRA

- 2.1 The entire site is located within Flood Zone 1.
- 2.2 The FRA sets out a detailed approach to attenuation across the Upper Heyford site which comprises of areas identified for retention, areas for refurbishment and areas for redevelopment to provide new residential dwellings.
- 2.3 The Environment Agency (EA) has confirmed that areas identified solely for retention and refurbishment do not require attenuation of existing surface water discharge.
- 2.4 The fundamental principle of the FRA is that runoff from proposed areas of redevelopment should be attenuated to existing 1 in 100 year flows with a 30% allowance for climate change.
- 2.5 Attenuation is to be provided through the use of balancing ponds, permeable paving and attenuation tanks where necessary.
- 2.6 The FRA splits the development into four main catchment areas and provides a series of calculations for each.
- 2.7 The FRA also requires a 10% betterment of existing flows entering the eastern tributary of the Gallos Brook.



3.0 **Proposed Development**

- 3.1 The proposed development is located north of Camp Road, Upper Heyford and consists of two distinct parcel of land- Parcel B4a located immediately north of the approved “Village Centre North” proposals and Parcel B4b located to the north of Parcel B4a.
- 3.2 The parcels comprise a total of 100 new dwellings (refer to **Appendix B** for proposed layout).
- 3.3 The FRA denotes this development as draining into Catchment Area 3.
- 3.4 The Indicative Surface Water Drainage Layout within the approved FRA suggests attenuation of surface water for Catchment 3 is provided by the use of attenuation tanks.

Discharge Strategy

- 3.5 Paragraph 3.20 of the FRA states: “In accordance with PPS25, local policy and EA guidance the rate of surface water runoff from new development would be controlled so that it does not increase over the existing situation for the 1 in 100 year even, while taking climate change into account”.
- 3.6 It is proposed to connect the Parcel B4a and B4b drainage runs and attenuation to the existing downstream network at three locations as shown on the drainage layout.
- 3.7 The existing downstream network then discharges into the existing watercourse to the east of the site which is a tributary of Gallos Brook.
- 3.8 Paragraph 3.21 requires a 10% betterment of flows discharging to the east of the site.
- 3.9 The FRA also prescribes the following existing 1 in 100 year runoff rates for use in calculations:

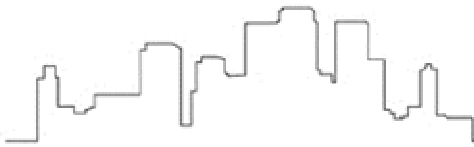
Existing 1 in 100yr	Greenfield runoff- 10.7 l/s/ha	Brownfield runoff- 112.8 l/s/ha
---------------------	--------------------------------	---------------------------------

- 3.10 The purpose of this report is not to revisit the calculation of these rates. Further information on how these rates were derived can be found in the approved FRA.
- 3.11 Following detailed assessment of the topographical survey, the information contained with section 3.9 and Microdrainage results the following calculations can be summarised:

Parcel B4a	
	Flow rate
Existing Impermeable surfacing of 6880m sq	77.6 l/s
Allowable brownfield rate from FRA minus 10%	68.8 l/s
Actual rate in pipe 22.001 plus 23.001	79.1 l/s (21.3+57.8)

Parcel B4b	
	Flow rate
Existing Impermeable surfacing of 4000m sq	45.1 l/s
Allowable brownfield rate from FRA minus 10%	40.6 l/s
Actual rate in pipe 11.001	30.2 l/s

Outfall	
	Flow rate
Existing outfall flow rate for 100yr event	393.3 l/s
Proposed outfall flow rate for 100yr event plus cc	386.1 l/s



Attenuation Strategy

- 3.12 The attenuation will be located on the phase in the form of cellular storage tanks.
- 3.13 Soakaway tests at suitable depths have not been undertaken due to solid rock/ stone being encountered at between 1.35m and 2.0m in boreholes BHNSA 29 to BHNSA 32 located within the parcels.
- 3.14 Attenuation tanks will cater for the majority of the attenuation required and either be maintained by a management company or the land owners. Porous paving may also be included to provide additional attenuation as required.
- 3.15 The final discharge from the parcel will be controlled using private orifices, small diameter pipes and adoptable hydrobrakes. The form of control used may be dependant on whether any of the roads are offered for adoption to the County Council.
- 3.16 Living roofs have been discounted as they are not in keeping with the strict urban planning requirements within a conservation area. Rain water harvesting has also been discounted due to ongoing maintenance issues and integration into domestic plumbing. Water butts may be provided on social units.

4.0 Hydraulic Performance

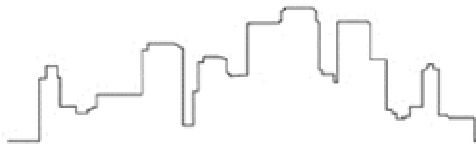
- 4.1 A detailed Microdrainage model has been constructed to simulate the 1 in 100 year storm in both existing and proposed systems (plus climate change post development).
- 4.2 The proposed Microdrainage model (see **Appendix D**) demonstrates that the proposed 1 in 100 year (plus climate change) discharge rates for the total B4 development do not exceed the allowable discharge rates and the total discharge rate from the overall development is no greater than existing.
- 4.3 The existing Microdrainage model is contained within **Appendix C**.

Exceedance

- 4.3 If an area of the drainage network was to become blocked or in instances where a storm in excess of the designated storm occurs, there is the potential for the storage structures and drainage system to be overwhelmed, leading to flooding. Finished floor levels and external levels have been designed in consideration of these, so that during these periods flood water will be directed away from the proposed building entrances and into the roads and soft landscaping areas.
- 4.4 The existing flood route indicates that water would flow to the south east into the existing road network. The proposals do not alter this extreme event flood route, although flooding from on parcel sources for storm events up to and including a 100 year event (plus climate change) have been completely removed.

Pollution prevention

- 4.5 As no parking area is 800m sq or greater, PPG3 states that trapped gullies will provide suitable protection against contamination. Permeable areas will filter through granular material. It is noted that this phase passes through an off parcel interceptor.



Maintenance

- 4.6 Private drainage serving multiple dwellings or located within shared areas will be maintained by the maintenance company.
- 4.7 Adoptable drainage will be maintained by the water company.
- 4.8 SUDS features (such as storage tanks and porous paving) contributing to the overall drainage strategy will be maintained by the maintenance company.
- 4.9 Refer to “SUDS Maintenance Regime” report dated April 2017 which covers this phase for further details. This document along with relevant designer’s risk assessments, calculations and drawings will be made available to the maintenance company.

5.0 Summary and Conclusions

- 5.1 This report has been prepared to allow discharge of any planning conditions which require evidence of compliance with the approved Flood Risk Assessment.
- 5.2 The FRA requires surface water runoff from new developments to be restricted to existing 1 in 100 year runoff rates, and flows attenuated including a 30% allowance for climate change. A 10% betterment is to be provided on existing flows discharging to the eastern tributary of Gallos Brook.
- 5.3 The Microdrainage models demonstrate the parcel discharge rates are no greater than permitted, that there is no on parcel flooding and that the outfall discharge rate is no greater than existing for the designed storms.

APPENDIX A

Residential Parcel Plan

APPENDIX B

Proposed levels and drainage layout

APPENDIX C

Existing Microdrainage Calculations

APPENDIX D

Proposed Microdrainage Calculations

Note:

The calculations include the entire network including existing areas outside of this phase. The runs numbers which relate to Trenchard Circle (in the order shown in the calculations) are:

Pipe refs within Parcel B4a

11.000
11.001

Pipe refs within Parcel B4b

22.000
22.001
23.000
23.001

APPENDIX E

Residual Flooding Masterplan