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Flood Risk Assessment

For
Camp Road, Upper Heyford
Trenchard Circle

Version 6
January 2019

Contents

Appendices

1.0 Introduction

1.1 Woods Hardwick Infrastructure LLP have been appointed by Dorchester Group to undertake a Flood Risk Assessment in respect of the Trenchard Circle development proposals at the Upper Heyford development site.

1.2 The wider development site comprises of approximately 76 hectares and has outline planning consent for residential and commercial use.

1.3 A Flood Risk Assessment was prepared and approved in support of the outline application. The report was produced by Waterman in October 2010.

1.4 The site is currently live and a number of development parcels have received reserved matters consent. These parcels have been supported by individual Flood Risk Assessment Compliance Notes to demonstrate that the detailed drainage design accords with those principles approved at the outline stage.

1.5 The purpose of this report is to support a new detailed planning application in support of the development at Trenchard Circle.

1.6 This report does not seek to undo the principles of the approved Flood Risk Assessment but to clarify them within a self-contained Flood Risk Assessment.

1.7 A copy of the residential parcel Plan is contained within **Appendix A.**

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. Swales will be incorporated through the site where appropriate.

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 Existing Site

3.1 Site Description

3.1.1 The Trenchard Circle development is located north of Camp Road, Upper Heyford Site taking its main access off the private road known as Trenchard Circle.

3.1.2 The existing site is occupied by former precast dwellings and associated hard standing.

3.2 Ground Conditions

3.2.1 Extensive intrusive site investigations have been undertaken which covered the entire site.

3.2.2 The general ground conditions comprise of layers of silt and clay. This is underlain by weathered limestone bedrock at an average depth of 1.5m.

3.3 Hydrology

3.3.1 The wider site includes a number of watercourses and tributaries.

3.3.2 A tributary of the Gallos Brook runs immediately to the east of Trenchard Circle and a further tributary serving the wider site runs along the northern boundary of the Trenchard Circle development parcel.

3.3.4 There is anecdotal evidence of flooding associated with this tributary at the caravan park to the south of the proposed development parcel

3.3.3 The Gallos Brook joins the River Ray approximately 11km to the south of the site. The River Cherwell is the nearest Main River and is some 1.2km to the west of the site.

4.0 Proposed Development

4.1 The Trenchard Circle development is a Dorchester Group development and comprises of the demolition of existing dwellings and construction of 31 new dwellings (refer to **Appendix B** for proposed layout).

4.2 The existing road pattern will be retained and the impermeable area will remain largely unchanged.

5.0 Flood Risk Assessment

5.1 Background

5.1.1 The purpose of this section of the report is to identify the risk of flooding to and by the development.

5.1.2 Following the increased frequency of flooding during recent years, much work has been undertaken at a national level to assess the relationship between new development and flood risk. This work resulted in the publication of Planning Policy Statement 25 (PPS25) in early 2007 with an update being released in March 2010.

5.1.3 Alongside the release of the NPPF in March 2012 the TGNPPF was released serving as a flood risk based addendum to the national planning guidance. These documents replace PPS25; however, many of the principles set out in PPS25 remain relevant. The TGNPPF was withdrawn in late 2014 and replaced with the online Planning Practice Guidance (PPG) albeit much of the advice relating to flood risk remains unchanged

5.1.4 Table 1 of PPG: Flood Risk and Coastal Change seeks to define different flood risk Zones where: Zone 1 is considered to be low risk since it is outside of the area which is likely to suffer inundation from a 0.1% probability rainfall event; Zone 2 is considered to be medium risk lying between the 0.1% probability flood contour and the 1% or 100 year flood area; Zone 3 is divided into 2 categories with Zone 3A having a >1% annual probability of river flooding or a >0.5% probability of flooding from the sea and Zone 3B being the functional floodplain. This guidance reaffirms the guidance and categorisation included within PPS25.

5.1.5 The Environment Agency's (EA) flood map demonstrates that this site lies within Flood Zone 1 and is therefore at low risk.

5.1.6 Table 2 of the PPG: Flood Risk and Coastal Change seeks to classify the vulnerability of different land uses. The residential dwellings fall under the More Vulnerable classification.

5.1.7 Finally Table 3 of the PPG: Flood Risk and Coastal Change brings Table 1 and 2 together to provide a matrix defining the level of Flood Risk Assessment required based on the flood zone and vulnerability class of a development.

5.1.8 Table 3 of the PPG: Flood Risk and Coastal Change therefore demonstrates that this land use is appropriate for the site given the flood zone and vulnerability class.

5.2 Risk of Flooding to the Development from Known Sources

5.2.1 Presented below is an analysis and summary of the potential for the site to flood from known sources.

Flooding from Rivers

5.2.2 The Environment Agency's (EA) flood map demonstrates that the site lies within Flood Zone 1.

Flooding from the Sea

5.2.3 Given the site's location some 100km inland there is considered to be no risk of flooding from this source.

Flooding from Land

5.2.4 The EA's surface water flood map demonstrates areas that are at risk of surface water flooding should there be an accumulation at ground level. The map demonstrates that the proposed development is not at risk of surface water flooding.

Flooding from Groundwater

5.2.5 The EA's groundwater flood risk maps demonstrate areas that are at risk of flooding from high groundwater. The site is noted as not at risk.

5.2.6 This is also confirmed on site and via ground water monitoring which noted ground water level some 1.2m below ground level.

Flooding from Sewers

5.2.7 There are no public sewers within the site and all sewers are currently privately owned. The main sewers serving the site are to the south of the proposed development parcel. Should these sewers flood the topography of the site would see the flood water conveyed east, away from the development, within the confines of the road box.

Flooding from Reservoirs, Canals and Other Artificial Sources

5.2.8 There are no man made features within the vicinity of the development site.

5.3 Risk of Flooding Caused by the Development

5.3.1 Presented below is a summary and analysis of the potential for the site to exacerbate the risk of flooding to third parties both upstream and downstream.

Encroachment onto Floodplain

5.3.2 The entirety of the site lies outside of the floodplain, there is therefore no risk of encroachment.

Impedance of Flood Flows

5.3.3 As the site lies outside of the flood plain there is no risk of the site impeding flood flows.

Contribution to Flood Flows by Development Drainage

5.3.4 The site is currently residential development and surface water is collected within existing sewers and discharged to the existing ditch unattenuated and unrestricted.

5.3.5 The approved FRA produced in support of the outline condition states in Paragraph 3.20: "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".

5.3.6 Paragraph 3.21 also goes on to require a 10% betterment of flows discharging to the east of the site, which includes the new Trenchard Circle properties. It excludes areas of refurbishment such as the Trenchard Circle bungalows.

5.3.7 It is proposed to maintain the existing drainage regime of the site. This will require flows from the proposed development to be restricted to provide the level of improvement required by the EA.

5.3.8 It is proposed to maintain the existing catchments and watershed with surface water draining to the existing ditch to the north of the site.

5.3.9 Restriction of proposed surface water runoff and attenuation will ensure the risk to others, and within the development is mitigated.

5.3.10 The detailed drainage strategy is described in more detail in **Section 6** of this report.

5.4 Climate Change

5.4.1 There is an increasing body of scientific evidence that suggests that the global climate is changing as a result of human activity. Past, present and future emissions of greenhouse gases are expected to cause significant climate change during this century.

5.4.2 The nature of climate change will vary: for the UK, projections of future climate change indicate that more frequent short-duration, high-intensity rainfall and more frequent periods of long-duration rainfall can be expected. These kinds of changes will have implications on river-flooding and also localised flash flooding.

5.4.3 The PPG requires developments to consider the potential impacts of climate change; as such this assessment makes a 30% allowance for climatic change.

6. SURFACE WATER DISPOSAL

6.1 Principles

6.1.1 In addition to ensuring that the development is not at risk of flooding from external sources, it is also important to ensure that the scheme itself does not exacerbate flood risk for others or within the proposed development. It is therefore essential that the arrangements for storm water disposal are fully assessed to guarantee that the effects are mitigated and that there will be no impact on the existing land drainage regime.

6.1.2 All of the recent guidance on the arrangements for storm water disposal from new developments has encouraged the application of a hierarchy for surface water disposal. This has now been formalised in the Building Regulations Part H.

6.1.3 The first choice for surface water disposal which should be pursued is via infiltration and only where it has been determined that the ground conditions are not suitable should the second choice of disposal to a ditch or watercourse be considered. If there is no alternative the third and last choice of disposal to public sewer can be considered.

6.2 Discharge Strategy

6.2.1 The existing residential development currently drains to the existing ditch at 4 locations along its length (HW1 – HW4).

6.2.2 It is proposed to discharge the surface water from the new dwellings to 2 of the 4 existing outfalls. The remaining 2 outfalls will become obsolete and removed.

6.2.3 It should be noted that due to the relatively shallow nature of the rock formation infiltration is not feasible. See section 6.3.4.

6.2.4 In accordance with the requirements of the EA including limiting flows to existing 1 in 100 year flows with a 10% betterment.

6.2.5 A MicroDrainage model has been built of the proposed ditch, development and adjacent contributing parcels. It should be noted that proposed development parcel D5a (Phase 2) contributes to the head of the ditch and is incorporated in the below calculations for completeness.

6.2.6 Following a detailed assessment of the topographical survey, site visits and proposed layout below are the Microdrainage simulation results:

Location	Existing 100 year discharge rate	Existing discharge rate Minus 10% betterment	Proposed 100 year discharge rate + 30%
D5a (upstream parcel)	174.8	157.32	98.30
HW1	8.4	7.56	9.90
HW2	9.2	8.28	0
HW3	3.5	3.15	0
HW4	8.0	7.20	65.50
Total	**203.9**	**183.51**	**173.70**

6.3 Attenuation Strategy

6.3.1 Paragraph 3.20 of the approved 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”.

6.3.2 Paragraph 3.21 also goes on to require a 10% betterment of flows discharging to the east of the site, which includes the new Trenchard Circle properties. It excludes areas of refurbishment such as the Trenchard Circle bungalows.

6.3.3 The Trenchard attenuation will be located on the parcel in the form of cellular storage tanks and granular filter drains.

6.3.4 Soakaway tests at a suitable depth have been undertaken around bungalow 31 in June 2016 and were abandoned due to lack of infiltration.

6.3.5 The attenuation tanks and filter drains will cater for the majority of the attenuation required and either be maintained by a management company or the land owners.

6.3.6 The final discharge from the parcel will be controlled using a small diameter pipe at HW 1 and an orifice manhole for HW 4.

6.3.7 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 will be provided on social units.

7.0 Hydraulic Performance

7.1 Modelling

7.1.1 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).

7.1.2 The proposed Microdrainage model (see **Appendix D**) demonstrates that the proposed 1 in 100 year (plus climate change) discharge rate does not exceed the allowable discharge rate.

7.1.3 The existing Microdrainage model is contained within **Appendix C.**

7.2 Exceedance

7.2.1 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.

7.2.2 The existing flood route indicates that water would flow to the north eastern area of Trenchard Circle's road before flowing into the existing soft landscaping and watercourse to the east. The proposals do not alter this extreme event flood route, although extreme event flood volumes have been notably reduced:

Location	Existing 100 year flood volume	Residual 100 year flood volume
Upstream of HW1	9.2 m cu	0 m cu
Upstream of HW2	12.67 m cu	0 m cu
Upstream of HW3	0 m cu	0 m cu
Upstream of HW4	21.99 m cu	4.14 m cu
Total	**43.86 m cu**	**4.14 m cu**

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7.3 Pollution prevention

7.3.1 As the parking areas are smaller than 800m sq, PPG3 states that trapped gullies will provide suitable protection against contamination. Permeable areas will filter through granular material.

7.4 Maintenance

7.4.1 Private drainage serving individual dwellings and located within the limits of the property will be maintained by the homeowner.

7.4.2 Private drainage serving multiple dwellings or located within shared areas will be maintained by the maintenance company.

7.4.3 Adoptable drainage will be maintained by the water company.

7.4.4 SUDS features contributing to the overall drainage strategy will be maintained by the maintenance company.

7.4.5 Refer to "SUDS Maintenance Regime" report dated July 2016 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.

8.0 Summary and Conclusions

8.1 This Flood Risk Assessment has been prepared in support of a detailed planning application for a small parcel at the Upper Heyford Development.

8.2 This FRA has been produced maintaining the same principles as the approved FRA attached to the outline planning consent.

8.3 The scheme has been assessed and is deemed not to be at risk of flooding and is also located within Flood Zone 1.

8.4 The proposed development will see existing housing stock replaced with new. The proposed dwellings will cover largely the same footprint and therefore the contributing areas will remain as per the existing situation.

8.5 The surface water will be restricted and attenuated to limit discharge to the existing 1 in 100 year event. Furthermore, there will be a 10% betterment of existing flows.

8.6 Attenuation will be provided within geocellular systems and stone filled trenches to ensure the system can accommodate the above restriction in flows.

8.7 Flows will be discharged into the existing ditch as currently occurs, maintaining the existing drainage regime.

8.8 Based on the detailed assessment of flood risk and betterment in proposed flows we fully support this planning application.

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 ref 19.000 19.001 19.002 19.003 20.000 19.004 21.000 19.005 19.006 19.007 19.008 29.000 29.001 24.007 24.008 24.009