

1.0 INTRODUCTION

Monson has been appointed to produce a Flood Risk Assessment (FRA) for a re-development of a former agricultural site located directly off Norton Lane, Aldingbourne, West Sussex. The existing site comprises a mixture of now redundant agricultural style buildings and the proposal is to re-furbish these buildings to secure the following extent of re-development.

- B1 offices together with stables and paddock.
- A total of 4 holiday cottages.
- Garaging/stores and implements shed.
- Residential accommodation relating to the property on the eastern side of the site.

Through further enquiries made to Arun District Council and the Environment Agency, it has been established that the site is in fact located in flood zone 1 but still requires the submission of a site specific Flood Risk Assessment. However, the flood zone designation and the characteristics of the proposed re-development mean that it is not necessary to apply the Sequential and Exception tests in this context.

The site comprises a mixture of proposed uses and in accordance with PPS 25 the designation relates to 'more vulnerable' in the context of residential and holiday cottages and 'less vulnerable' in relation to the B1 offices and general storage etc. All of the above is deemed appropriate to site within a flood zone 1 area.

This Flood Risk Assessment (FRA) will follow the guidelines set down in PPS25 that was published on 7th December 2006.

2.0 LOCATION

The site is bounded by properties known as Harvests and Norton Farm House, sited directly off Norton Lane, Aldingbourne, West Sussex, as shown on Drawing No 4615/01A included in Appendix A. The existing site is for the greater part hard-surfaced with existing agricultural buildings dispersed there on. The site is bounded by residential properties and accesses directly on to Norton Lane.

3.0 SITE LEVELS

Levels at and around the site are shown on drawing 4615/02A which is also included in Appendix A and indicate a maximum ground level of 16.3m ODN inside the northern boundary and a minimum ground level of 15.5m ODN at and on to Norton Lane on the eastern extremity of the plot. Over the site, levels vary between these maximum and minimum values.

Levels in the adjoining properties to the site are similar to the site levels for the west and east boundaries. The general ground level rises away from the site extending north along Norton Lane towards the A27 Arundel Road.

4.0 FLOOD ALLEVIATION MEASURES CURRENTLY IN PLACE

There are no flood defences protecting this individual plot, however there are no identified risks associated with Tidal flooding, Fluvial flooding or Ground Water inundation. The main flooding risk associated with the site would appear to originate from potential highway surface water run-off originating from Norton Lane.

5.0 SOURCE OF FLOODING

The site is within an area deemed to be at risk from fluvial flooding as shown on the flood zone map for the area published by the Environment Agency and included in Appendix B. However, further enquiries made of Arun District Council and the local Environment Agency office have clarified the site, on the west side of Norton Lane, as being located in flood zone 1. The principle source of flooding would appear to relate to the adjacent highway, Norton Lane, and the potential for water to enter the site through the main entrance.

In respect of the above enquiries have been made of West Sussex Highways to establish the current and future status relating to the Norton Lane highway drainage. In previous years drainage improvement works were undertaken along Norton Lane to alleviate a history of local and related flooding. Since the introduction of such works there have been no known reports of associated flooding to local properties. Future improvement works are also planned further south in Nyton Road to increase the capacity of the system downstream. This will provide an indirect improvement with respect to surface water management in relation to Norton Lane.

6.0 PREVIOUS FLOODING HISTORY

The site in question has suffered some incidents of flooding in the past, but as stated in Section 5.0 above this has largely been alleviated by the highway drainage improvement works completed by West Sussex Highways. Further improvement works are programmed to be undertaken downstream in Nyton Road. No other incidents of flooding are known to have arisen in respect of fluvial or ground water elements.

7.0 LOCAL HYDRAULICS AND RATE OF FLOODING

The principle risk of flooding would appear to relate to surface water draining west off the adjacent Norton Lane. As shown on site drawing 4615/02A, the ground level gradually increases extending west in to the site. Together with

the highway drainage improvement works and related flooding is not expected to encroach on to the site and in the worst case may only result in relatively shallow flooding of the entrance area. Therefore the concept of depth and rate of flooding on the site is not considered applicable.

8.0 FLOOD TRENDS AND CLIMATE CHANGE

The current owners of the property have confirmed that there have been no flooding incidents during the time of their ownership and no recent reports from the records of Arun District Council.

The site is deemed to be within Zone 1 in accordance with the flood risk maps and further Agency enquiries. The impact of climate change is considered more fully in Section 12.0 of this report.

9.0 SEWERAGE SYSTEM AND SURFACE WATER DRAINAGE

The proposed re-developed properties will need to connect into the existing 150mm diameter foul sewer which is located in Norton Lane.

There is no surface water sewer serving the site in question. If the roof drainage is connected to a multiple soakaway facility then a site investigation would be required to ascertain insitu permeability. In addition further investigations would be required to confirm the Aquifer status of the site and any associated discharge restrictions. If the site is located within a Non-Aquifer there should be no onerous discharge conditions.

If the attenuation scheme is utilised we would advise that water butts are installed as these can attenuate flows and will act as water conservation devices.

In addition, the use of permeable surfacing for the access roads, parking and turning areas is recommended. This will provide the site with positive improvements to its drainage and attenuation characteristics. Again insitu tests will be required to check the permeability of the underlying soils.

It is recommended that any insitu permeability testing in relation to the site is undertaken during the typically wetter winter months to ensure representative results are obtained.

Run-off storage facilities on site must exercise care not to pollute any potential nearby boreholes. Consultation with the Environment Agency is recommended with respect to aquifer protection plans.

The risk of pluvial flooding from Norton Lane surface water requires some consideration. It is recommended to construct a low 'sleeping policeman' type feature incorporated within the detailed site design and located across the principal site entrance, to facilitate the effective north/south channelling of the

highway water and so help prevent this source of water entering the site via the main entrance off Norton Lane.

10.0 DISPLACED WATER

With the elevation of the re-developed units and the flood characteristics associated with the site, there is no expectation relating to the displacement of surface water arising. The overall plot is relatively large and any associated displacement of water would have ample capacity/area to be dissipated, resulting in the potential for very shallow localised pockets of water only within the confines of the site. The introduction of SUDS would help to alleviate any such potential problems.

11.0 IMPACT ON NEIGHBOURING PROPERTIES

For the reasons given in the previous sections, there will be no detrimental impact on the neighbouring properties.

12.0 CLIMATE CHANGE

Anticipated flood levels at this location have been assessed based on the current requirements of PPS 25, relating to climate change enhancement extending to a design horizon of 2115. However the site has been recognised as being located within flood zone 1 and as such the identified surface water flooding risk is considered as relatively minor in context.

13.0 DRY ACCESS

The estimated pluvial flood scenario indicates that a dry access away from the property can be achieved in a flood event. Any surface water build up in Norton Lane is expected to be relatively shallow, considering north/south gradients and recent improvement works, with a short related duration prior to draining away from the area of the site. It is therefore considered that safe dry access can be achieved on to Norton Lane from the site and by extending directly north towards the relatively local and much higher level A27 Arundel Road (Approximate level of 27m ODN).

A research paper completed by HR Wallingford on behalf of DEFRA and the Environment Agency has recently been completed. This is paper FD2320 FRA Guidance for New Development. Within this paper is a chapter relating to Safe Access and Exit. This document provides a table of danger to people for different combinations of depths and velocities.

The relevant table is included below.

Table 13.1 Danger to people for different combinations of depth and velocity

Velocity (m/s)	Depth of flooding (m)											
	0.05	0.10	0.20	0.30	0.40	0.50	0.60	0.80	1.00	1.50	2.00	2.50
0.00												
0.10												
0.25												
0.50												
1.00												
1.50												
2.00												
2.50												
3.00												
3.50												
4.00												
4.50												
5.00												

Key:
 Danger for some
 Danger for most
 Danger for all

The topographical nature of the site and the surrounding land would indicate a flood velocity not exceeding 0.5m/s and a flood depth of less than 0.10m. The resultant risk is therefore regarded as very low when considering the site occupants.

14.0 SEQUENTIAL TEST

The principle in PPS25 is to direct development away from high flood risk areas and the Sequential Test is the basis on which the location of development should be made.

The Sequential Test is based on a Strategic Flood Risk Assessment completed by the Local Authority. Associated enquiries made of Arun District Council have indicated that this potential site is in fact located in flood zone 1 and therefore meets the basic Sequential requirements from the perspective of directing re-development to areas of low flood risk (i.e zone 1). With suitable flood mitigation measures there is therefore no need to apply the Sequential Test in this context.

15.0 FLOOD MITIGATION MEASURES

It is recommended that the ground floor of the units in question will be raised to provide a sufficient margin of freeboard in relation to the site as a whole. In relation to the topography of the site it is therefore proposed to construct all ground floor slabs a minimum of 300mm above the existing ground level in each case. Based on average site levels this provides a typical GF build elevation of around 15.9m ODN. This amount of freeboard is required as sleeping accommodation will be included on the ground floor.

It is also proposed that the construction of the respective ground floors should utilise flood resilient materials extending typically to a height of 0.3m above the thresholds. This would involve using water resistance plaster and raising electrical sockets so that any possible damage from flooding can be minimised. Full details of the document issued by CIRIA on "Improving the Flood Performance of New Buildings" can be found at the web address below.

http://www.planningportal.gov.uk/uploads/br/flood_performance.pdf

The site must also incorporate a defined and well communicated emergency procedure should any form flooding occur. This must include the routes and designated procedures for safe access and egress from the site.

16.0 RESIDUAL RISK

The residual risk is that risk which remains after the sequential approach and mitigation measures have been taken into account.

In this case, although the site may be at very minor risk of flooding, the units will be re-constructed at least 0.3m above the respective ground levels and hence well above any potential flood water. It should be noted that the site is typically set at a higher elevation by comparison to Norton Lane on the east side.

In this case the residual risk has been managed by ensuring the ground floors are raised well above any anticipated flood level, incorporating the sleeping accommodation.

17.0 EXCEPTION TEST

The guidance within PPS 25 indicates that a combination of 'more and less vulnerable' re-development when located within flood zone 1 is considered appropriate, subject to the application of sufficient flood mitigation measures and ensuring the newly established units are deemed safe in the context of the structures and their occupants. Due to the flood zone designation there is no requirement to apply the Exception Test to this development. This has been further confirmed and clarified by Arun District Council.

18.0 WATER EFFICIENCY

Water efficiency measures should be considered in relation to the development proposals and developers have found that implementing these recommendations has little impact on cost.

Rainwater/greywater schemes can also be given consideration as these can be applied to the range of units intended for this particular site.

The efficiency measures themselves are easy to introduce and consist of selecting appropriate appliances that reduce water demand. An example would be showers with air entrainment which limit water use without affecting shower performance.

19.0 SUMMARY

This site specific Flood Risk Assessment has shown that the proposed development is within flood risk Zone 1, as further clarified by Arun District Council and the Environment Agency. In the context of PPS 25 there is therefore no requirement to apply either the Sequential or Exception test to redevelopment of this nature. In summary, the existing site comprises now redundant agricultural related buildings and through re-development of the existing range of structures the proposal will provide:

- B1 offices together with stables and paddock.
- A total of 4 holiday cottages.
- Garaging/stores and implements shed.
- Residential accommodation relating to the property on the eastern side of the site.

The re-generation of such a site, by the re-construction of existing structures, for business and residential use is entirely in keeping with the relevant local authority planning policies, providing certain related conditional criteria are adhered to.

The ground floors of the proposed units will be designed to be similar to the existing structures on the site, but this will be approximately 300mm above the respective ground levels in each case. This will ensure that any sleeping accommodation has sufficient freeboard above any anticipated flood level that could possibly encroach upon the site. Surface water attenuation would be further enhanced by the introduction of SUDS in relation to access roads and parking areas etc within the site.

Any flood levels would be very shallow in relation to the site and would tend to rise very slowly in the case of an extreme storm event. In such a case access can be achieved from the buildings directly on to Norton Lane immediately to the east and likewise further north to much higher land situated close to the A27 Arundel Road.

Water efficiency measures are also proposed as a further sustainable measure, these include:

- * Husbandry of the roof drainage including the provision of water butt storage where appropriate.
- * Permeable surfacing to the parking and turning areas provided insitu soils testing confirms suitable permeability.
- * Use of the Flood Warning Service, if available for the area in question.

- * Elevation of the unit construction levels by a minimum of 0.3 metres above the respective existing ground levels.
- * The adoption of flood resilient construction and the raising of electrical apparatus.
- * Construction of a low raised 'sleeping policeman' type arrangement across the channel of the main entrance to facilitate the flow of highway drainage.

20.0 RECOMMENDATION

It is recommended that the Planning Authority accept the findings of this Flood Risk Assessment which shows the re-development of the site at Norton Lane can be designed to be safe from a low risk of flooding and will meet the criteria set out in PPS 25 and accord with LPA re-generation policies.