AMBIENTAL

ENVIRONMENTAL ASSESSMENT

Flood Risk Assessment (FRA)
4261

The Lakes
Swainshill
Herefordshire
HR4 7PU

Document Issue Record

Project:	Flood Risk Assessment
Prepared for:	T.J. Crump Oakwrights Ltd.
Reference:	4261 FRA
Site Location:	The Lakes, Swainshill, Herefordshire, HR4 7PU
Proposed Development:	Partial demolition of existing structures and redevelopment to include 8 dwellings (use Class C3), a design studio (use Class B1), outdoor living area with display outbuilding, cycle, storage building along with associated infrastructure and landscaping.

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Contents

1. Introduction

1.1 Ambiental Environmental Assessment has been appointed by T J Crump Oakwrights Ltd to undertake a Flood Risk Assessment for the proposed development at The Lakes, Swainshill, Herefordshire, HR4 7PU.

1.2 The existing site is predominantly greenfield and existing office building, a workshop and other structures. The proposed development is for the partial demolition of the existing structures on site and construction of eight dwellings (use Class C3), a design studio (use Class B1), outdoor living area with display outbuilding, cycle, storage building along with associated infrastructure and landscaping.

1.3 The redline application boundary area is approximately 13,300m^2 (1.33ha). The existing impermeable area is associated with the building (to be partially demolished) and paths/driveways, totals approximately 3,800m^2. The total proposed built area (roofs and hardstanding) post-

development would increase to approximately 6,050m^2 (0.605ha) according to the proposed plans. See in Appendix 1 – Supporting Information.

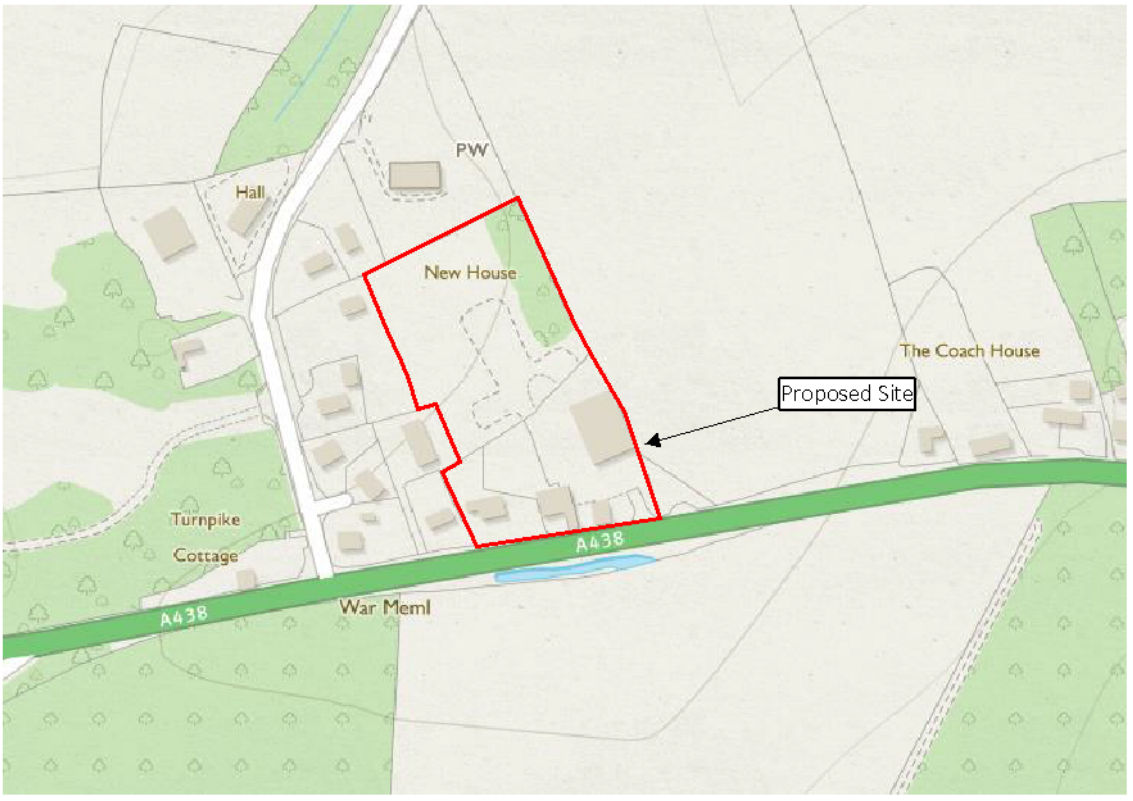

Figure 1: Site Location

1.4 Elevations on site vary between approximately 71.68mAOD at the lowest point along the eastern boundary rising to 78.93mAOD to the northern boundary. Analysis of topographic levels indicate that the site generally slopes from northwest to east at gradients between 1 in 10 to 1 in 150. See topographic survey in Appendix 1.

1.5 The purpose of this assessment is to demonstrate that the development proposal outlined above can be satisfactorily accommodated without worsening flood risk for the area and without placing the development itself at risk of flooding, as per national guidance provided within the National Planning Policy Framework (NPPF) 2018.

Existing Drainage Infrastructure and Watercourses

1.6 The topographic survey indicates the location of gullies within the site, and therefore it is presumed that surface water drainage infrastructure and pipework is present. It is proposed to reuse the existing surface water drainage network post-development where possible and if structurally sound. The condition of the drains can be revealed by a CCTV drain survey.

1.7 The sewer asset plan provided by Welsh Water indicates the presence of only foul water sewerage in the vicinity of the site.

1.8 Analysis of 2m LiDAR remotely sensed topography indicates the presence of a ditch on the site's lower eastern boundary. Prior to detailed design, it is recommended that the ditch and wider site area and drainage is surveyed to confirm its condition. See section of assumed ditch in the drainage strategy drawing in Appendix 2.

2. Flood Risk

EA Flood Map for Planning

2.1 The national-scale flood mapping created on behalf of the EA, the application site is shown to be located within Flood Zone 1 (Figure 2). Based on the EA Flood Map for Planning the proposed development has an annual probability of fluvial or tidal flooding of less than 0.1% (1 in 1,000) in any year.

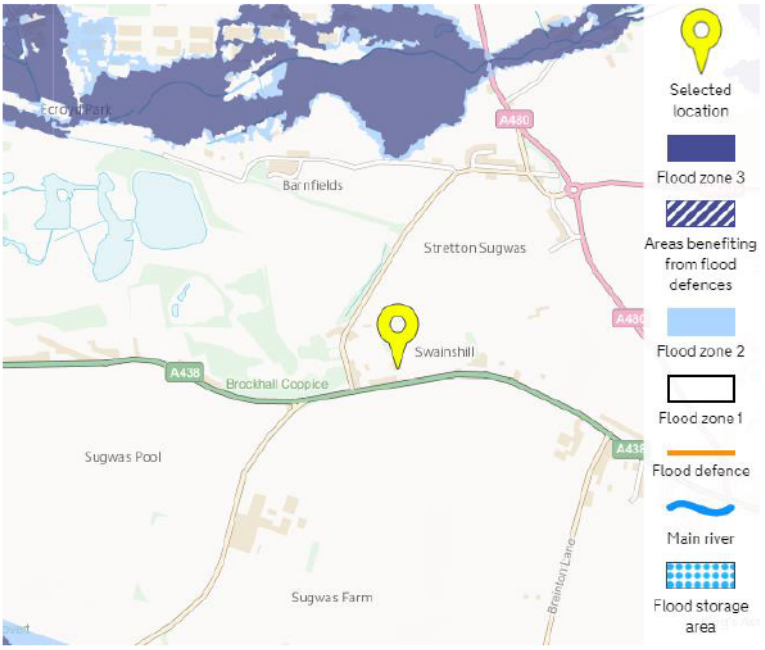

Figure 2: Flood risk map for planning (Source: Environmental Agency, EA)

Vulnerability Classification

2.2 The proposed development usage is for residential and commercial purposes, as such, under the NPPF 2018, the proposed usage is classified as a 'More Vulnerable'. According to Table 1 below extracted from the NPPF 2018 indicates the development is appropriate for this flood zone.

Flood Risk Vulnerability Classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test Required	✓	✓
	Zone 3a	Exception Test Required	✓	×	Exception Test Required	✓
	Zone 3b *Functional Floodplain*	Exception Test Required	✓	×	×	×

Table 1: Flood risk vulnerability and flood zone 'Compatibility' table as specified by NPPF 2018.
. Please note: ✓ means development is appropriate;
× means the development should not be permitted

2.3 As such, under the NPPF 2018 guidance, the development is considered to be compatible with the flood zone, and would not require testing under the Exception Test.

Other Sources of Flooding

Surface Water (Pluvial)

2.4 The EA Risk of Surface Water map has shown that part of the site is located in an area at a "Medium" risk of surface water flooding (Figure 3). These areas have a chance of flooding lower than 1 in 30 (3.3%) and greater than 1 in 100 (1%) annual probability.

2.5 The EA's Surface Water Depth, High Chance of Occurring Map, shows that the site would not experience flooding during such an event (Figure 4).

Figure 3: Flood risk from surface water (Source: EA)

Figure 4: EA Surface water depth, 'High' chance of occurring (Source: EA)

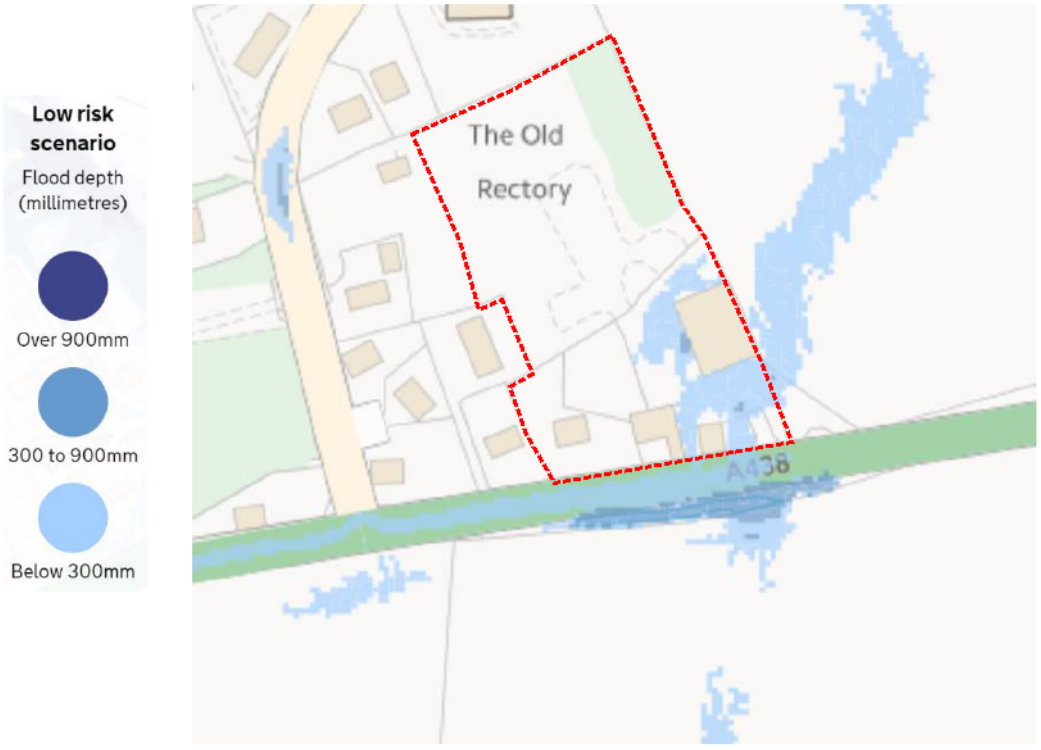

Figure 5: EA Surface water depth, 'Low' chance of occurring (Source: EA)

2.6 The EA's Surface Water Depth, Low Chance of Occurring Map, indicates that most areas surrounding the existing workshop building and access entrance to experience flood depths of up to 300mm (Figure 5). Analysis of the flow velocities indicates these areas are part of the main flow path of runoff from the wider area (Figure 6).

Figure 6: Surface water velocity, 'Low' chance of occurring (Source: EA)

2.7 No records have been provided by the EA or in the Herefordshire Council Strategic Flood Risk Assessment to suggest that the site has previously flooded from this source.

2.8 As such, the risk from surface water flooding can be considered to be relatively high. Section 3 outlines the surface water drainage strategy for the site which includes, options for the management of the offsite surface water flows, to minimise flood risk to the development.

Climate Change on Site

2.9 The current Environment Agency guidance on climate change is in the process of being reviewed, in line with the UK Climate Projections 2018. However, this FRA has been produced based on the current climate change allowances for use in Flood Risk Assessments. It is understood from the Environment Agency, that the River Thames Tidal flood outputs include appropriate allowances for climate change. Current climate change predictions are that there will be increases in winter precipitation volumes, which are likely to increase the occurrences of floods. Predictions of summer precipitation volumes are that these will decrease, however summer storms will increase in intensity, leading to more flash flooding events. These factors combined, are predicted to result in the probability of flooding increasing for all areas at risk of flooding.

2.10 Table 2 presents the EA flood zones and required climate change allowances, Table 3 presents the climate change allowance values for the scenarios within the river basin catchment for increase in peak fluvial flows.

Flood Zone	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
1	Central	Central	Central	Central	None of the allowances
2	Higher Central and Upper End	Higher Central and Upper End	Central and Higher Central	Central	None of the allowances
3a	Upper End	Development should not be permitted	Higher Central and Upper End	Central and Higher	Central
3b	Upper End	Development should not be permitted	Development should not be permitted	Development should not be permitted	Central

Table 2 EA Climate Change Allowance and Flood Zone Table

River basin district	Allowance category	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Severn	Upper end	25%	40%	70%
	Higher central	15%	25%	35%
	Central	10%	20%	25%

Table 3 Peak river flow allowances for Thames river basin

2.11 For residential uses within Flood Zone 1, within the River Severn drainage basin, the Central allowance over the lifetime of the development, assumed to be 100 years, should be adopted, i.e. an increase of +25% on peak river flows.

2.12 As such the proposed development may be at more risk of flooding in the future.

Flood Risk Management Measures

2.13 The proposed development is shown to be located within Flood Zone 1 according to the low-detail EA Flood Map for Planning, having a less than 1 in 1,000 annual probability of river or sea flooding in any year (<0.1%) as shown in Figure 2.

2.14 The predominant flood risk source on site is from surface water. To provide betterment to the site during its lifetime, it is recommended that the proposed development should incorporate the following mitigation measures:

- Ground floor to be solid (i.e. concrete floors) where possible, with waterproof membrane;
- Wall cavities to be filled with closed-cell foam throughout;
- Exterior ventilation outlets, utility points and air bricks to be fitted with removable waterproof covers.
- External walls to be resistant to flooding to at least 900mm above external ground level;
- Bringing down electrical services from ceilings toward the floor, at ground floor level;
- Raise internal threshold to ground floor above the external ground level by 300mm, if possible;
- Anti-syphon fitted to all toilets;
- Non-return valves to be fitted to all drain and sewer outlets; and,
- Incorporation of surface water drainage strategy measures.

Flood Warning Service

2.1 The EA operates a 24-hour telephone service on 0345 988 1188 that provides frequently updated flood warnings and associated floodplain information. Further information can be found on www.environment-agency.gov.uk/floodline. Floodline Warnings Direct is a free service operated by the EA that provides flood warnings direct to occupants by telephone, mobile phone, fax or pager.

2.2 During periods of bad weather, site users should monitor local weather reports and sign up for the Met Office UK weather warnings. Warnings can be monitored through an Apple/Android app, Twitter or directly via emails. Further information can be found at https://www.metoffice.gov.uk/.

2.3 The EA operate a 5 day county-wide forecast in relation to flood risk. It is recommended that this service is regularly checked to ensure occupants/residents are aware of any possible risks: https://flood-warning-information.service.gov.uk/5-day-flood-risk.

Flood Evacuation Plan

2.15 Given that the site and all the surrounding roads are located in Flood Zone 1, there is no requirement under the NPPF for an evacuation route.

SuDS Study

2.16 According to Herefordshire Council Sustainable Drainage Systems (SuDS) Handbook all new developments should seek to provide SuDS in order to manage runoff sustainably and as closely as possible to the greenfield setting.

2.17 A surface water drainage strategy (SWDS) has been prepare by Ambiental under document reference no. 4261 SWDS following the SuDS requirements of Herefordshire Council at outline planning stage.

Design Exceedance

3.1 In the event of drainage system failure under extreme rainfall events or blockage, overland flow may occur within the site. In the event of the development's drainage system failure, the surface water flow will be dictated by topography on site. Design of external ground levels should be completed at detailed design stage to finalise these overland routes, but some indicative flow paths have been included on the outline strategy drawings. External levels should be designed to direct overland flow away from buildings and threshold as depicted on the proposed surface water drainage layout (Ambiental drawing no. 4261 SWDS -01).

3.2 It is advised that the finished floor level of the proposed building should be 300mm above the external ground levels in the event of drainage system failure, extreme rainfall events or blockage, as flooding would occur within the site. In the event it should be ensured water runoff should not impact on the building.

3. Conclusion

4.1 This study has been undertaken in accordance with the principles set out in NPPF 2018. We can conclude that providing the development adheres to the conditions advised in the conclusions of this report, the said development proposals can be accommodated without increasing flood risk within the locality in accordance with objectives set by Central Government and the EA.

4.2 With reference to the Environment Agency (EA) national-scale flood mapping created on behalf of the EA, the redline application boundary of the site is located within Flood Zone 1. The proposed development has an annual probability of fluvial or tidal flooding less than 0.1% (1 in 1000) in any given year. The development is classed as 'More Vulnerable' due to its residential use, and under the principles of the Sequential Test it is deemed appropriate.

4.3 The main risk of flooding to the site is from surface water. The majority of the site's area is located within a 'Very Low' risk of surface water flooding and would not experience any significant flooding during rainfall events having annual probability greater than 0.1% (1 in 1000) in any given year. The area surrounding the existing workshop building and access entrance could experience flood depths of up to 300mm. Analysis of the flow velocities indicates these areas are part of the main flow path of runoff from the wider site region.

4.4 In the event of drainage system failure, extreme rainfall events or blockage, flooding may occur within the site. In a drainage flooding event it, should be ensured water runoff should not impact the proposed building. To mitigate against this, the building's finished floor level should be raised 300mm above adjacent external ground levels, if feasible.

Appendix 1 – Supporting Information

LOCATION PLAN, Proposed
Scale 1:1250

BLOCK PLAN, Proposed
Scale 1:500

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