Flood Risk Assessment

Proposed Residential Development
On Land at Oakfields Farm,
Hanwood Road, Edgebold, Shrewsbury.
SY5 8NT.

September 2020

Statement prepared for
Davies Parry (Oakfields) Ltd

Report prepared by
Woodsyde Developments Ltd

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Executive Summary

Woodsyde Developments Ltd has been commissioned by Roger Parry and Partners - Planning Agent on behalf of Davies Parry (Oakfields) Ltd to undertake a Flood Risk Assessment (FRA) to support the allocation of land in the Shropshire Local Plan for a proposed residential development at Oakfields Farm, Edgebold, Shrewsbury. The proposed development will be accessed direct from a single access to the A488 Principal Road. The A488 provides one of the main routes into Shrewsbury from the south west of the town.

The site is approximately 19.70 hectares (48.68 acres) in size and as such requires the submission of a Flood Risk Assessment as designated by National Planning Policy Framework (NPPF). According to the Environment Agency Flood Maps the application site is not located part within any Flood Zone, however on an individual basis given the topography of the site it is noted that there is localised ponding from surface water run-off and an area of ponding along the eastern boundary which forms a wet area and pond.

Data has been gathered from a number of other sources including: the Environment Agency (EA), the British Geological Society (BGS), National Soil Research Institute (NSRI), aerial photographs, Ordnance Survey (OS), commercially available historic mapping and relevant strategic documents developed by Shropshire Council, in their capacity as both Local Planning Authority and Lead Local Flood Authority.

As part of the site appraisal process it has been necessary to demonstrate that the proposed development can be achieved with an acceptable risk of flooding and without increasing flood risk to third parties. This report describes the methods used and the results of this study. The report takes into account the recommendations of National Planning Policy Framework (NPPF).

This report will demonstrate that there will be no additional flood risk to the site or any other properties as a result of this development. Appropriate attenuation will be provided within the development, with the discharge reduced to Greenfield run-off rates.

1.0 Introduction

1.1 Project Brief.

Woodsyde Developments Limited has been commissioned to carry out an assessment to satisfy the Shropshire Council and Environment Agency's (EA) requirements for a Flood Risk Assessment (FRA) for the allocation of a parcel of land sized 19.7 hectares at Oakfields Farm, Hanwood Road, Edgebold, Shrewsbury on behalf of Davis Parry (Oakfields) Ltd.

The FRA is prepared in full accordance with the National Planning Policy Framework (NPPF). The FRA is required to identify the 1% (1 in 100 year) and 1%+ allowance for climate change flood extents and levels for the site and ensure that all aspects of development are clear of the 1%+ allowance for climate change floodplain.

The Environment Agency Flood Maps indicate that the site to be wholly located in Flood Zone 1 and is not liable to any flooding. The area of land the subject of the planning application comprises predominantly farmland located on the northern side of the A488 principal road on the western fringes of Shrewsbury, but well within the confines of the outer A5 bypass. The site falls from west to east with a high on the western boundary of approximately 88.0m AOD adjacent to the existing property outbuildings and a low to the north easterly corner of around 70.0m AOD. The land area is currently subdivided with semi-mature hedges and some trees within the hedgerows.

From the EA Flood Maps and site observation, the area on the eastern boundary is fairly low lying which does collect surface water run-off which discharges to the existing watercourse to the north. In periods of heavy precipitation over prolonged periods this water gathers to create a wet area/pond. This area will be retained for the site drainage but will be formalised and a flow control provided to the existing outfall. Any other minor areas where surface water may gather will be dealt with during construction, levels re-engineered, and sub surface drainage provided to ensure that no flooding occurs.

The future development of this land will be protected from any potential pluvial, fluvial or groundwater flooding risk by re-engineering levels across the site as necessary and raising and setting the finished floor levels minimum 150mm above the surrounding ground. Within the future design of the site drainage it is proposed to capture any possible pluvial overland flows at source and direct them to the proposed drainage system. Cut-off drains will be utilised where appropriate to capture any possible exceedance flows.

1.2 Assessment Procedure

This report has been prepared in accordance with the requirements of NPPF.

An assessment of the flood risk to the proposed development has been considered on the basis of the best information available at the date of this report. The assessment herein is deemed appropriate to the requirements of the Environment Agency, the scale and nature of the development, and the available data. The key elements of this assessment are as follows:

- Desk study scoping exercise;
- Site visit;
- Consultation with relevant authorities;
- Review of site topography and development proposals;
- Identification of data corresponding to appropriate design flood events;
- Consideration of climate change;
- Consideration of flood risks to and from the development;
- Calculation of the impact of the development on surface water run-off, and;
- Recommended attenuation measures.

1.3 National Planning Policy Framework

- NPPF was published by Communities and Local Government, March 2012 and supersedes the Planning Policy Guidance Note 25.
- NPPF has been developed to provide additional guidance to local planning authorities to ensure the effective implementation of the planning policy set out in the NPPF on development in areas at risk of flooding.
- The NPPF guidance retains the key elements of Planning Policy Statement 25.
- The EA is a statutory consultee for all planning applications and will give comment and recommendations to the planning authority for any proposed developments affecting a watercourse.
- NPPF states that a Strategic Flood Risk Assessment (SFRA) should be carried out by the local planning authority to inform the preparation of Local Development Documents (LDDs), having regard to catchment wide flooding issues which affect the area. The SFRA will provide the information needed to apply the sequential approach.

1.4 Requirements of NPPF

For an FRA proportionate to the risk and appropriate to the scale, nature and location of the development the following will need to be considered;

- the risk of flooding arising from the development in addition to the risk of flooding to the development; take the impacts of climate change into account;
- the potential adverse and beneficial effects of flood risk management infrastructure including raised defences, flow channels, flood storage areas and other artificial features together with the consequences of their failure;
- the vulnerability of those that could occupy and use the development, taking account of the Sequential and Exception Tests and the vulnerability classification, including arrangements for safe access;
- quantify the different types of flooding (whether from natural and human sources and including joint and cumulative effects) and identify flood risk reduction measures, so that assessments are fit for the purpose of the decisions being made;
- the effects of a range of flooding events including extreme events on people, property, the natural and historic environment and river and coastal processes; include the assessment of the remaining (known as ‘residual’) risk after risk reduction measures have been taken into account and demonstrate that this is acceptable for the particular development or land use;

- how the ability of water to soak into the ground may change with development, along with how the proposed layout of the development may affect drainage systems;
- and be supported by appropriate data and information, including historical information on previous events.

2.0 Site Details

2.1 Site Overview

The site is located off the A488 on the western fringes of the town of Shrewsbury. (NGR 346693, 311162). The A488 Hanwood Road is one of the main roads into the town.

Figure 2.1 below shows the location of the application site.

OS NGR	SJ 346693, 311162
Local Planning Authority	Shropshire Council
Environment Agency Office	Shropshire Region
Water Utility Company	Severn Trent

2.2 Site Description

The site lies to the north of the A488 on the western fringe of Shrewsbury. Presently the site is Greenfield used as a mix of agricultural uses, there is an existing dwelling on the site known as Oakfields Farm which we believe is to remain. The site proposes an access direct to the A488. The parcel of land is 19.7 hectares (48.68 acres) in size. The site falls from west to east with a high on the western boundary of approximately 88.0m AOD adjacent to the existing property outbuildings and a low to the north easterly corner of around 70.0m AOD. The proposed site access will be located fairly centrally along the site road frontage to the A488 and will be in the form of a ghost island arrangement. The site sits within the national speed limit of 60mph along the A488 and is approximately 300m from the 40mph speed limit entering the Radbrook area.

2.3 Surrounding Area

To the south eastern boundary lies the A488, and to the northern and eastern side lies existing residential development. Open fields and farmland are to the west.

The watercourse known as Bowbrook lies to the north and east being approximately 300m from the north eastern corner of the site. Smaller tributaries bound the eastern and north eastern part of the site which connect to other smaller watercourses before out falling to the Bowbrook.

2.4 Development Proposals

The proposed development land is circa 19.7 hectares and is capable of accommodating 300-400 dwellings. A Location Plan has been provided which indicates the proposed surface water attenuation to the western boundary in the location of the existing watercourse and a significant area provided as a playing field (see Appendix A).

Access to the land will be from the A488, with a new access created centrally along the site road frontage to the principal road. However, access will also be provided to further lands to the north and west of the site. Here the access will be provided as a distributor type road, with culs-de-sac serving much of the development.

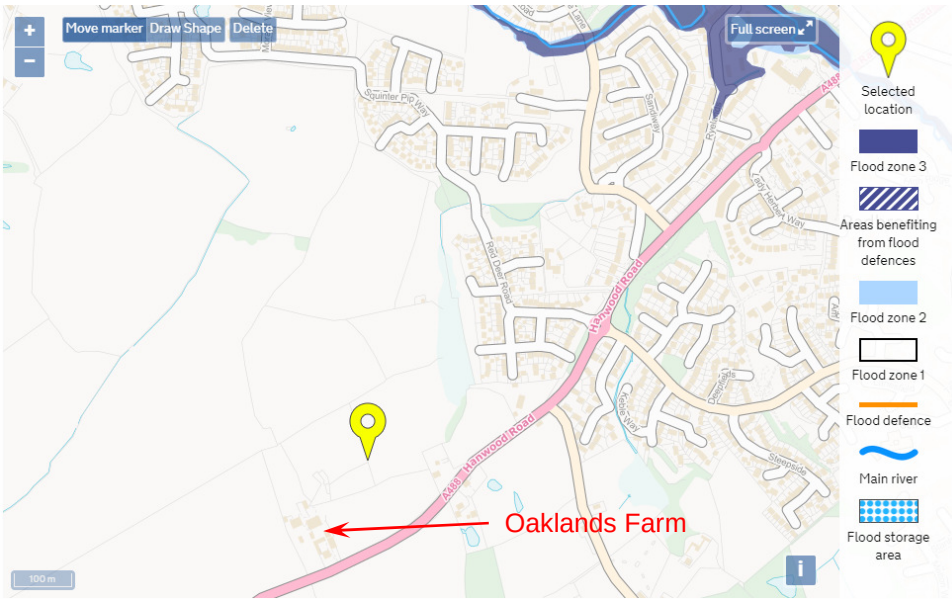
The development proposals will result not result in an increase in surface water with the design of the surface water drainage system limited to existing Greenfield run-off rates.

3.0 Scoping Report

3.1 Indicative Floodplain Map

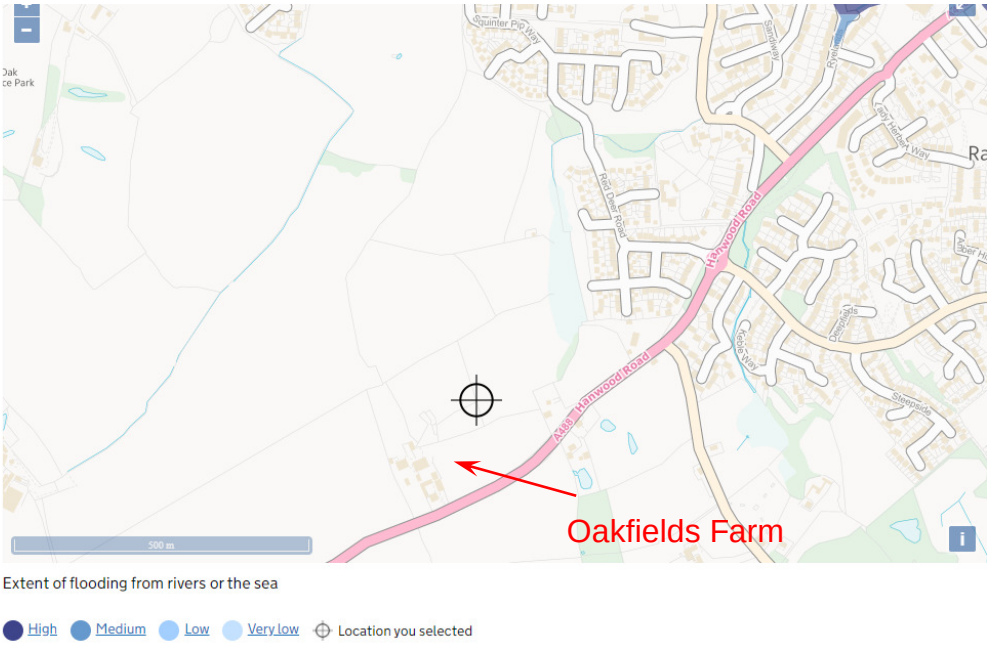
The Environment Agency is responsible for the provision of information pertaining to flood risk from tidal and main watercourses throughout England and Wales. The EA provides online information service though its Flood Map data. This data is not intended to provide detailed flood information for individual properties but does provide a useful resource at scoping stage. An extract from the Flood Map is given in Figure 3.1 below.

Figure 3.1: Extract from EA Flood Map – Planning (downloaded on 11/11/19)



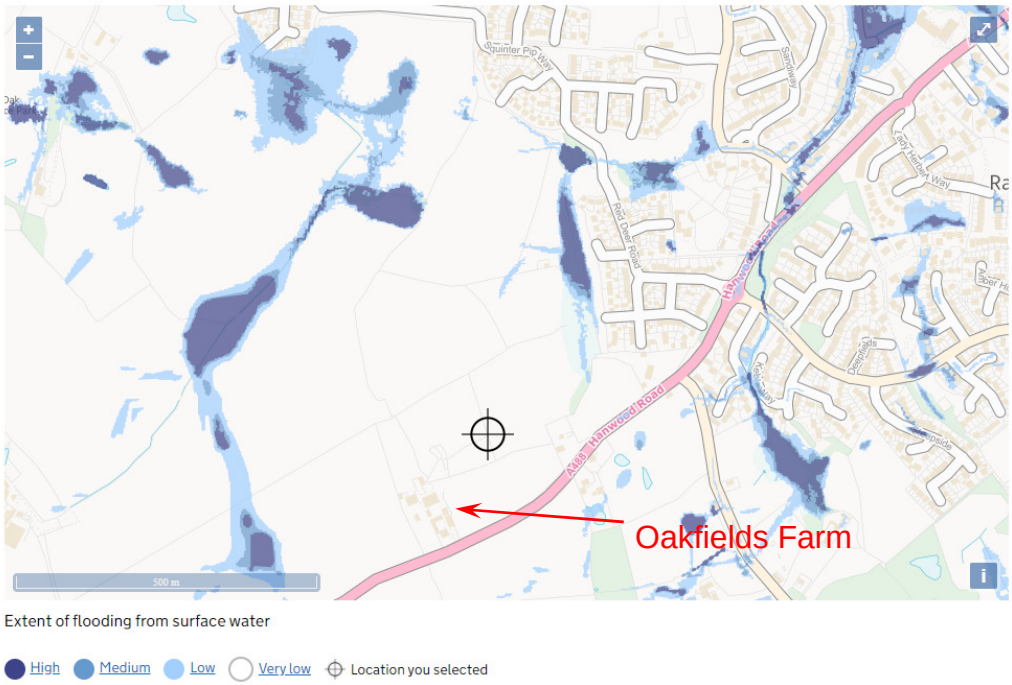
It can be seen from the above that the Flood map for planning shows the area of the site to be at risk of flooding and categorises this to be Zone 1. There is no identified flooding of any type within the application lands.

Figure 3.2: Extract from EA Flood Map – Flood Risk from Rivers (downloaded on 23/09/20)



From this more detailed map of risk of flooding from rivers or any watercourse it can be seen that the site is not at any risk of flooding from this source.

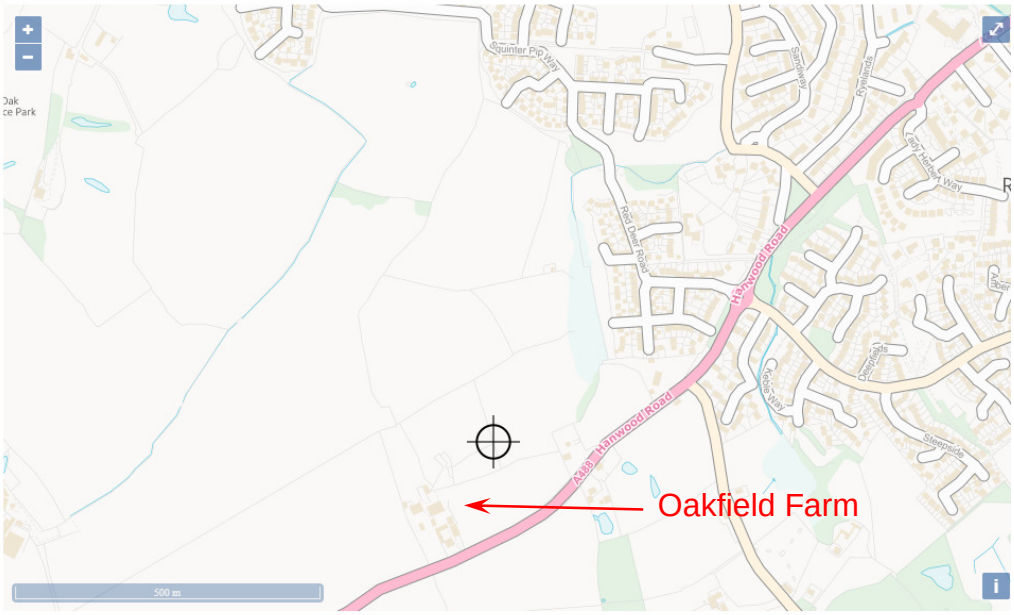
Figure 3.3: Extract from EA Flood Map – Flood Risk from Surface Water (downloaded on 23/09/20)



From the above plan it can be seen that there is a length along the eastern boundary which has potential flood risk to surface water run-off. The proposals for the site will be to provide all attenuation within this area and enhance the existing wetland/pond

area, with the outfall controlled to the existing watercourse along the north western boundary.

Figure 3.4: Extract from EA Flood Map – Flood Risk from Reservoirs (downloaded on 23/09/20)



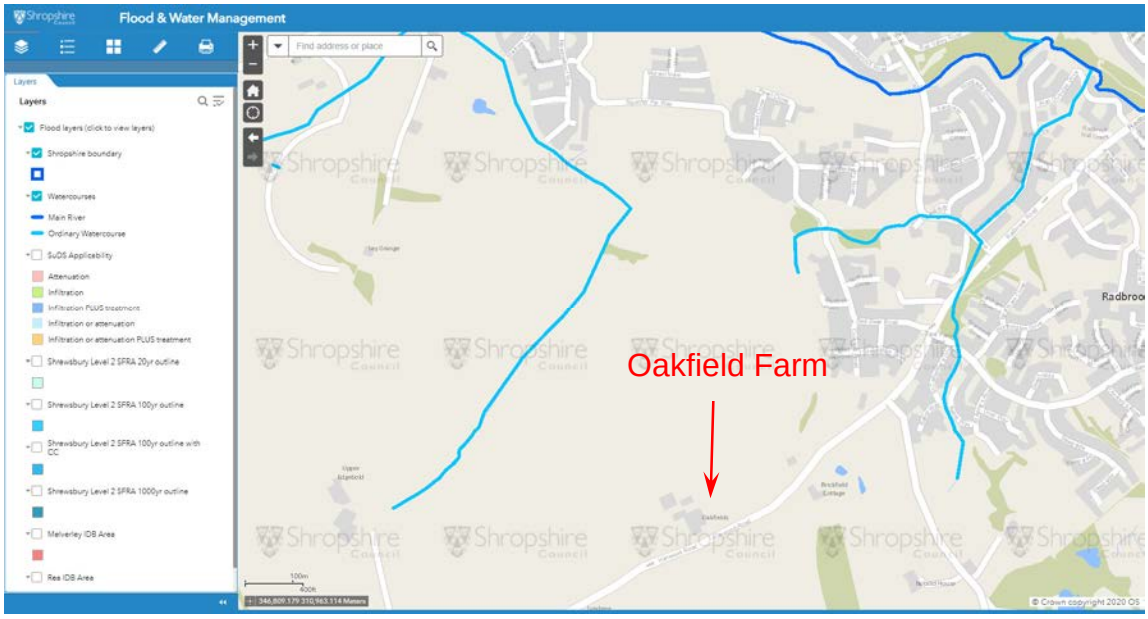
Extent of flooding from reservoirs

Maximum extent of flooding Location you selected

It shall be noted that there is no risk of flooding from reservoirs at this site.

From the above maps it can be acknowledged that a small area of the site is at potential risk of flooding from surface water run-off. This area already provides an outfall to the watercourse to the north and this will be used for the site surface water drainage outfall, assuming the site has little or no porosity. Having worked extensively in the area we believe the sub soils to be a mix of clays and not therefore suitable for the use of soakaways. Nonetheless, this will be fully explored and assessed at the time of a Full Planning Application for development at the site. According to the flood maps the site is not at risk from any other source.

Figure 3.5: Extract of Shropshire Council Flood and Water Management Map – (downloaded on 23/09/20)



From the above map it can be seen that there is a connecting tributary from the site boundary to the Bowbrook to the north.

3.2 Historical Flooding

Discussion with the landowner have confirmed that there have been no reported incidents of flooding at the application site. However, I am aware that as the ground is undulating and that some localise ponding could occur during prolonged rainfall particularly along the eastern boundary. From knowledge of the area the grounds will likely be clay, sub-soils with no inherent porosity available, however porosity testing will be undertaken when a Full Application is lodged for development. However, we are led to believe that some surface water gathers in the lower levels along the eastern boundary, however this is a part wet area and will be enhanced and used for the site attenuation with a restricted outfall to the existing watercourse.

3.3 Strategic Flood Risk Assessment

The Shropshire Council Local Plan advises that development should be well located and preferably on previously developed land. Here it is expected that preference should be given to locating development in Flood Zone 1. However, consideration must be given to the risk of alternative sources of flooding (e.g. surface water, sewage, and/or groundwater). Sustainable urban drainage techniques should be employed to ensure that any existing flooding problems elsewhere within the area are not exacerbated.

3.4 NPPF– The Sequential Test

The sequential test should demonstrate that there are no reasonably available sites in areas with a lower probability of flooding that would be appropriate to the type of development or land use proposed.

NPPF suggests that where an SFRA is not available, the sequential test will be based on the EA Flood Zones. The EA maps confirm that no part of the site falls within Flood Zone 2 or 3. The actual development and built form of the site will fall within the Flood Risk Vulnerability classification "high vulnerable" (this includes buildings used for: dwelling houses; student halls of residence; drinking establishments; nightclubs; and hostels). Therefore, based on the EA flood zone classification of the development, Table 3 in NPPF (see Table 3.0 below), indicates that development is appropriate, but a Flood Risk Assessment test is required due to the size of the site being considered and being in excess of 1 hectare. It is noted that an area along the eastern boundary does collect surface water runoff during prolonged rainfall, however this contains an existing ditch/watercourse and this will be enhanced and used for the site drainage.

Table 3.0: NPPF: Flood Risk Vulnerability and Flood Zone 'Compatibility'

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	✓	X	Exception Test required	✓
	Zone 3b 'Functional Floodplain'	Exception Test required	✓	X	X	X

Key:

✓ Development is appropriate. **x** Development should not be permitted

3.5 Mechanisms of Flooding

To understand the risk of flooding to a site, it is imperative that potential sources of flooding be clearly defined. The likelihood and severity of flooding depends on the characteristics of the flood sources and the degree to which the site is currently, or can potentially, be protected against flooding from these sources. Table 3.2 reviews the potential risk of flooding at the proposed site from different sources.

Table 3.2 Potential Risk of Flooding to the Proposed Development

Source of Flooding	Potential			Comments
	High	Med	Low	
Fluvial (Rivers)			**X**	The site is located within Flood Zone 1 (Low Probability)
Tidal/Coastal			**X**	The site is located far inland and there is no risk of tidal flooding
Pluvial (drainage system)		**X**		Possibility of Pluvial flooding along eastern boundary following prolonged or intense rainfall event.
Surface Run-off		**X**		Increased areas of impermeable material and potential ponding in low areas.
Ponding		**X**		Proposed drainage must prevent Ponding
Groundwater			**X**	No apparent Groundwater flood risk. No basements proposed at this site.

4.0 Flood Risk Assessment

4.1 Introduction

Following the scoping exercise, the primary flood risks are identified to be from Fluvial, Pluvial, Surface Run-off, and Ponding. These sources of flooding have been investigated in greater detail, to ascertain whether the risks are acceptable to the nature of the proposed development. Opportunities to mitigate these risks are discussed in Section 5 of this report.

4.2 Fluvial (Rivers)

The site is located within Flood Zone 1 (low probability), which means that the likelihood of flooding from fluvial or tidal sources in Flood Zone 1 is less than a 1 in 1000-year probability of flooding or <0.1% and potentially greater than 1 in 100-year probability of flooding.

The Bowbrook River is located approximately 300m from the north eastern corner of the site and the site connects to this via a network of smaller tributaries which includes a ditch/watercourse along the north and north eastern site boundary.

It is noted that the Environment Agency Flood Maps indicate that the site is not at risk from any flood waters from the Bowbrook. It is suggested that there will be no risk of flooding from this source.

4.3 Pluvial (Drainage Systems)

There is no reported evidence of pluvial flooding at the application site. The proposed drainage system for the site will utilise Sustainable Drainage Systems (SUDS) where possible. We understand from our knowledge of the area that it is unlikely that site porosity will be available to enable the use of soakaways for the disposal of the domestic surface water drainage.

Currently there is no identifiable positive surface water drainage system, save the small ditch/watercourse along the eastern boundary which outfalls to the Bowbrook. It is unclear if there is any sub drainage to the farmland.

Largely a new drainage system will be provided to serve the development land with this having an attenuation feature along the route of the existing ditch/watercourse to the eastern boundary. It is noted that the site falls approximately 16m from the south western corner to the north eastern corner. The site has a fairly uniform gradient from west to east.

The drainage proposals will include a suitably located and designed hydrobrake to ensure that Greenfield rates of run-off are not exceeded and that appropriate attenuation is provided for all storm events. The drainage proposals will collect any potential pluvial flooding and direct it away from the proposed and existing properties. The drainage system will provide a measure of drainage attenuation and improve existing conditions where some surface water collects in pockets and lower levels.

Further details of the Drainage Strategy for the site are presented in Section 6 of this report.

4.4 Surface Run-off

Currently the surface water discharges to top-soils and sub-soils where possible with overland flows collecting along the eastern boundary in an existing wetland area/pond and having an outfall to the existing ditches and smaller tributaries to the Bowbrook.

We consider that the existing system will have adequate capacity to accommodate the proposed site drainage subject to amendment to the size and depth of the existing wetland area. From inspection the areas of existing Greenfield would appear to dissipate into the upper layers of the ground strata and feed the existing crops within the fields.

Surface water drainage for the proposed development will utilise a mix of SUDS features and a piped system with this designed for a 1 in 100 year + 35% climate change storm event, with the pipes sized accordingly and discharged to the existing/proposed attenuation pond, which will be re-engineered accordingly, to ensure sufficient capacity is provided to accommodate the site flows.

Further details of the Drainage Strategy for this site are presented in Section 6 of this report. Appropriate cut-off drains will be provided to boundaries to capture any flows from adjacent land. The site drainage will capture any exceedance flows and potential urban creep.

4.5 Ponding

Ponding may occur if drainage is not adequately designed after periods of heavy rainfall. The new development will have to implement an adequate drainage system as discussed in Section 5 and 6 of this report.

4.6 Groundwater

There is no apparent flooding threat posed from the ground water level at this site. There are currently no basements to be constructed in the development and therefore no seepage into these structures will occur. Suitable cut-off drainage and French drainage will be incorporated to ensure there are no issues from this source.

4.7 Residual Risk

It is considered that there will be no residual risk as a result of the proposed development.

5.0 Recommended Flood Mitigation

5.1 Introduction

This section discusses mitigation options that should be considered in order to reduce the severity of the flood risk and to minimise the potential hazards associated with any residual flood risk.

5.2 Design Levels

The proposed development will as a matter of course have finished floor levels which are at least 150mm above existing ground levels.

5.3 Site Topography and Flood Routing

Where achievable there should be a differential level of at least 150mm between the threshold and surrounding ground levels. Where possible, levels should also fall away from buildings, and areas where water could dam up against structures should be avoided, even if drainage is provided. The site is undulating but has a predominant fall from west to east with the north eastern corner of the site being the lowest.

The site falls from west to east with a high on the western boundary of approximately 88.0m AOD adjacent to the existing property outbuildings and a low to the north easterly corner of around 70.0m AOD.

It is noted that the Flood Map identifies the whole to be located in Flood Zone 1. The Bowbrook is located approximately 300m to the north, which will have no influence on the site.

5.4 Sustainable Drainage Systems

It is now commonly a planning requirement to consider utilising sustainable drainage systems (SUDS), if it is appropriate to the specific site conditions. These systems are diverse, but generally aim to provide drainage systems that may facilitate flood and/or pollution control, related to run-off. Such systems are generally ‘soft engineering’ and as a result can be financially, as well as environmentally, attractive engineering solutions.

From knowledge of the area porosity is not available, such that soakaways cannot be considered for the discharge of the surface water drainage.

Grassed areas will have some small level of infiltration given the provision of topsoil and the run-off from these areas will typically feed the planting and grassed areas.

The proposed impermeable areas will be collected at source, such there will be no issue with potential flooding and the surface water will be directed towards the attenuation feature via varying sized pipes. Rainwater harvesting, permeable surfacing and other SUDS features will be considered and used where appropriate.

5.5 Flood Resistance & Resilience

A basic level of flood resistance and resilience can be achieved by following good building practice and complying with the requirements of the Building regulations 2000 published by the Office of the Deputy Prime Minister (ODPM). The incorporation of flood proofing measures should be considered as part of the design and construction of the development. These could include removable flood barriers across doorways and airbricks or raising the electrical sockets/services if appropriate.

6.0 Drainage Strategy

6.1 Introduction

In order to demonstrate that all forms of flooding have been considered as required by NPPF a drainage strategy is being developed. The aim of including this strategy as part of the flood risk assessment is so that it can easily be seen that the proposed development will not adversely affect the surface water regime in the area and that overall the current situation will be improved. A location plan can be found in Appendix A.

6.2 Existing Surface Water Drainage

The site currently has no clear identifiable surface water drainage, save an existing ditch and wetland area along the eastern boundary which we understand discharges to the existing ditch and watercourse network, ultimately discharging to Bowbrook. It is understood that the existing property and outbuildings would appear to have some kind of positive drainage system and it is likely that this drains via a land drainage system.

From knowledge of the area the ground will likely have insufficient porosity to allow the use of soakaways for the surface water drainage, however testing will have to be conducted at the appropriate time when a Planning Application is made for development. Currently, it is expected that some surface water run off does however discharge to the topsoil's and likely feeds the crop or retained grassed areas. The remainder of the run-off enters the ditch course along the eastern boundary and discharges to Bowbrook.

6.3 Existing Foul Water Drainage

At present the existing property likely discharges to a septic tank arrangement with no other identifiable drainage within the immediate vicinity of the property. It is noted that the closest public sewers are located to the north and east within the adjacent cul-de-sacs known as Wrekin Dove Close, Bluebell Place and Violet Grove. Appendix C shows the proximity of the foul water drains in the locality.

It is understood that the existing foul water system is maintained by Severn Trent Water Ltd.

6.4 Proposed Surface Water Drainage

It is proposed that the surface water run off from the dwellings, driveways, roadways and other impermeable type areas will be collected in a positive system and this will discharge to an attenuation pond located to the eastern boundary where this will have an outfall to the existing ditch/watercourse flowing to smaller tributaries of Bowbrook and then eventually to the Bowbrook river. The drainage will have a restricted outfall via flow vortex at Greenfield rates or better to the existing outfall.

Permeable surfacing will be provided to the access roads and footpaths where appropriate, rainwater harvesting and smaller swales and French drains will be introduced to collect all surface water run-off and this will discharge to the attenuation system. The attenuated system will discharge to Bowbrook.

Other suitable SuDS techniques will be utilised within the development with the possible use of water butts and rainwater harvesting where appropriate.

The majority of the development land and site falls within Flood Zone 1 as identified on the Environment Agency Flood Maps. However, a small portion along the eastern boundary is shown to be at risk of flood from surface water run-off, but at this area from inspection is a wet area and is part ditch course which outfalls to further tributaries of Bowbrook. The surface water will be collected at source and will be suitably attenuated/designed for the 1 in 100-year event plus 35% climate change. This will provide betterment to the existing arrangements and better protect adjacent dwellings.

6.5 Proposed Foul Water Drainage

Foul water drainage will be collected in a sealed piped system and will seek to discharge to the existing public sewers located in the adjacent culs-de-sac known as Wrekin Dove Close, Bluebell Place and Violet Grove. One or more of these potential connections would be used for connection of the site drainage.

All sewers will be designed in accordance with Codes for Adoption.

6.6 Maintenance/Adoption.

It is proposed that the new development will connect into the existing foul water sewers in the adjacent culs-de-sac via a new connection(s). The drainage system both surface water and foul will be designed in accordance with Codes for Adoption and both will be offered for adoption by the Local Water Authority subject to the completion of an appropriate Section 104 and Section 106 for the final connection. It is understood that the POS will be offered for adoption by either the Local Parish Council or the County Council.

6.7 Sustainable Drainage Techniques

It is now commonly a planning requirement to consider utilising sustainable drainage systems (SUDS), if it is appropriate to the specific site conditions. These systems are diverse, but generally aim to provide drainage systems that may facilitate flood and/or pollution control, related to run-off. Such systems are generally ‘soft engineering’ and as a result can be financially, as well as environmentally, attractive engineering solutions.

Where possible the use of permeable surfacing, storage within subgrades, French drains, water butts and some rainwater harvesting may be used, otherwise all surface water will drain to a new attenuation system/pond.

7.0 Conclusions & Recommendations

The proposed allocation of land and future development on land at Oakfields Farm, Hanwood Road, Edgebold, Shrewsbury, Shropshire has been assessed with regards to flood risk. The larger developable area of the site falls within Flood Zone 1 and subject to satisfactory surface water drainage to the site proposals there will be no flood risk to the site or any other properties. Appropriate attenuation will be provided alongside the development, with discharge of surface water reduced to Greenfield run-off rates to the existing ditch/watercourse serving the land. It is noted that some localised surface water run-off and ponding occurs along the eastern boundary and this area of existing ditch/wetland area will be extended and reengineered to provide a suitable attenuation feature.

7.1 Review of NPPF Objectives

The proposed development will not be affected by current or future flooding from any source. Appropriate additional cut-off and land drains will be provided to receive any potential overland flooding.
The site is situated at an approximate level of 84.0m AOD, with a high of approximately 88.0m AOD along the central area of the western boundary and low of approximately 70.0m AOD in the north easterly corner of the site.
The development will not increase flood risk elsewhere, with the restriction of surface water run-off at Greenfield rates.
The measures proposed to deal with the effects and risks are appropriate, for example if there is insufficient porosity, an attenuation system and restricted outfall, permeable paving and cut-off/land/ditch course drainage has been used where possible.
It is considered that the exception test has been met as all of the site falls within Flood Zone 1.
The site will benefit from the use of an attenuation system for the surface water drainage with controlled discharge to the Bowbrook.
Other origins of flooding have also been assessed and it has been found that there will be no increase in risk of flooding from land, groundwater or sewers as a result of this development.
There are no anticipated negative social, economic on environmental impacts which would result from the allocation of this land for residential development providing mitigation measures outlined in Section 6.4 are adhered to.

Review of Drainage Strategy

The proposed development will ensure that the 1 in 100 year + 35% climate change flows will be attenuated within an extension and re-engineered attenuation feature located along the eastern boundary where an existing ditch course exists and where this discharges to a further watercourse, finally outfalling to Bowbrook to the north east.
Permeable paving, rainwater butts, rainwater harvesting, cut-off drains and land drainage will be provided where necessary to ensure Sustainable Drainage Techniques.
New foul water sewers will be constructed in line with Codes for Adoption and applications for a Section 104 and Section 106 Agreements will be made where applicable.
Sustainable Drainage Systems will be utilised as where ground conditions allow, and this will be incorporated at the detailed design stage.