



Flood Risk Assessment for Planning



Report on:

Sample Property, Sample Town, Sample Postcode

Report prepared for:

Sample

Report Reference:

AEL-XXXX-FRA-XXXX

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Client Reference:

Sample

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123456, 123456

Report Author:

Sample Person



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Document Control

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Executive Summary

This flood risk assessment has been compiled in-line with NPPF guidelines, as part of a formal planning application for a new build two story house and garage extension upon previously developed land. It has identified that the site's boundary lies within Flood Zone 2 and Flood Zone 3, on the Environment Agency (EA) Flood Map for Planning. This is also supported by correspondence from Sample District Council Planning Authority.

Despite the fact that a fluvial risk has been identified, the topography of the land indicates that Stream X poses a negligible threat to the property. Indicating that any water that may breach the banks will flow to the west of the stream, into opposing low lying farmland, and not to the east where the proposed property is to be situated.

Flood risk from surface water flooding was identified to potentially occur within 50m of the property, but as this is based upon high level mapping, it cannot be fully relied upon. The topography of the site promotes surface water to flow away from the development's location, deeming it to pose minimal risk. Although there are several covered reservoirs within the Sample Valley, there has been no reservoir risk identified within the area.

Detailed flood mapping for groundwater flooding is not available, but due to the geological characteristics of the area, appropriate consideration of this risk should be included within the design. Groundwater flooding as a sole source is deemed to be of low risk to the site. Artificial sources of flooding must also be taken into account and although difficult to predict, having the appropriate knowledge of the local supply, storm and foul arrangement ensures that the chances of flooding are very minimal.

Overall, in the context of seeking planning permission, the development is at a low risk of flooding and flood risk should not deter the client from proceeding with the application. The development of this property is not said to increase surface water runoff or increase the risk of flooding or need for flood defences further downstream.

Further recommendations have also been made to ensure that the design proposals remain flood resilient for the lifetime of the development. This includes managing any localised accumulation of storm water, storm surcharge and the consideration of non-permeable building materials. These recommendations are in line with Communities and Local Government Guidance¹. The successful incorporation of these recommendations within the design would negate any remaining risk.

¹ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/7730/flood_performance.pdf

1. Introduction

Argyll Environmental (part of Landmark Information Group) was commissioned on the 3rd October 2016 by an unspecified company on behalf of Mr. & Mrs. Sample Client ("the client") to undertake a Flood Risk Assessment ("FRA"), on Sample Property, Sample Town, Sample Postcode ("the property").

This FRA has been produced in line with the following documents, with the aim of providing an informative appraisal to the client, which will be included as part of a planning application:

- National Planning Policy Framework Flood Risk and Coastal Change Planning Practice Guidance (the national guidance);
- Planning Policy Statement 25 (Development and Flood Risk Practice Guide)
- Strategic Flood Risk Assessment (SFRA) produced by Sample District Council
- Environment Agency Standing Advice

1.1 Purpose of Report

An initial planning application (Application Ref.: AB/2016/1234) was issued to Sample District Council, received on the XXth May 2016 for a new build two story house with detached garage to be built following the demolition of an existing bungalow. As part of the formal planning application, Argyll were instructed to complete a FRA to ensure that flood risk has been satisfactorily considered. The following wording was extracted from said application response:

"Parts of this site is located within the high risk flood zone 3 and medium risk flood zone 2. All development in high risk flood zones like this must be supported with a detailed flood risk assessment demonstrating how the development is appropriate and will not increase flood risk."

Based on the above statement, as part of the client's planning application, Argyll has undertaken the necessary measures to ensure that flood risk has been satisfactorily considered.

1.2 Site Location

The property is positioned at XY coordinates XY: 123456, 123456 (nearest post code: AB1 2CD). The front of the property (facing west), is used as its main access. A location map of the property can be seen within Appendix B.

1.3 Site Observations

A site walkover was conducted on the XXth of October 2016, and the following observations were made, which are accompanied by the photographs seen in Appendix C:

- Upstream of the site location, the stream flows beneath Sample Road through two circular culverts. Both are of a diameter of approximately 1 metre (as shown in image 1). The depth of the culverts are approximately 3 metres below road level (bottom of culvert), with the streams width being approximately 5m on the up and downstream faces.
- It is noted that should river flows be sufficiently high, following an extreme rainstorm, or blockage, the surcharge of this bridge may occur. Should this bridge become overwhelmed and surcharge, the topography of the area promotes the flow of water to continue in the same direction as the stream, flowing south.
- Sample Road's topography is seen to dip downwards towards the bridge from both the east and west direction (seen in image 3).
- The roads gradient drops from east to west, away from Sample property entrance from the main road.
- Downstream of the bridge, the stream maintains a fairly constant width and depth, passing the property on its western side (image 4).
- On site, the stream runs along the western boundary in a southerly direction, flowing under a footbridge near to the property. The channel is approximately 3m wide with natural banks of 1m in height on both sides.
- The river bed is located within a deep valley approximately 10m west of the property, being approximately 5m lower than the proposed finished floor level.
- Farmland on the opposite side of the stream to the property is seen to be of lower level, and extends for a considerable distance away from the stream at this level.
- The site cross section, seen in Drawing 06 demonstrates the variation in topography, and the promoting of any out of bank flow to move in a westerly direction, away from the property.
- Image 5 is taken from the west bank showing the footbridge and the general topography of the area.
- Image 6 indicates the height difference from the stream to the house, using the measuring staff as an approximate reference.

2. Flood Risk Evaluation

The following sections analyse each potential flood risk source that are relevant to this assessment in relation to the property's location. Consideration is given to the severity of flood risk to the site as a whole, including, but not limited to, the use of existing flood mapping, high level local strategic studies and available topographic information. These are referenced throughout.

2.1 Fluvial & Tidal Flood Risk

Fluvial flood risk originates from a watercourse of any size that may affect a site when the channel capacity is exceeded. This type of flooding often occurs following an extreme rainstorm event or a prolonged period of wet weather. Tidal flood risk can affect the coastline as well as estuaries and rivers that are tidally influenced. Flood events often coincide with the tidal regime, high rainfall events or other natural phenomena, which can lead to water levels covering low lying land or exceeding natural or man-made defences.

Based on the *EA Flood Map for Planning* (seen in Drawing 02), the property location is identified to be within Flood Zone 2 and 3. Due to the site's in-land location, as well as the local topography being circa 80mAOD, tidal flood risk has not been considered further within this report. Fluvial flood risk is seen to come from the nearby Sample Stream, which flows in a generally southern direction, eventually joining the River X much further downstream.

Based on a Product 4 data request to the EA (seen in Appendix A), the *EA Flood Map for Planning* is derived from a JFLOW flood model, produced in 2004. The modelled outlines within the vicinity of the property are seen to not flow along the path of the Sample Stream, despite the topography of the area being well defined as a fluvial valley along its course. The outline shows that both the 1% and 0.1% annual exceedance probability (1 in 100 and 1 in 1000 year flood events respectively), come out of the channel approximately 75m upstream of the property. Based on the findings of the site walkover and topographic survey, it strongly suggests that the flow of water during an extreme flood event would remain largely within the stream's course, upstream of the property.

The above irregularity within the flood mapping was discussed with the EA, and it is noted that updated flood modelling is currently being undertaken for the area, due to anomalies within the current information.

The most likely course that elevated flows would travel within the stream would be to the west of the property, flowing in a generally southern direction. The further upstream topography strongly suggests that this is the case, and further photographs captured during the site walkover demonstrates this. Additionally, the topography of the land directly opposite the property is seen to be lower, promoting its designation as a flood plain, compared to the properties elevation, which is elevated much higher. This can be seen within the cross section within Drawing 06.

Further to the above, no history of flooding was noted to have occurred within the locality of the property. Therefore, based on the above information, the location of the site is considered to be outside an area of extreme flooding. The natural flood plain on the opposite side of the stream would continually provide a flow route which would ensure that flood depths would constantly remain below the level of the site.

2.2 Surface Water Flooding

Surface water flooding occurs when local drainage networks are overwhelmed during an extreme rainfall event, causing water to flow over the surface and follow gravity to the lowest point where it often pools. This flood source is increasingly becoming one of the major contributors of flood risk, due to changing weather patterns and increased extreme rainfall events occurring across the UK. This places more pressure than ever on drainage systems, which are often overwhelmed during flash flood events, normally only designed to take between a 1 in 20 and a 1 in 30 return period event.

When interpreting the surface water flood map information, it needs to be taken into account that surface water mapping is generated from information that is largely high-level. The flood mapping must be correctly interpreted in order to give a fair representation of the site's surface water flood risk and used only as a guide.

Based on the *EA Surface Water Flood Map* (seen in Drawing 03), surface water flood risk is seen to be located to the east of the property, flowing in a south eastern direction. Despite its close proximity to this, the location of the development is seen to be outside the area of risk, which equates to a classification risk being very low. Much of the risk is at the rear of the proposed development, based on the design proposals. The area that is depicted at higher flood risk is mostly open greenfield, with minimal obstructions.

The Sample District Council Level 1 Strategic Flood Risk Assessment (SFRA) was carried out in January 2012, and it includes surface water flood risk evaluation based on the EA mapping discussed above. Further to this, there was no reported surface water incidents discussed near to the property.

2.3 Reservoir Failure

Assessment of risk of a reservoir failure may be interpreted as the extent of flooding that would occur, should any reservoir that has a capacity larger than 25,000m³, suffer a catastrophic failure. Mapping of this nature is described by the Environment Agency as a very worst case scenario, with a flood event of this type being extremely unlikely to occur.

The *EA Risk of Flooding from Reservoirs Map* (seen in Drawing 04) shows that the property would not be affected by a catastrophic failure of the nearest reservoir. The nearest reservoir is a covered reservoir and lies approximately 2 kilometres to the north of the proposed property location. As defined by the EA, the likely chances of this occurring are extremely low, therefore no further consideration of this risk has been made within this report.

2.4 Groundwater

Flooding from a groundwater source often occurs during or following a period of prolonged wet weather within areas that are low lying underlain by permeable rocks (aquifers). When aquifers are at their maximum holding potential, flooding at surface level can occur from beneath the ground.

Groundwater as a sole flooding mechanism is often regarded as low risk as it often relies on a coinciding rainfall, or flood event from an additional source to become a flood risk. The main contributory factor that will enhance the risk of groundwater flooding is prolonged periods of high rainfall, which result in the groundwater saturation level rising to the point where it reaches the surface.

The susceptibility of groundwater flooding within the area of the property is summarised within the SFRA, for Sample District Council. The SFRA details that the property is within an area of potential for groundwater flooding (Drawing 05) to occur at surface. Despite this, the number of recorded incidents of groundwater flooding are low. Within the Sample SFRA, *map 1b* shows that the site location is on the border of ground water flood risk, but is not within a “wet zone” due to the topography of the land.

The location of the property is not within a low lying area, and any groundwater that may come to the surface would flow away, and not accumulate to any significant depth.

2.5 Artificial Flood Sources

Flood risk from artificial sources would include the failure of man-made drainage or water supply network. Although the likelihood of such an occurrence is highly unpredictable, it is recommended that any proposed designs for the site take the location of any existing below ground services into account, in order to avoid any inadvertent flooding taking place during the construction phase and in the future.

2.6 Summary

The following table provides a summary of the classification of risk to the property, and any further considerations that are required.

Table 1: Summary of flood risk to site

Flood Risk Source	Overall Risk Classification	Additional Considerations
Fluvial & Coastal	LOW	Justifications within the planning context are made below.
Surface Water	LOW	Justifications within the planning context are made below.
Reservoir Failure	LOW	-
Groundwater	LOW	-
Artificial Sources	LOW	-

3. Flood Risk in Planning Context

Flood risk must be considered at the appropriate level of detail in line with the development proposals, based on the NPPF guidance as well as PPS25 and the Flood Risk SPD. This report has so far analysed all potential flood risk sources that may affect the property. This section will now look to conclude all findings, and provide any further recommendations that may be required.

3.1 Proposed Development Type

The development is a new build on previously developed ground and is required to consider the consequences of flood risk which has been identified by the Environment Agency.

3.2 Flood Risk in Planning Context

The property is of a 'more vulnerable' classification and lies within Flood Zone 2 and 3, based on the current flood mapping. Despite this, the report has demonstrated that this classification of risk can be reduced, based on the level of understanding that has been made both on the accuracy of the current modelling, and actual on site conditions.

The sequential test is used to steer new development to areas with the lowest probability of flooding. Due to the proposed development being in the area of lowest risk within the property boundary, the sequential test is passed. The proposed development is to replace an existing dwelling and will therefore not increase the flood risk to the local area. Despite the properties location being of low surface water risk, this risk classification increases to high within 50m of the property. Because of this, recommendations have been made in section 3.3 to affirm a robust approach to nearby risk.

3.3 Design Recommendations

It is recommended that based on the current design proposals, the following should be incorporated to demonstrate its long term resilience to flood risk. These recommendations are in line with Communities and Local Government guidance – Flood Resilient Construction of New Buildings².

3.3.1 Drainage – Surface Water

As part of the new build's design, it should be ensured that any modification of external surface water drainage systems do not increase surface water flooding elsewhere. This should be done with the minimising of hard surfacing where possible, and the promotion of permeable materials. As shown in the proposed design, much of the property is to remain undeveloped, allowing water to be stored onsite, within the ground.

External ground levels immediately outside of the building should ensure the minimisation of internal storm water ingress. This can be achieved by either lowering external ground levels a sufficient level below internal floor levels, or incorporating an 'ACO' type drainage grating system along all entrances into the building to effectively carry away overland flow.

² <https://www.gov.uk/government/publications/flood-resilient-construction-of-new-buildings>

3.3.2 Flood Resilience

It is recommended that the overall construction methods below ground as well as immediately above ground level should consider the potential for localised surface water accumulation. The type of design assurances would include less permeable building materials such as engineering brick and the most appropriate damp proof membrane.

3.3.3 Flood Plan

It is recommended that the client prepares a flood plan, which ensures that they understand the risks associated with the nearby watercourse, should it contain increased volumes of water following extreme rainfall events, taking the footbridge into account.

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4. Conclusion

The property has been assessed for flood risk from numerous sources. In the context of seeking planning permission, the property is a new build on previously developed land.

A Flood Risk Assessment to be used in a planning application for a development such as this, is required to comply with the defined Environment Agency standing advice³. This report has looked to fulfil this requirement, demonstrating that the intentions to build a property upon the previously developed ground, does not contribute to the overall increase in flood risk to the surrounding area. As well as demonstrating this, recommendations have been made in order to ensure that the property remains at a low flood risk for its lifetime.

This includes the following:

- Any drainage systems are routinely maintained
- Any construction occurring below and at ground level, should include less permeable building materials and the most appropriate damp proof membrane
- A flood plan that should ensure the safety of any articles stored at or below ground level

These recommendations seek to negate any outstanding flood risk in line with Communities and Local Government Guidance⁴. The successful incorporation of these recommendations within the design would aim to negate any resilient risk for the lifetime of the development.

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³ <https://www.gov.uk/guidance/flood-risk-assessment-standing-advice>

⁴ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/7730/flood_performance.pdf

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Drawings

Drawing Number:	Drawing Title:
01	Site Location
02	EA Flood Map for Planning (Rivers and Sea)
03	EA Risk of Flooding from Surface Water
04	EA Risk of Flooding from Reservoirs
05	Groundwater flooding
06	Site cross-section (CSM)

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Appendices

Item Number:	File Description:
Appendix A	EA Product 4 (Detailed Flood Risk) for: Sample Site, Sample Town, AB1 2CD
Appendix B	Design proposals
Appendix C	Site Walkover Photographs
Appendix D	Correspondence

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Appendix A
EA Product 4 (Detailed Flood Risk) for:
Sample Property, Sample Town, Sample
Postcode

SAMPLE

Appendix B Design Proposals

SAMPLE

Appendix C

Site Walkover Photographs

SAMPLE

Appendix D Correspondence

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