**Commercial-in-Confidence**
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Gifford

# THE FORMER BROOKFIELD GARAGE, GLOSSOP

## FLOOD RISK ASSESSMENT

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HPK/2008/0673

Commercial-In-Confidence



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# THE FORMER BROOKFIELD GARAGE, GLOSSOP

## FLOOD RISK ASSESSMENT

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# 1. INTRODUCTION

## 1.1 General

1.1.1 Gifford has been appointed by Lidl UK GmbH (Lidl) to carry out a Flood Risk Assessment (FRA) for a proposed new superstore, which will be constructed on the site formerly occupied by Brookfield Garage, Glossop.

## 1.2 Scope and Objectives

1.2.1 The aim of this FRA is to assist the Local Planning Authority (LPA) in taking account of flooding issues when considering the development proposals in the planning application. The assessment of flood risk has been undertaken following the guidelines presented in Planning Policy Guidance 25, Development and Flood Risk (PPS25).

1.2.2 The specific objectives of this FRA are to establish the following:

- Whether the proposed development is likely to be affected by current or future flooding from any source;
- Whether the proposed development will increase flood risk elsewhere;
- What measures will appropriately and effectively deal with any effects that are identified;
- Whether the site is required to pass an Exception Test or Sequential Test under PPS25, and if so, demonstrate the ability of the site to do so.

1.2.3 This FRA includes an assessment of the flood risk to the site and other potential receptors from the various sources of flooding that may be relevant to the development. This assessment is based upon information provided by the LPA, the Environment Agency (EA), the local utilities providers, Lidl planning consultants (How Planning) as well as topographical, hydrological and geological information reviewed within the assessment process.

1.2.4 The FRA is set within the framework of local and national government policy guidance and considers both the current and potential future flood impacts to the site. Proposals are also included for the suitable mitigation of any flooding impacts that are identified within the assessment and any residual risk following the implementation of these measures is considered.

## 2. LIMITATIONS

2.1.1 It should be noted that some of the aspects considered in this study are subject to change with time. Therefore, should the development be delayed or postponed, consideration should be given to reviewing such issues to confirm that no changes have taken place either at the site or within relevant legislation.

2.1.2 The assessment detailed in this document is based on the end use specified in the text. If this end use is changed then once again consideration should be given to re-visiting the findings of this document to ensure that they remain valid.

2.1.3 This report has been undertaken for Lidl. It shall not be relied upon or transferred to any other party without the prior written authorisation of Gifford.

## 3. GENERAL DESCRIPTION

### 3.1 General

3.1.1 The site is located on an area of land occupied currently by buildings and infrastructure associated with a former car dealership. The site is centred within Grid Reference 401126, 395221 as shown within Figure 14908/FRA/01. The A57 road forms the north-eastern boundary of the site whilst the other boundaries are formed by various other industrial and commercial properties.

3.1.2 The area of the site is 0.45hectares (ha) with the existing main building being approximately 0.15ha in area. The remainder consists of hardstanding surfaces around the building.

### 3.2 Topography

3.2.1 A topographical survey has been undertaken for the site by Malcolm Hughes Land Surveyors on behalf of the Client. This is presented as within Figure 14908/FRA/02. The site is generally flat and slopes slightly from north-west to south-east. The site has a maximum level of 121.24m Above Ordnance Datum (AOD) at the existing building and the lowest level is 120.67m AOD near the south-eastern boundary.

### 3.3 Geology

3.3.1 The British Geological Survey (BGS) 1:50,000 – Glossop Sheet 86 Solid and Drift Edition shows that the site is underlain by Alluvium and River Terrace Deposits, which in turn are underlain by Lower Kinderscout and Shale Grit.

### 3.4 Hydrogeology

3.4.1 The EA Groundwater Vulnerability Map 1:100,000 – Derbyshire and North Staffordshire Sheet 17 shows that the site lies over a minor aquifer. Part of the minor aquifer is overlain by highly permeable soils and the other part is overlain by soil of low permeability. It should be noted that the site is located very close to Glossop Brook and the River Etherow. As such, any surface water discharge into the ground is likely to rapidly migrate either into the river or brook.

3.4.2 According to the EA online maps for this area, the site does not lie within a Groundwater Source Protection Zone. This means that, subject to the ability of the ground to infiltrate water, uncontaminated surface water runoff could potentially be discharged to the ground.

### 3.5 Hydrological setting

3.5.1 There are three watercourses within 150m of the site. These are Glossop Brook, the River Etherow and a minor watercourse which is a tributary of Glossop Brook. Glossop Brook is approximately 50m to the south-west of the edge/centre of the site and flows in a north-westerly direction. 70m north west of the site on Glossop Brook is Melandra Road Bridge. The confluence of Glossop Brook and the River Etherow is located 150m to the north-west. At its closest point the River Etherow flows in a south-easterly direction. Six hundred metres upstream of the site is Wooley Bridge on Etherow. The confluence of the minor watercourse and Glossop Brook is approximately 50m downstream of the site. The above water features are shown on Figure 14908/FRA/03.

### 3.6 Existing Drainage

3.6.1 It is understood that both foul and surface water from the site is currently discharged into public combined sewers along the A57.

3.6.2 The United Utilities (UU) sewer records for the area are shown in Appendix A.

3.6.3 According to UU sewer records a UU sewer is crossing the site.

3.6.4 At this stage the rate of discharge of foul and surface water to those sewers is unknown.

## 4. EXISTING RISK OF FLOODING

### 4.1 General

4.1.1 PPS25 requires that all risks of flooding to and from the site should be identified. On a general level risks from flooding may occur from fluvial (river), tidal, groundwater, sewers or surface water sources. There is no risk of tidal flooding to this site due to its geographical location. Therefore tidal flooding will not be discussed any further in this report.

### 4.2 Fluvial Flooding

4.2.1 The EA has produced an Indicative Flood Map that covers England and Wales which shows areas that could be affected by flooding and classifies the areas by their risk of flooding.

4.2.2 Table D1 of PPS25 defines the three Flood Zones shown on this map as:

- Zone 1, Low Probability: Land considered as having less than 1 in 1000 annual probability of river flooding (<0.1%).
- Zone 2, Medium Probability: Land considered as having between a 1 in 100 and 1 in 1000 probability of river flooding (1% to 0.1%).
- Zone 3, High Probability: Land considered as having a 1 in 100 or greater probability of river flooding (>1%).

4.2.3 The EA indicative Flood Maps for this area show that the site is located in Flood Zone 3 and is at high risk from river sources. This has been confirmed in conversation with David Astbury (Development Control Engineer for the EA on 2nd April 2008). The flood map is reproduced in Appendix B.

4.2.4 The EA have provided a hydraulic (river) model for Glossop Brook. This was undertaken by their consultants in 2005. Level data is given in Appendix C. This model shows that the site will be flooded in a 1 in 100 year Flood event (with climate change) to a depth of water of approximately 1.2m (the 1 in 100 year flood level closest to the site plus climate change is 122.09mAOD). There are higher levels further away from the site because of the backwater effect of the River Etherow. The prepared model takes full account of this backwater effect but the mitigation provided by Melandra Road Bridge reduces the levels on the site in consideration. The use of the selected level has been confirmed by the EA (fax from David Astbury 30th September 2008).

4.2.5 There are higher levels for the River Etherow further upstream but through consultation with the EA, it has been felt that due to the distance the water will not effect the site. Refer to letter in Appendix D.

### 4.3 Historical Flooding

4.3.1 The site has flooded in the past. The two largest floods were recorded in 1946 and more recently in July 2002. The drawing of the flood outline of the 1946 flood (reviewed at the meeting between Gifford and EA on the 2nd April) shows the site flooded. There is photographic evidence of the site flooding in July 2002. In this photograph it would appear the flooding is "ponding" (ponding is water which does not have much flow) in the area.

### 4.4 Groundwater Flooding

4.4.1 The precise groundwater regime is not known by Gifford, but the geology and the recorded water table in the area suggests that flooding from groundwater is unlikely. Further to this, DEFRA (Department of Environment, Food, Rural Affairs) Strategy for Flood and Coastal Erosion Risk Management: Groundwater Flooding Scoping Study (LDS23) Final Report, May 2004, for the UK indicates there is no historical risk of groundwater flooding in this area. Consultation in the Draft EA Catchment Flood Management Plan (CFMP) for the Upper Mersey (May 2008) confirms that there has been no reported incidents of groundwater flooding in this area.

### 4.5 Sewer Flooding

4.5.1 There is no record of sewage flooding in this area, confirmed by UU in their correspondence with Lidl on the 20th February 2008 (Appendix E).

### 4.6 Surface Water Flooding

4.6.1 There is no evidence of surface water flooding from land drainage or highways in the area. This was confirmed to Gifford during a telephone conversation with Kevin Hartley from High Peak Council's Highway Department 30th April 2008.

## 5. THE PROPOSED DEVELOPMENT

### 5.1 Description

5.1.1 The proposed development comprises the demolition of the existing car showroom and the construction of a Lidl superstore with associated infrastructure including loading bays and car park (Figure 14908/FRA/04).

### 5.2 Vulnerability

5.2.1 The Sequential Test and Exception Test, of PPS25 Annex D identify the vulnerability of a site and uses this in conjunction with the likelihood of flooding to assess whether or not the development is appropriate in this area. Vulnerability type is assessed by classifying developments into five categories;

1. Essential infrastructure
2. Highly Vulnerable
3. More Vulnerable
4. Less Vulnerable and
5. Water-Compatible Development

5.2.2 The proposed commercial land use of the site results in a vulnerability classification under these guidelines of Less Vulnerable.

5.2.3 Table D.3[22] Flood Risk Vulnerability and Flood Zone 'Compatibility' specifies sites in terms of these vulnerability classifications with regard to their location within Flood Zones in order to determine how appropriate the development is. The site is outside the 1 in 20 year flood event (the 1 in 20 year flood event is 119.8m AOD and the minimum ground level is 121.10mAOD) but inside the 1 in 100 year flood event. Therefore, the site is not in the functional floodplain. The site lies within Flood Zone 3a and is considered to be Less Vulnerable in terms of land-use. From the table below the proposed development is appropriate to be Flood Zone 3a if it passes the Sequential Test.

**Table D.3[22]: Flood Risk Vulnerability and Flood Zone 'Compatibility'**

| Flood Risk Vulnerability classification (see Table D2) | | Essential Infrastructure | Water compatible | Highly Vulnerable | More Vulnerable | Less Vulnerable |
|---|---|---|---|---|---|---|
| Flood Zone (see Table D.1) | Zone 1 | ✔ | ✔ | ✔ | ✔ | ✔ |
| | Zone 2 | ✔ | ✔ | Exception Test required | ✔ | ✔ |
| | Zone 3a | Exception Test required | ✔ | ✗ | Exception Test required | ✔ |
| | Zone 3b 'Functional Floodplain' | Exception Test required | ✔ | ✗ | ✗ | ✗ |

Key:

✔ Development is appropriate

✗ Development should not be permitted

**Figure 5.2.3: Table D.3[22]: Flood Risk Vulnerability and Flood Zone 'Compatibility',**

### 5.3 Sequential Test

5.3.1 In accordance with the guidelines set out in PPS25, potential sites in Flood Zone 1 must be investigated first for possible development. If development within flood zone 1 is not feasible then sites within Flood Zone 2 should be investigated. If there are no sites available in either Flood Zone 1 or 2, then sites in Flood Zone 3 maybe allowable.

5.3.2 Lidl's planning consultants (How Planning) and the local authority have identified that there are currently five sites in Hadfield, Padfield, Gamesley and Glossop may be suitable for development. These are:

1. Woods Mill Site, Glossop
2. Wrens Nest Mill, Glossop
3. Brookfield Garage, Glossop
4. Ferro Metals Site, Glossop
5. George Street, Glossop

5.3.3 Ferro Metals site and George Street have been ignored because Ferro Metals is not available and George Street is not adequate size for a Lidl superstore.

5.3.4 Consequently, it is acceptable to investigate sites within EA Flood Zone 3.

5.3.5 The likelihood of flooding for those three sites has been assessed using information from the Glossop hydraulic model. This is shown in the following table.

| Site | Flood Probability |
|---|---|
| Woods Mill Site, Glossop | 1 in 10 year event |
| Wrens Nest Mill, Glossop | 1 in 10 year event |
| Brookfield Garage, Glossop | 1 in 100 year event |

**Table 5.3.5: Flood Risk of Proposed Developments**

5.3.6 The Sequential Test considers the other sites that have been investigated and shows that the proposed development at the site is at the lowest risk of flooding and is an acceptable place to develop a Lidl store.

## 6. IMPACT OF THE PROPOSED DEVELOPMENT ON FLOODING

### 6.1 Fluvial Flooding

6.1.1 It has been identified that the site lies within the floodplain of Glossop Brook near its confluence with the River Etherow. But not in functional floodplain.

6.1.2 The existing flood volume uptake of the existing development is approximately 1507m$^3$. This is from calculations based on the difference between the 1 in 100 year water level, 122.09m AOD, and the existing site level of approximately 121.1mAOD.

6.1.3 The proposed development flood volume uptake is 2790m$^3$

6.1.4 There is a total increase uptake of flood volume storage of 1283m$^3$

### 6.2 Groundwater Flooding

6.2.1 The proposed development will have no effect on the groundwater flooding. This assessment is based on information reviewed from the CFMP and DEFRA publications mentioned in Section 4.4.

### 6.3 Sewer Flooding

6.3.1 There is no reported sewer flooding in the area. Therefore there will be no impact by or to the proposed development.

### 6.4 Surface Water Flooding

6.4.1 The proposed development will not change the overall impermeable surface area. On this basis there will be no increase in surface water runoff from the site after the proposed development.

### 6.5 Mitigation Measures

6.5.1 From the foregoing, three issues are identified as requiring mitigation. These are:

i. Potential flood Storage deficit
ii. Potential flood Risk to the new structure
iii. Potential Access and Egress during a flood

6.5.2 The following paragraphs detail the proposed mitigation for each of these:

i. Potential Flood Storage Deficit

Flood volume storage will be provided underneath the superstore. This will be expanded further in detail design. Preliminary design is that water will be able to flow into and out of the space with the minimum of intervention.

Based on this principle it is considered, that the development will have no increase in flood risk due to a reduction in flood storage volume.

ii. Potential flood risk to new structure

According to the Glossop Brook model the 1 in 100 year flood level plus climate change is 122.1m AOD. A further 600mm is required for freeboard to take account of mathematical uncertainty in the model. Therefore, the finished floor levels should be set at 122.7m AOD. This will ensure that the building should not flood up to the 1 in 100 year event plus climate change.

iii. Provision of Access and Egress

Figure 14908/FRA/05 shows the access and egress routes to the proposed site. The access and egress route then crosses the A57. The depth of water crossing the A57 on the sites north east boundary will be approximately 1.2m and the velocity will be slow. The reason for the velocity being slow is that the A57 is not on the direct flow route from the river, and buildings between the road and the watercourse will help slow down the flow. The historical photograph from the EA shows that the water "ponds" in this area. The historical flooding photographs show a person walking through the flood water, although the exact time that the photograph was taken relative to the flooding event is unknown.

Glossop Brook is a very flashy river as confirmed in a meeting with the EA on the 2nd April 2008. The rise and fall of Glossop Brook was approximately 3 hours. The proposed development will be above the 1 in 100 year event flood event plus climate change. Therefore people could have safe refuge in the store for the duration of flood peak.

The site will be evacuated before the site is inundated. There is no EA flood warning system on Glossop Brook. This will be achieved instead by applying a river sensor on Melandra Bridge to the north-west of the site. When the level sensor is triggered the Store Manager will be able to evacuate the proposed development. This will enable the site to have dry access and egress and people will be able to evacuate before a flood event. An emergency flood plan will be placed inside the store which will be referred to when the sensor is activated.

## 7. OUTLINE SURFACE WATER RUN-OFF & DRAINAGE STRATEGY

7.1.1 The surface water is likely to be discharged into the Glossop Brook.

7.1.2 As confirmed in the meeting with the EA (2nd April 2008 Appendix F) that attenuation is not required for the surface water discharge to the watercourse.

7.1.3 Public sewerage records have been obtained from the sewerage undertaker. There is a public foul water sewer running within the A57. There is also a public sewer passing through the site.

7.1.4 According to the proposed layout plan both sewers appear to be remote from the proposed building. However due care will be needed to ensure the public sewer crossing the site is not damaged and that access is afforded to it at all times. It should be possible to alter the location of the public sewer should the development proposal warrant it.

## 8. CONCLUSIONS

8.1.1 The site is in Flood Zone 3a as identified in PPS25. The site has flooded in the past from a fluvial source. There is no record of flooding from sewerage, groundwater or surface water.

8.1.2 The Sequential test shows that out of the three possible developable sites in the area, the Brookfield Garage is the least prone to flooding.

8.1.3 The site will not increase flood risk to third parties due to storage provided under the new store.

8.1.4 The finished floor levels will be set at 122.7mAOD. This is above the 1 in 100 year flood level plus climate change and includes 600mm of freeboard. The proposed new building is unlikely to flood in a 1 in 100 year event plus climate change event.

8.1.5 An alarm system will be installed on the Melandra Road Bridge this would enable the development to be evacuated before external areas of the site are inundated. This will enable the site to have dry access and egress.

8.1.6 The surface water from the site will discharge to Glossop Brook or public sewer.